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Christine L. Dobridge, Paul Landefeld, and Jacob Mortenson

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

Christine L. Dobridge
Board of Governors,
Federal Reserve System

Paul Landefeld
Joint Committee on
Taxation, U.S. Congress

Jacob Mortenson[†]
Joint Committee on
Taxation, U.S. Congress

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Abstract

This paper investigates how corporate tax changes affect workers' earnings. We use a 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 the DPAD tax rate reduction has a substantial effect on the distribution of annual wage earnings within a firm. Earnings of workers at the top of their firm's earnings distribution rise relative to those at the bottom of the distribution. We estimate a semi-elasticity of average earnings of 1.1 with respect to the DPAD marginal tax rate reduction, while the semi-elasticity of median earnings is notably smaller—0.5. Furthermore, we estimate a semi-elasticity of 1.3 at the 95th percentile of workers' earnings and 2.7 at the 99th percentile. This trend of larger semi-elasticities at the top of the earnings distribution is 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. In contrast, we find that capital investment rises for large firms, suggesting that the DPAD also resulted in domestic capital-labor substitution for large corporations. Our paper has significant implications for assessing the progressivity of the U.S. tax code and for analyzing the effect of corporate tax policy changes on the U.S. income distribution. *JEL Codes: D31, H22, H25, J31.*

[†]Corresponding author: Jake.Mortenson@jct.gov;
502 Ford House Office Building, Washington, DC 20515; (202) 225-3261

The views and opinions expressed here are the authors' own. They are not necessarily those of the Board of Governors of the Federal Reserve System, its members, or its staff. This research embodies work undertaken for the staff of the Joint Committee on Taxation, but as members of both parties and both houses of Congress comprise the Joint Committee on Taxation, this work should not be construed to represent the position of any member of the Committee. This work is integral to the Joint Committee on Taxation staff's work and its ability to model and estimate the effects of changes in the tax treatment of U.S. corporations. We thank Andrew Baker, Erin Henry, Jim Hines, Patrick Kennedy, Amit Khandelwal, Rebecca Lester, Sanjay Misra, Eric Ohrn, Nathan Seegert, and Eric Zwick for helpful comments, as well as seminar and conference participants at the Federal Reserve Board of Governors, the 2018 National Tax Association meeting, the 2019 Society for Government Economists Annual Meeting, the 2019 Georgetown Center for Economic Research Conference, the 2019 Utah Tax Invitational, the 2019 NBER Business Tax Meeting, and the 2020 Mannheim Tax Conference. We also thank Thomas Willingham for his work on the parent-subsidiary bridge.

I. Introduction

This paper studies how corporate income tax changes affect average earnings paid within a firm, the earnings distribution within a firm, and within-firm employment and investment. The relative effect of corporate taxes on capital and labor incomes is a fundamental question in economics and remains an on-going subject of vigorous academic and public discussion. For example, the question of whether corporate tax rate cuts would result in higher earnings was at the forefront of debate in the United States about the 2017 tax legislation—the law commonly referred to as the Tax Cuts and Jobs Act (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' earnings 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 recent 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 related to domestic production.[2] To study the effect of this tax change on earnings, we create a matched employer-employee dataset, linking the universe of worker-level W-2 filings with corporate tax returns of public and private corporations. These data allow us to analyze the effects of the DPAD on the distribution of earnings within a firm. In particular, the granularity of this matched dataset allows us to estimate the semi-elasticity of worker earnings at different points along the within-firm earnings distribution, which has implications for the overall incidence of the deduction and the degree of progressivity embedded in the corporate income tax. In addition, the data allow us

[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.

to study employment effects, by summing W-2s linked to a particular corporation, and investment effects, using capital expenditure data reported on tax returns.

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. The identification strategy we use to address endogeneity of the DPAD rate reduction and employment decisions is a continuous-treatment difference-in-difference strategy, coupled with an instrumental variables strategy. This strategy exploits parallel trends in within-firm earnings prior to passage of the DPAD, as well as natural variation in a firm's exposure to the DPAD by industry and firm size and statutory limitations in the DPAD deduction size by firm, building on work by Ohrn (2018, 2021). Our identification strategy also takes advantage of the gradual implementation of the deduction over several years and the considerable variation in the DPAD rate reduction by firm, by year.

We first estimate the effect of the DPAD marginal tax rate reduction on average firm earnings and on earnings at various points in the within-firm earnings distribution. We find the DPAD tax reduction resulted in a substantial increase in mean earnings at the firm level and that earnings gains were particularly concentrated at the top of the earnings distribution within firms. Our results suggest that a one percentage point reduction in marginal tax rates due to the DPAD led to a 1.1 percent increase in average earnings at the firm level. We find a much smaller impact, however, on median earnings within a firm, with an estimated semi-elasticity that is less than half the size of the average effect. Looking more broadly across the within-firm earnings distribution, we find semi-elasticities of earnings that are statistically indistinguishable from 0 at the very bottom of the earnings distribution—the 1st percentile through the 10th percentile. At the 25th percentile, we observe a statistically significant semi-elasticity of 0.4, which rises slightly at the median and the 75th percentiles, to 0.5 and 0.6, respectively. Earnings at the top of the distribution are notably

more responsive: we find a semi-elasticity of 0.9 at the 90th percentile and of 1.3 at the 95th percentile. Earnings are the most responsive at the very top of the distribution; at the 99th percentile, we observe a semi-elasticity of 2.7—more than double that of mean earnings.

As a result of rising earnings at the top of the distribution, we find the tax reduction leads to a widening of the within-firm earnings distribution overall. A one percentage point tax rate reduction due to the DPAD leads to a 1.1 percent increase in the ratio of earnings 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 2.8 percent increase in the 99th-to-1st percentile earnings ratio.

While a wide range of theoretical models predict that workers will bear at least some portion of the corporate tax burden and it is difficult to pinpoint the precise mechanisms driving our effects, our finding that the earnings 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—proxied by higher earning workers in our case—bear more of the corporate tax incidence. While such models predict heterogeneity across workers in response to tax cuts, other models also suggest we should expect heterogeneity across firms. Models of firm monopsony power, for example, suggest that effects of a tax cut change will be smaller for firms that have more market power in setting wages. To further investigate the mechanisms behind our result, therefore, we also study the heterogeneous effects of the tax change across different types of firms. Analyzing the effects by firm size, we find that average and top earner responses are the largest for firms in the bottom

[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.

quintile of employment size (i.e., firms with fewer than about 50 employees). Individuals may have more bargaining power in small firms compared to large firms and these firms may have less monopsony power to set wages as well. Publicly traded firms and multinational firms have markedly smaller earnings responses to the DPAD than in the full sample and are only significant at the right tail of the within-firm earnings distribution (the 99th percentile). This result is also consistent with models of firm monopsony power in setting wages.

We also examine the DPAD's effect on overall firm employment and investment. We find no effect of the DPAD tax reduction on firm employment but find that the number of employees rises at small firms and declines at large firms. Our estimates of investment responses are consistent with capital-labor substitution for large firms, with investment increasing substantially in the highest two quintiles of firm size. But we find no investment effect of the tax cut for small firms.

Finally, we calculate back-of-the-envelope estimates of the overall earnings incidence of the DPAD tax rate cut using three variations of the DPAD semi-elasticity of earnings estimates: 1) the mean estimate, 2) the median estimate, and 3) estimates taking into account heterogeneous effects for workers by various earnings percentiles (i.e., 1st, 5th, etc…) as well as by firm public or private status, firm size, and the status of a worker as a firm owner or a non-owner. We use sample weights to generate aggregate, economy-wide incidence estimates for C corporations under each of these measures.

In line with our results showing considerable heterogeneity in earnings responses to the DPAD, we find substantial differences in incidence calculated by each of the three methods. We estimate the earnings incidence of the DPAD to be almost 200 percent using the mean semi-elasticity estimate, compared to around 90 percent using the median estimate. Our preferred method for calculating incidence takes into account the heterogeneous effects across worker and firm type and

generates an incidence of about 80 percent, with the bulk of the earnings benefits accruing to workers at the top of the earnings distribution. The range of these estimates highlights the importance of considering heterogeneity in earnings responses in calculating tax incidence and points to the need for further work considering heterogeneity in incidence. Additionally, using data on which workers were also firm owners, we calculate that about 5 percent of the earnings benefit associated with the DPAD accrued to firm owners (under our preferred calculation method). This result suggests that some of the benefit appearing to accrue to labor income may instead accrue to capital income.

In studying how corporate tax changes affect the full earnings distribution within a firm, we contribute to the literature on business tax incidence as well as the literature on drivers of changes in the U.S. income distribution over time, 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; Gravelle and Kotlikoff 1989; Harberger 1995; Auerbach 2005; Gravelle and Smetters 2006; Randolph 2006). Empirical work to-date, however, has faced challenges identifying the effect of corporate tax changes on earnings due to the scarcity of exogenous variation in corporate tax rates. The literature has also faced challenges in data availability, as access to linked employer-employee data are limited.

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 earnings 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 (2021) 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.[4] In contrast to these studies, we evaluate the effect of corporate tax changes on earnings across the distribution within a firm and show there is substantial heterogeneity across the distribution. Risch (2020), similar to our work, uses a linked employer-employee dataset based on U.S. tax filings to examine how changes in business taxation affect worker-level earnings and employment. That work focuses on S-corporations, a popular organizational form in which profits are taxed at the individual level via the business owner. Following an increase in the top individual level marginal tax rate in 2012, Risch (2020) finds that a significant portion of that change in individual rates is borne by the employees of affected businesses—about 15 to 18 cents for every dollar of new tax liability. Risch (2020) finds that the earnings moderation associated with the tax increase was primarily concentrated among employees in the bottom three quartiles of the within-firm earnings distribution, leading to a widening of within-firm earnings inequality.

Our paper also contributes to the literature studying drivers of changes in the U.S. income distribution, particularly to recent work studying the role of within-firm earnings changes.[5] Song,

[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); Altshuler and Liu (2013).

[5] The ongoing increase in the concentration of U.S. income at the top of the income distribution has been documented, for example, by Piketty and Saez (2003), Acemoglu and Autor (2011), Saez (2017), and Piketty, Saez and Zucman (2018). Auten and Splinter (2019) challenge the view that the concentration of U.S. income has risen on an after-tax basis.

Price, Guvenen, Bloom, and von Wachter (2018) find 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 also highlights the importance of firm-level factors in worker compensation and examines how firm-level shocks are incorporated into compensation (i.e., Kaplan and Rauh 2013; Piketty, Saez, and Stantcheva 2014; Card, Cardoso, and Kline 2016; Barth, Bryson, Davis, and Freeman 2016; Mueller, Ouimet, and Simintzi 2016, 2017; Card, Cardoso, Heining, and Kline 2018; Kline, Petkova, Williams, and Zidar 2019; Lamadon, Mogstag, and Setzler 2019; Smith, Yagan, Zidar, and Zwick 2019; Saez, Schoefer and Seim 2019; Howell and Brown 2020; Kogan, Papanikolaou, Schmidt, and Song 2020; Kroft, Luo, Mogstad, and Setzler 2021). We contribute to this literature by exploring how corporate tax changes affect the U.S. within-firm earnings distribution, highlighting the importance of taxes as a factor widening the earnings distribution of small firms specifically. Relatedly, Nallareddy, Rouen, and Suárez Serrato (2018) study the effect of state-level corporate tax changes on state-level income inequality, finding that tax cuts increase inequality substantially at the local geographic level.

Finally, our paper complements work studying effects of corporate tax changes on employment and investment more generally. Lester (2018) also 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 capital-labor substitution—we find similar results for the largest firms in our sample.[6] Ohrn (2018) also finds effects of the DPAD on investment and recent papers by Giroud and Rauh (2019) and Ljungqvist and Smolyansky (2016)

[6] Lester (2018) also finds the DPAD had significant financial reporting effects for firms. The DPAD has been found to have notable effects on other aspects corporate behavior as well, including payout (Blouin, Krull, and Schwab 2014), corporate merger activity (Blouin, Fich, Rice, and Tran 2021) and firm debt (Ohrn 2018).

find notable firm responses of employment to state-level corporate tax changes. A large literature studies corporate taxation and capital investment decisions more broadly, dating to Hall and Jorgenson (1967), with recent empirical contributions including House and Shapiro (2008), Edgerton (2010), Yagan (2015), Zwick and Mahon (2017), Dobridge (2021), and Xu and Zwick (forthcoming).

II. The Domestic Production Activities Deduction

This section summarizes the source of tax rate variation used in this paper: the Domestic Production Activities Deduction (DPAD). The DPAD 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 applied to all firm types, including pass-through businesses, and was repealed in 2017 (effective in 2018) as part of public law 115-97, commonly known as the Tax Cuts and Jobs Act (TCJA). When in force, the deduction was intended as a replacement for several export subsidies that were repealed by the AJCA in response to international pressure.

In order to take advantage of the deduction, firms first determined their domestic production gross receipts, which are total receipts derived from sales of goods "manufactured, produced, grown, or extracted by the taxpayer in whole or in significant part within the United States."[7] After determining their level of domestic production gross receipts (DPGR), firms netted out cost of goods sold and other expenses associated with those receipts to arrive at the net 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 in 2005 to 6 percent in 2007 and 9 percent in 2010. This pattern of the phase-in is shown in Figure

[7] Section 199(c)(4)(A)(i)(I) of the Internal Revenue Code.

I.A. Upon full implementation of the policy, the deduction resulted in a reduction in marginal tax rates faced by taxpayers of up to 3.15 percentage points (i.e., 9 percent deduction rate times 35 percent top statutory tax rate).

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 annual wages paid subject to Federal Insurance Contributions Act (FICA) limits in relation to domestic production gross receipts. Second, the deduction amount was limited to 9 percent of taxable income calculated without regard to the DPAD. This latter restriction was binding for many 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 aggregate amount of qualifying income and total DPAD claimed were substantial. Figure I.B 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]

III. Empirical Strategy

We use the DPAD to identify the effect of a change in corporate income tax rates on several firm-level behaviors. Our identification strategy—a continuous-treatment, difference-in-difference estimation with an instrumental variable— takes advantage of the considerable variation

[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.

at the firm level, by year, in the value of the deduction rate and relies on three features particular to the domestic production deduction as well. First, due to the requirements for qualifying domestic activities, firms in certain types of industries with more exposure to domestic production were better able to make use of the deduction than other firms, introducing cross-sectional variation in the value of the deduction. Second, 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. Finally, some firms received a larger benefit than others due to the taxable income limitation of the deduction and the fact that only firms with non-negative taxable income could take advantage of the deduction in a given year.

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. This is the continuous variable in the difference-in-difference framework, as it is a variable that changes from zero prior to AJCA enactment to the firm-specific tax cut in each year post-AJCA, ranging from zero to 3.15 percentage points:

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

The reduction in the marginal rate owing to the domestic production deduction is the amount of the deduction as a share of taxable income before the deduction times the marginal rate faced by the firm.[9] Our baseline difference-in-difference specification is a log-linear equation of the following form:

$$\ln\left(w_{it}^{p}\right) = \beta_0 + \beta_1 DPAD\_CUT_{it} + \gamma\chi_{it} + ETI_{nt} + Bonus_{nt} + f_i + y_t + \phi(n * t) + \epsilon_{it} \tag{2}$$

[9] This construction of the marginal tax rate change assumes that the marginal dollar of income mirrors the firm's aggregate mix of qualifying and non-qualifying income. This results in relatively smaller values for *DPAD_CUT* relative to an alternative assumption that the marginal dollar of income is purely qualifying income.

We begin by estimating versions of equation (2) via unweighted OLS where $\ln(w_{it}^{p})$ are log earnings as measured at various points in the earnings distribution within each firm. For example, ln (w_{it}^{mean}) is the log of mean earnings in the firm, ln (w_{it}^{p50}) is log earnings at the 50th percentile at firm i in year t, and ln (w_{it}^{p99}) is log earnings at the 99th percentile of that same firm. We estimate this specification for mean earnings at a given firm as well at the 1st, 5th, 10th, 25th, 50th, 75th, 90th, 95th, and 99th percentiles of the within-firm earnings distribution. Here, χ_{it} are time-varying firm-level controls—fourth-order polynomials of age, revenue, profit margin and revenue growth, following Yagan (2015)—and f_i and y_t are firm and year fixed effects.[10] We also include controls for the implementation of bonus depreciation ($Bonus_{nt}$) and the repeal of the regime for extraterritorial income (ETI_{nt}) at the industry n-by-year t level, two tax policies in effect during the period. In creating these controls, we follow Zwick and Mahon (2017) and Ohrn (2018), respectively. Finally, we include an industry-by-year time trend $n * t$ to account for any unobserved, differential trends in earnings by industry over time. Including this variable alleviates concern about correlated, unobserved trends at the industry level biasing the regression estimates.[11] We cluster standard errors at the industry-size bin, as we exploit in the instrumental variable analysis (discussed below) is at the industry-size level.

In this equation, β_1 is interpreted as the semi-elasticity of the effect of the DPAD rate reduction on worker earnings—i.e., the percent change in worker earnings resulting from a one percentage point reduction in the marginal corporate tax rate.

[10] Our estimation strategy uses two dimensions of fixed effects: year and firm. The average treatment effect produced by this two-way fixed effects regression is a weighted sum of the average treatment effects by firm and year. One concern, raised by de Chaisemartin and D'Haultfœuille (2020), is that the weights associated with certain groups might be negative, producing wrong-signed coefficient estimates. We use Stata code provided by the authors and find that negative weights are not common among groups in our setting.

[11] For industry assignment, we use industry codes based on the three-digit Statistics on Income (SOI) industries, which are similar to North American Industry Classification Codes (NAICS). There are 90 total industries in our sample. We use twelve size bins, and for the sample as a whole, we have 1,033 unique, populated industry-size bins in total.

To provide a broader picture of the impact of the DPAD rate reduction, we also study other outcome variables Y_{it} that include proxies for the shape of the firm earnings distribution (the ratio of earnings at different points in the firm distribution), firm employment, investment, total earnings, and financial policies. To do so, we estimate similar equations of the form:

$$\ln(Y_{it}) = \beta_0 + \beta_1 DPAD\_CUT + \gamma\chi_{it} + \beta_2 ETI_{nt} + \beta_3 Bonus_{nt} + f_i + y_t + \phi(n * t) + \epsilon_{it} \quad (3)$$

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 earnings.[12] 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 (decrease) earnings, OLS estimates could be biased upward (downward).

To address these sources of endogeneity, we instrument for $DPAD\_CUT_{it}$ using two firm-by-year-level variables: 1) the aggregate share of gross receipts classified as domestic production gross receipts (DPGR) in a firm's industry and size category, by year, excluding the firm's contribution, interacted with the statutory deduction rate in year *t* and 2) a dummy variable for whether a firm is subject to the statutory limitation on the value of the deduction in a given year. In using the DPGR share instrument, we rely on the fact that certain industries and types of firms

[12] 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).

are more likely to be able to benefit from the DPAD than others, i.e., industries that generate more sales from domestic production of goods as opposed to foreign production or to services production. In addition, larger and more diversified firms are likely to have a different profile of qualifying and non-qualifying income as compared to smaller, less diversified firms. 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.[13] 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 using the discontinuity instrument, we rely on a statutory requirement that limits the deduction amount to 9 percent of taxable income prior to taking the deduction.[14]

Our first-stage equation is then:

$$DPAD\_CUT_{it} = \alpha_0 + \alpha_1 DPAD\_PCT_t * DPGR\_SHARE_{ict} + \alpha_2 D_{it} + \rho\chi_{it} + \alpha_3 ETI_{nt} + \alpha_4 Bonus_{nt} + f_i + y_t + \zeta(n * t) + \upsilon_{it} \quad (4)$$

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 c_t, calculated without 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.

[13] 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.

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

More details on the calculation of variables discussed here are found in Appendix B, including references to tax forms and line numbers.

IV. Data

We use two sources of tax data to create the merged employee-employer dataset for our analysis: Form W-2 filings (which contain annual, firm-specific individual wage income) and Form 1120 corporate tax return filings. The W-2 filings are drawn from the population of W-2s received by the IRS in each year. The corporate filings selected for the analysis were sampled as part of IRS's 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 use data from Schedule L, which includes balance sheet information on a GAAP basis, and Form 8903, which taxpayers use to claim the DPAD. We define all other variables used in the paper, including tax form line numbers when appropriate, in Appendix B.

Our earnings data come from Form W-2. The W-2 is an annual report of wage earnings at the individual-employer level filed by the employer and containing individual and employer taxpayer identification numbers. We access the population of these filings for the purposes of generating our match to corporate returns and exclude W-2s with less than $5,000 in 2019 dollars, deflated using the personal consumption expenditure price index. 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 (i.e., Box 1 of Form W-2).

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, many large firms use multiple EINs to file W-2s. The central data-related innovation of this paper is linking other EINs back to the parent company using a W-2 EIN to corporate tax return EIN crosswalk (for more information, see Appendix C). Relative to aggregating W-2s by employer identification number (EIN) as the measure of a firm, linking all EINs belonging to a given parent company and aggregating to the ultimate parent company level creates a more precise and consistent definition of a firm (and the firm's earnings distribution). To finalize our W-2 sample, we limit to W-2s belonging to parent companies filing Form 1120, collapse these 970 million matched worker-firm observations from 1999 to 2015 to the parent level, and are left with around 18.2 million firm-year observations.

To generate our corporate sample, we combine SOI samples for tax years 1999-2015 to create an unbalanced panel. We include only C corporations, which excludes pass-through and other entities. This creates an unbalanced panel of around 1 million firm-year observations. We further exclude payroll agencies and firms who identify as being in the financial, insurance, or utility industries and firms that report zero total compensation on the Form 1120. This results in an unbalanced panel of around 733,000 firm-year observations. Next, we implement a sample restriction that firms must have at least 20 workers (as counted by the number of W-2s), reducing our sample to roughly 536,000 observations. Further requiring that firms report information for all our control variables and that they be in the sample for at least two years leaves us with a sample of roughly 348,000 firm-year observations.

Summary statistics for this sample of around 348,000 firm-years are found in Table I. Each line presents the mean, median, 25th, and 75th percentile of the firm-level statistics indicated.[15] The overall average of firm-level mean earnings is $49,800 and the overall average of worker-level median earnings is $37,100. The average firm in our sample pays workers at the 75th percentile about 2.8 times the amount of a worker at the 25th percentile. The same statistic measured from the 90th to the 10th percentile is 8.3. The statistics presented make it clear that the distribution of firm size as measured by number of workers, total earnings, and revenue are all highly skewed in the sample. These summary statistics motivate our work investigating distributional effects, beyond mean or median effects.

Table II presents summary statistics on the tax policy variables we use in our analysis, for the years in which the DPAD was in effect in our sample period (2005 to 2015). Because the DPAD was phased in from 2005 to 2009, we present samples for the phase-in period and the full policy period (post-2009) 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 around 25 percent during the phase-in period and 29 percent in the full policy period. Since a firm could only claim the DPAD deduction if it had positive taxable income, this utilization represents a sizable fraction of DPAD-eligible firm-year observations. The utilization rates in our sample are somewhat higher than the usage reported by Lester and Rector (2016), primarily due to our sample restrictions. In particular, the exclusion of certain industries—particularly finance and utilities—largely eliminates firms who would have little benefit from the DPAD. The mean rate reduction due to the DPAD is 1.12 percentage points during the phase-in and 2.40 percentage points during the full-policy period among firms with

[15] All percentile estimates, including medians, in Table I are calculated as the average of the ten observations around the percentile cutoff to preserve confidentiality of reported tax data.

positive QPAI. 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 II present summary statistics for the instruments and policy variables, including the DPGR share and QPAI share calculated for each firm using industry-size cells as detailed in Section III. For the average positive QPAI firm, 34 and 37 percent of total gross receipts in their industry-size cell (excluding the firm) were DPGR during the phase-in and full policy periods, respectively. The QPAI share of taxable income is around 70 percent on average for positive QPAI firms during the phase-in period. 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 both periods, 41 percent of firms are limited in their DPAD usage due to their taxable income, nearly the same share as reported by Lester and Rector (2016).

V. Results

V.A. Graphical Results

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. To test this assumption, we estimate our first stage regression, 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:

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

The point estimates $\beta_{1,t}$ provide a sense of how the rate reduction engendered by the DPAD affected firms in each year of the sample. In addition to 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 II for mean earnings, median earnings, the 5th percentile and the 95th percentile. In general, the figure suggests that the parallel trends assumption is satisfied. To preview our main results, it appears there is a positive and significant effect of the policy on average earnings. The response of firm median earnings is substantially smaller and took effect somewhat later. Similarly, earnings for the 5th percentile workers in firms show no discernible pattern while those of the 95th percentile increase significantly. In addition, for mean and 95th percentile earnings, the coefficient estimates in the full policy period (2010 and after) are 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.

V.B. Mean and Median Earnings Level Estimates

We next present estimates of the effect of DPAD on mean and median firm earnings. We present first-stage estimates of the DPAD rate cut in Panel A of Table III and OLS and IV estimates of specifications following equation (2) in Panel B of Table III. Panel A confirms a strong first-stage estimate of the *DPAD Cut* variable, with strongly statistically significant coefficients on both instrumental variables. In the second stage, columns (1) and (2) on Panel B are the coefficients on the natural log of firm average earnings. The OLS estimate is 0.011, indicating that a one percentage point reduction in the marginal tax rate owing to the DPAD results in a 1.1 percent

increase in mean earnings.[16] The IV estimate is approximately the same, implying a semi-elasticity of 1.1. 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, but we do not observe particular bias in the OLS regressions. In contrast to the mean earnings effect, we see median earnings exhibits a much weaker reaction, with the coefficient estimate in the IV specification implying a statistically significant semi-elasticity of 0.5 (Table III, Panel B, columns (3) and (4)).

The distributional summary statistics presented in Table I suggest the distribution of earnings and other firm-level variables are highly skewed. The same is true of within-firm earnings. The regression results presented in Table III—a large mean response and a smaller median response—suggest aggregate measures of earnings (e.g., total or mean) may mask substantial heterogeneity by earnings, both between and within firms. In the next two sub-sections, we investigate heterogeneous responses along these lines.

V.C. Within-Firm Earnings Distribution Estimates

We next estimate equation (3) via IV separately for various points in the within-firm earnings distribution, finding that the largest earnings effects indeed accrue at the top of the distribution. This approach is similar in spirit to that of Fuest, Peichl, and Siegloch (2018), who perform separate regressions for different types of workers to tease out worker heterogeneity in wage responsiveness to local business taxes. The coefficients of each regression are plotted in Figure III and are presented in Table IV. The point estimate at the 1st percentile estimate implies a semi-elasticity of –0.1 for the very bottom of the firm earnings distribution, which is not statistically significant at the 10 percent level. Moving up the within-firm earnings distribution, the point estimates are monotonically increasing and begin to be statistically discernible from zero at the

[16] We present full regression results including all control variables in Appendix Table A1.

25th percent level, with a semi-elasticity of 0.4. The semi-elasticity estimates increase slightly for the median worker and the worker at the 75th percentile (0.5 and 0.6, respectively) and begin to increase more substantially in the upper portion of the within-firm earning distribution. We estimate a semi-elasticity of 0.9 for workers at the 90th percentile of the distribution, of 1.3 for workers at the 95th percentile, and 2.7 for workers at the 99th percentile.

Given the differential response of firm mean and median earnings, we further examine the DPAD's effect on the firm earnings distribution at various points. Table V contains IV estimates from a regression of equation 3, where the log ratios of various points of the within-firm earnings distributions are regressed on the DPAD. In particular, our dependent variables are the log ratio of the worker at the 75th percentile to the 25th percentile (the firm inter-quartile range), the 90th percentile to the 10th percentile, the 95th percentile to the 5th percentile, and the 99th percentile to the 1st percentile. We estimate statistically significant positive effects of the DPAD for all ratios above the firm inter-quartile range, suggesting that benefits of the rate reduction accrue more frequently to workers at the higher end of a firm's earnings distribution. A one percentage point tax rate reduction due to the DPAD leads to a 1.1 percent increase in the ratio of earnings paid to the 95th percentile compared to the 5th percentile, for example. At the far end of the distribution, a one percentage point rate reduction due to the DPAD leads to a 2.8 percent increase in the ratio of earnings at the 99th percentile to the 1st percentile.

This significant heterogeneity in earnings 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—which may proxy for the highest skill or highest productivity workers—having more bargaining power within a firm. However, they potentially contrast to the wage effects by

worker type found in Fuest, Peichl, and Siegloch, 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 partly due to differences in worker mobility—general equilibrium tax incidence theories generally suggests that more mobile workers will see smaller wage effects of tax rate changes. While they study municipal-level corporate tax changes, in our federal corporate tax cut setting, mobility is likely to be less important, especially within a given industry.[17] In addition, the majority of tax changes in their analysis are tax increases, suggesting a possible asymmetry in the response to tax changes. Risch (2020) also finds that the bottom of the worker distribution bears a sizeable fraction of an increase in the corporate tax rate for S-corporations, further supporting the possibility of asymmetric effects.

An analysis of firm earnings responses to the DPAD rate cut is complicated somewhat in our setting due to some specifics of the DPAD. Namely, the deduction amount is limited to 50 percent of the W-2 wages attributable to domestic production gross receipts. For firms in which this is binding, there is an incentive to increase W-2 wages to take full advantage of the deduction. This incentive is particularly strong in the case of wages paid to the owner of a firm where there may be shifting from other forms of compensation to wages to maximize the DPAD.

Finally, to this point we have discussed earnings when considering the impact of the DPAD on workers, but there are two ways firms can change their earnings 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 earnings workers while holding all current worker earnings constant, the earnings recorded at the 99th percentile will decrease despite no change in earnings paid to existing

[17] The data used by Fuest, Peichl, and Siegloch are also top-coded, which is a key reason that their analysis focuses on median wage effects. The top-coding could also cause some difference between our results.

workers. Another margin along which firms might respond is in terms of capital investment. If firms then decide to substitute capital for low-skilled labor in response to the deduction, the earnings recorded at the 99th percentile will increase. If this is the case, capital deepening could lead to earnings increases for workers at the firm and a widening of the earnings distribution, but capital-labor substitution could also lead to declines in employment. We investigate these extensive margin effects further in Section V.E.

V.D. Potential Mechanisms for Within-Firm Earnings Changes

After documenting substantial within-firm heterogeneity in the effects of the DPAD across the earnings distribution, we investigate differential responses across firms to gain greater insight into the potential mechanisms driving earnings effects. There are numerous models of corporate tax incidence that generate different predictions for earnings effects (Fuest, Peichl, Siegloch 2018). Our estimates capture the overall effect of the DPAD tax change, which may be working through several channels, and find our results are generally most consistent with models of individual-level worker bargaining and models of firm monopsony power in setting wages.[18]

As discussed above, our findings that the largest earnings gains from the DPAD accrue to the highest-paid workers is consistent with models in which workers with more bargaining power—proxied in our case by high earning workers—gain more earnings increases from a corporate tax cut. Assuming marginal firm search costs are declining in the number of employees, workers at small firms are likely to have more bargaining power than workers at large firms. To see whether workers at small firms benefited differentially than those of large firms, we perform separate regressions by quintiles of the employment-size distribution at various points of the earnings distribution as well as ratios of percentiles of the distribution: the 75th/25th percentiles, the 95th/5th

[18] Fuest, Peichl, and Siegloch (2018) provide a theoretical framework for how a variety of wage setting models for the effect of corporate tax changes on worker wages.

percentiles, and the 99th/1st percentiles. In Figure IV.A, we present results visually for the semi-elasticity of earnings at different points of the within-firm earnings distribution—the 1st percentile to the 99th—for firms in the bottom quintile of employment (below about 50 employees) and top quintile of employment (around 800 employees), and we present the semi-elasticity coefficient estimates for all quintiles over the earnings distribution in Table IV. Coefficient estimates of effects on ratios of percentiles for the firms in the bottom quintile of employment are presented in Table VI, column (1), with coefficient estimates for firms in the top quintile presented in Table VI, column (2).[19]

Generally, these results suggest that the DPAD had larger effects on the widening of the earnings distribution for the smallest firms by employment size than for the largest firms. Small firms exhibit positive and significant semi-elasticity estimates, and the estimates are strongest at the upper end of the earnings distribution. The semi-elasticities for small firms are statistically discernible from zero at the 25th, 50th, 75th, 90th, 95th, and 99th percentiles, with magnitudes that increase substantially at the very top of the distribution. The semi-elasticities in the upper portion of the distribution are also notably larger for small firms than for larger firms. The point estimate for the median percentile of small firms is a semi-elasticity of 1.8, for example, which rises to 4.4 and 5.7 percent, respectively, for the 95th and 99th percentiles. In contrast, for the largest firms, semi-elasticity estimates are considerably smaller overall. The point estimate for the semi-elasticity of the earnings for the median worker is 0.03, for example, and not statistically different from zero. Estimates increase the most at the very top of the earnings distribution for the largest firms, with a 2.2 semi-elasticity of earnings estimate for workers in the 99th percentile (though still less than half the magnitude of the 5.7 estimate at the 99th percentile for the smallest firms).

[19] Quintile breakpoints are calculated each year and vary over time. We present regression coefficients for ratios of percentiles of all firm size quintiles in Appendix Table A2.

Interestingly, for the largest firms, we observe statistically significant earnings increases at the very bottom of the earnings distribution—the 1st, 5th, and 10th percentiles—in addition to the top of the distribution, and the magnitude of the effect is similar to that for workers in higher earnings percentiles of these large firms. For workers in the 5th and 10th percentiles of the largest firms, for example, the semi-elasticity point estimates are 0.9, similar to the point estimates of 0.7 and 0.9 for the 90th and 95th percentile. The largest firms are the only firms for which we observe earnings increases due to the DPAD at the very bottom of the distribution. For firms in the middle of the employment distribution (the 2nd through 4th quintiles), we observe a statistically significant increase in earnings only at the 99th percentile for the third and fourth employment quintiles, and also at the 75th percentile for the third employment quintile.[20]

Finding larger effects for small firms is consistent with employees having more bargaining power at those firms but is also consistent with small firms having less monopsony power than large firms to set earnings. We further investigate the bargaining power and monopsony theories by studying effects of the DPAD on earnings for publicly traded firms and multinational firms in our sample. Large, public firms and multinational firms operating in global markets may also be expected to have greater local wage-setting power and workers in these firms may have less bargaining power as well. Semi-elasticities specific to publicly held firms for select earnings percentiles are presented in Table VI, column (3) and shown in Figure IV.B. Multinational firm results are in Table VI, column (4). Semi-elasticities for the full earnings distribution for public and multinational firms are given in Appendix Table A3.

[20] 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.

For publicly held firms, we find little effect of the DPAD on workers' earnings. The largest point estimate is for the 99th percentile of the within-firm earnings distribution and implies a semi-elasticity of about 2.2. This result lends some support for Ohrn's (2021) finding that top executives of publicly traded firms capture a substantial fraction of the DPAD and bonus depreciation tax reductions, but that there are no effects elsewhere in the earnings distribution for public firms. Widening of the within-firm earnings distribution, therefore, only occurs when comparing the very top of the distribution to the very bottom; the ratio of the 99th percentile earnings to the 1st percentile earnings rises by 2.2 percent as a result of the DPAD (Table VI).

Our results for multinational firms look similar to the publicly traded firm results, with all of the point estimates indistinguishable from zero until the 99th percentile, at which the semi-elasticity estimate is 1.9. Small or negligible earnings effects for multinational firms are also consistent with other models implying that multinational firms may have increased bargaining power relative to workers, leading to smaller wage effects (Arulampalam, Devereux and Maffini 2012). These models suggest that wage effects will be smaller if workers are more mobile across borders, as for multinationals with the potential to hire globally.[21] For multinational firms, the within-firm earnings distribution widens both for the 95th-to-5th earnings percentile ratio and the 99th-to-1st ratio, by 0.7 percent and 2.0 percent, respectively.

[21] While we argue that results presented in this section are consistent with models of wage bargaining, models of monopsonistic labor markets, and models highlighting international capital mobility, we are not ruling out that there may be other channels thorough the DPAD is affecting wages. Another channel potentially at play, for example, is firm responses to competitive pressures. From a theoretical perspective, competition may either increase or depress investment depending on how competition affects monopoly profits or whether goods that firms compete over are strategic complements or substitutes (e.g., Salop 1977 and Fudenberg and Tirole 1984). Competition may thus affect wages through the complementarity or substitutability of capital and labor. In a corporate tax context, Patel and Seegert (2020) indeed show that competition was an important channel affecting investment following enactment of bonus depreciation. A competition channel is likely more important for our large firm results than for our small firm results, as small firms are less likely to wield market power.

Next, we investigate how financial constraints may affect firm responses to the DPAD rate cut as well. If firms are financially constrained from pursuing profitable investment opportunities and earnings are a complement to this investment, a tax cut that relaxes financial constraints by raising after-tax income may cause an increase in employment and earnings for those firms. We proxy for financial constraints using firm payouts to shareholders, as firms making payouts to shareholders are less likely to be financially constrained (Dharmapala, Foley, and Forbes 2011). Results for firm-years in which firms do not payout to shareholders and do pay out, respectively, are found in columns (5) and (6) of Table VI (with results for the full earnings distribution presented in Appendix Table A3) and in general, are not particularly supportive of the financial constraints hypothesis. In general, the earnings response among payout firms—those less likely to be financially constrained—appear to be stronger than those of the non-payout firms. These results suggest that financial constraints are not a major consideration for firm wage-setting. Alternatively, it may also be that the payout measure is not a particularly good measure of financial constraints in this setting. There is a considerable debate in the literature about how to measure financial constraints (Farre-Mensa and Ljungqvist, 2016). Two of our previous results—the limited earnings response for large firms and for publicly traded firms—are more consistent with the financial constraints hypothesis that less constrained firms are less likely to increase wages when the tax cut eased constraints. Large firm size and access to public capital markets may be reasonable proxies for being less financially constrained. (Hadlock and Pierce (2010) demonstrate that size is a key predictor of firm financial constraints, for example.)

Next, we explore the degree to which earnings increases due to the DPAD at the top of the within-firm earnings distribution might be flowing to firm owners. As noted, there are a number of theories consistent with the heterogeneous earnings response according to firm size, but another

explanation may be that a large part of the observed earnings response among the top earners within small firms is actually a return to capital rather than a return to labor. At small firms, the owners of the business are likely to also be some of the highest earnings employees. Owner-employees may have the incentive to raise their wages out of the DPAD benefit instead of receiving a dividend, for example, as owner-employees may have to split dividends with non-employee owners or among multiple owners. (In our sample, we have about 60,000 owner observations, who owned 20 percent or more of one or more C corporations in at least one year from 2011 to 2015. Of these 60,000 owner observations, about 43,000 observations are also employees receiving a W-2 from at least one of the companies they own in a given year.)[22] If owners are receiving higher wages due to the DPAD, it may be a misinterpretation to attribute the increase in owner wages as a return to labor rather than a return to capital.

To investigate whether earnings increases are flowing to firm owners, we examine a sample of firms (half of whom are in our main sample) who reveal their owners in Schedule G of their corporate tax return.[23] These data are available starting in 2011. We match these firm owners to W-2s issued by the company and determine where in the firm earnings distribution these owners lie for firms with employee counts in the first quintile of our main sample (about 50 employees or less). The location of owners in the within-firm earnings distribution is shown in Figure V.[24] This figure demonstrates that owners comprise more than 50 percent of the workers above the 99th percentile at these firms and around 25 percent of the workers between the 95th and 99th percentiles

[22] Owners of firms limited by the W-2 wage requirement may also have the incentive to boost after-tax take-home pay by increasing their wage and claiming a higher DPAD deduction instead of paying out after-tax profits to themselves as dividends. However, since the W-2 deduction applied to wages subject to the FICA limit—ranging from $90,000 in 2005 to $118,500 in 2015—to the extent that owners' wages were already above the FICA limit, they would not have had such an incentive.

[23] Specifically, these are all firms in the edited SOI corporate cross-sections for 2011-2015 that filed schedule G.

[24] Around half of the firm-year observations in the owner data are also in our primary sample of companies. The firms with details on owners are generally much smaller than our main sample. The median number of employees is around 25 in the former and around 150 in the latter.

(i.e., more than 75 percent of workers in this sample of firms are in the top 5 percent of their within-firm distributions). This result provides suggestive evidence that earnings gains among these small firms are accruing to firm owners and that some of the corporate tax cut benefits are accruing to capital and not labor.

We next investigate whether the increased earnings are likely in salary or hourly wage earnings increases or in bonus payments. Using data on firm quarterly compensation ("wages, tips, and other compensation") by calendar quarter from Form 941, we present a graph of the estimated DPAD rate cut semi-elasticity on average quarterly compensation (the quarter's wages divided by annual employment for the firm) by calendar quarter in Appendix Figure A1. We see the largest effect on wages in the fourth quarter of the year, with a semi-elasticity of about 2½, providing some suggestive evidence that at least part of the wage increases were coming as bonus payments, which are more likely to be paid out in the fourth quarter. The evidence is not strong, however; there are statistically significant increases in the first and second quarters as well, though the magnitude is somewhat smaller. And regardless of how the wages are paid—bonuses, salaries or hourly wages—results from the graphical year-by-year trends presented in Figure II show that the wage increases appear persistent over time in our sample.

V.E. Employment, Net Investment, and Total Earnings Effects

Next, to gauge extensive margin effects of the policy on workers, we investigate responses of firm-level total domestic employment to the DPAD.[25] As discussed earlier, the extensive margin

[25] We investigate the effect of the DPAD on firm financial policies more broadly as well, including payout policy and debt financing, with results presented Table A4. As shown in Ohrn (2018), the DPAD rate cut would be predicted to increase the reliance on equity financing and reduce reliance on debt financing. Similar to Ohrn's results, we find that the DPAD reduces firm debt holdings, with a one percentage point rate cut leading to a 4.8 percent reduction in total firm debt—a similar magnitude found by Ohrn. We find no statistically significant effect on dividends or share repurchases, however, in contrast to Ohrn, who finds the DPAD leads to some small increase in payout following DPAD implementation, and in contrast to Blouin, Krull, and Schwab (2014), who find that firms that particularly benefitted from the DPAD decreased total shareholder payout.

effect of the DPAD policy on employment has the potential to play an important role in changes in the within-firm earnings distribution. The complementarity of labor and capital also has the potential to play a key role. To examine the extensive margin effect on firm employment and to examine investment effects therefore, we estimate the effect of the DPAD on the log number of workers and on net investment as a share of installed capital. To calculate the number of workers for a firm, we sum the number of W-2s that we count for each firm in a given year.

We report results for employment in column (1) of Table VII, Panel A, and we find an aggregate firm employment effect that is indistinguishable from zero. Column (2) presents the results for net investment as a share of installed capital and finds a point estimate of 0.008, implying that a one percentage point reduction in the tax rate leads to 0.8 percentage point increase in net investment as a share of installed capital.[26] Because the calculation of net investment requires an extra year of data and therefore the sample of firms is smaller, column (3) reproduces the estimates from column (1) with the smaller, common sample as well. We see that the employment effect remains statistically insignificant if a somewhat larger magnitude in the common sample.

These estimates report average policy effects, but our prior analysis on the heterogeneity of earnings effects across firms suggests that the aggregate point estimates likely mask substantial differences in response across firms. We therefore examine heterogeneity in domestic employment and investment effects across the firm size distribution, for public firms, for multinational firms, and for firms sorted by a measure of financial constraints. We first divide firms by size based on their quintile of the total employment distribution in a given year. Indeed, we find that the responses of employment and investment differ substantially across quintiles of the employment distribution. The heterogeneity in terms of overall employment is quite pronounced (Figure VI.A

[26] 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.

and Table VII, Panel B), with the smallest firms showing increases in employment (1.4 percent and 0.9 percent for firms in the 1st and 2nd quintiles by employment size, respectively) and the largest firms showing large declines (-0.7 and -2.8 percent for firms in the 4th and 5th quintiles by employment size, respectively).[27] This heterogeneity is offsetting across the equally weighted average of firms, causing the aggregate "null" result.

Figure VI.B 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, with an increase in net investment as a share of capital of about 0.8 and 1.4 for every 1 percentage point decline in the tax rate due to the DPAD, for firms in the 4th and 5th quintiles by employment size, respectively.[28] Of note, the combination of results in Figures VI.A and VI.B 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 while investment increased. Lester suggests that this is consistent with capital-labor substitution among these firms.

Similarly to the largest firms in our sample, we also observe some decline in terms of total employment for publicly traded firms and for firms that payout to shareholders (our proxy for firms less likely to be financially constrained)—declines of 1.6 percent and 1.2 percent, respectively (Table VII). In contrast, we do not observe a statistically significant responses in terms of total employment among multinationals or firms that do not payout to shareholders. But we find that all of these subsets of companies have statistically significant and sizeable investment responses (1.6 percent, 1.1 percent, 0.7 percent, 1.0 percent for publicly traded, multinational, no

[27] Of note, since we only observe employment of U.S. workers, we cannot draw conclusions about the effect of the DPAD on multinational firms' employment of offshore workers.

[28] We present regression results for Figures VI.A and VI.B in Appendix Table A5. 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.

payout and payout firms, respectively). Of note, the results for payout and non-payout firms taken together do not provide consistent evidence of financial constraints driving firm investment or employment responses to the tax cut; if looser financial constraints due to the DPAD were the primary mechanism driving our results, we would expect to see an investment increase in the "no payout" firms only.

As we find potentially important extensive margin effects on employment, next we investigate whether the within-firm earnings distribution effects we have documented are driven by changes in the composition of workers through workers joining or leaving the firm. For example, one potential pattern which could affect the within-firm earnings distribution is if the widening of the distribution overall is due to firms hiring new, low-wage employees. We use the panel nature of the W-2 and 1120 data to isolate employees that joined or left the firm in year *t.* For employees that join the firm, we first observe earnings for them with the firm in year *t* and retrieve their earnings with the firm in *t+1*, the first full year of compensation. Similarly, we can observe the earnings of employees who were already at the firm in year *t* (stayers), and limit to those at the firm the year before and year after the earnings measurement to ensure it is a full year of compensation. This allows us to calculate where a new employee in year *t,* with earnings observed in year *t+1*, fits in the distribution of existing employees at a firm. We estimate a variant of specification 3 where the dependent variable is the share of new employees hired into various points of the within-firm earnings distribution.[29] The coefficient of interest in these regressions is interpreted as the percent change in the fraction of employees that were hired by a corporation at a given point in the earnings distribution that results from a 1 percentage point tax rate reduction

[29] To ensure we observe a full year of earnings, 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*, and *t+1*. We compare earnings of new employees in *t+1* to the distribution of "stayers" in year *t.*

due to the DPAD. Similarly, we analyze employees that left the firm in year *t*, studying the share of exiting employees at various points of the pre-worker-exit firm distribution.

Taken together, we do not find evidence that employees entering or exiting the firm are driving our main result that the earnings distribution widened due to the DPAD. First, we do not see a systematic pattern for where new employees are hired into the earnings distribution (Figure VII.A). We see evidence that new employees are more likely to be hired into the 50th-to-75th percentile earnings bin. The coefficient for this quartile is approximately 0.35, indicating that an employee who enters the firm has about a 35 percent higher change of entering in the 50th to 75th quartile of the firm earnings distribution as a result of a one percentage point reduction in the firm's marginal tax rate due to the DPAD. We also see some evidence that the DPAD rate cut results in new employees being less likely to be hired into the upper end of the earnings distribution (above the 90th percentile).

When analyzing employees that left the firm in year *t*, there is a more noticeable trend in the direction of the effects, with point estimates suggesting that low-wage employees—below the 25th percentile of earnings—were somewhat more likely to leave a firm due to the DPAD rate cut and higher wage employees were either somewhat less likely to leave the firm (or the likelihood of leaving was nearly unchanged). The only coefficient that is statistically different from zero, however, is for the decline in the exit likelihood in the 25th-to-50th percentile bin. These changes in the middle of the distribution for employees entering and exiting a firm, in particular, are unlikely to be driving the large change in earnings that we observe at the tails of the distribution.

Finally, we investigate the effect of the DPAD on total wages paid by firms—total wages reflect a combination of the employment effects and the within-firm earnings distributional effects. We first present the average estimated effect, and then examine heterogeneity in the response across

firms. We find an average estimated semi-elasticity for the SOI sample of firms of 0.9 for total wages (Table VII, Panel A, column (4)). For the common sample of firms with net investment data we estimate a total wage semi-elasticity is 1.2 (column 5). As with all our point estimates, this total wage effect is estimated from regressions that are equally weighted across all firms in the sample. We find considerable differences in earnings, however, across firms in different employment quintiles (similarly to the within-firm earnings distribution effects and for employment effects). We present total wage results across size quintiles in Figure VIII, with full regression results included in Appendix Table A5.

We find the total wage effects are driven by firms in the smallest earnings quintiles and we see a monotonic decline in the total wage semi-elasticity as firm size increases. For the first quintile of size, we find a very large semi-elasticity—around 3.9—and in the second quintile, we find a semi-elasticity of around 1.7. For the third and fourth size quintiles, we find semi-elasticities which are indistinguishable from 0. Finally, for the largest firms—the firms we estimated reduced employment—we see a negative semi-elasticity of about -1.8 on total earnings.[30] The sizeable total earnings reductions at the largest firms are consistent with the employment declines for those firms. In addition, earnings effects observed for the smallest firms are again consistent with hiring in those firms and with owner-employees at the top of the distribution giving themselves earnings increases, as discussed earlier.

V.F. Robustness

[30] While our primary measure of firm wages is calculated by aggregating W-2 data of firms, we also estimate the effect of the DPAD on firm total compensation as reported on Form 1120 and report the results in Appendix Table A6. These measures of compensation differ in several ways, including that total compensation includes pension and other benefits such as employer-paid health insurance and also includes wages paid to contract workers. For total compensation, we find a larger semi-elasticity of 1.6 using compensation reported on the Form 1120. We find larger effects for officer compensation (semi-elasticity of 4.4) compared to non-officer compensation (semi-elasticity of 1.3), consistent with our results of larger wage effects for employees at the higher end of the wage distribution and larger potential wage effects for firm owners.

In this section, we present robustness to our instrumental variable choice. One concern about our instrumental variable might be that, because of the policy, the industry composition of the sample changes over time endogenously, affecting the value of the instrument. For example, if the policy caused firms with a greater ability to use the deduction to grow relative to the rest of their industry, that would increase the value of the instrument and potentially bias our results. To address this, we alternatively perform the analysis where we use only the gross receipts share in the first year of the policy—2005—as an instrument in constructing our instrument. This still includes across-time variation due to the phase-in of the deduction but eliminates any endogenous changes in DPGR shares by industry as a result of changing market composition due to the policy. We also re-estimate our baseline specifications using the share of income that is designated as QPAI as an instrument, rather than the share of gross receipts. This is more closely related to the proxy variable used in Ohrn (2018, 2021) and Blouin, Fich, Rice, and Tran (2021).

Results of these robustness tests are found in Table VIII, which re-produces the IV estimates from Table III alongside with these two alternative instruments. Appendix Figure A2 similarly re-creates Figure III and plots the earnings elasticities across the full within-firm earnings distribution. The results are little changed on the whole. The pattern of semi-elasticity estimates is similar for the alternative instruments and the estimates are not statistically different compared the baseline specification, though there appears to be some attenuation in the upper half of the employment distribution for both instruments. In the case of the point-in-time instrument, this figure displays less responsiveness across the earnings distribution. For the QPAI-based instruments, the semi-elasticity point estimates are a bit larger than in the baseline specification at the very bottom of the distribution and are lower at the top. For example, the estimated semi-

elasticity of the 99th percentile earnings falls from 2.7 in the baseline to 2.5 with the point-in-time instrument and 2.0 with the QPAI-based instrument.

VI. Discussion of Labor Incidence

In this section we provide back-of-the-envelope estimates of the labor earnings incidence of the DPAD—i.e., the fraction of total DPAD tax savings that accrue to workers. We calculate three separate incidence measures using estimates of the DPAD semi-elasticity on labor income for 1) mean earnings, 2) median earnings, and 3) earnings at various points in the distribution, allowing for heterogeneity by firm employment size quintile, public or private firm status, and status of a worker as a firm owner or not. Consistent with the heterogeneous effects by earnings and firm size shown in the previous section, estimates of incidence are highly sensitive to the measure of earnings used.

The earnings income benefit accruing to each worker is the observed wage earnings minus a counterfactual wage earnings measure constructed as if the DPAD effect were removed. We construct the counterfactual earnings measure using the estimated semi-elasticities and the firm-level measures of the DPAD rate cut. The earnings benefit is then calculated as follows:

$$Earnings\ Benefit_{ift} = \left(Earnings_{ift} - Earnings_{ift}/\mathrm{e}^{\beta_1 * DPAD\_CUT_{ft}}\right)$$

To calculate total earnings benefits for workers in the sample, each worker's earnings benefit is summed across individuals i in each year. To arrive at a back-of-the-envelope incidence measure, we divide these by a rough calculation of the tax savings attributable to the DPAD, which is the magnitude of the DPAD for a given firm times the top statutory corporate income tax rate during this time period (35 percent), summed across all firms in the sample. Finally, we utilize the sample

weights provided SOI, recalculated to account for our various sample restrictions, to generate measures of economy-wide tax incidence for C corporations.

While our back-of-the envelope estimates suggest that workers bear a sizeable fraction of corporate tax incidence on the whole, the heterogeneity of our semi-elasticity estimates lead to large, economically meaningful differences across incidence measures. In 2014, for example, the measure of incidence calculated using the mean response is quite high—198 percent. In contrast, the incidence estimate calculated using the earnings semi-elasticity for the median worker is 88 percent.[31] For comparison, Fuest, Peichl, and Siegloch (2018) find a smaller incidence estimate (51 percent) using an estimated earnings semi-elasticity with respect to the German corporate income tax for the median worker. Given the considerable heterogeneity in earnings responses across the employment distribution and across firm sizes, however, applying the mean or the median semi-elasticity estimate to *all* workers in the sample uniformly is likely to generate distortions in the incidence measures. The mean semi-elasticity is driven by workers at the top of the distribution, for example, and is not representative for workers in other parts of the distribution. The median semi-elasticity is likewise not representative for workers in other parts of the distribution, and in particular, does not capture earnings changes at the top of the distribution.

To calculate a more refined measure of the tax incidence, therefore, we separately estimate semi-elasticities using the percentile bins used in our estimates above.[32] We also allow for additional heterogeneity by estimating the elasticities separately for public and private companies and for the private companies, we estimate elasticities that are specific to a firm's employee size

[31] We find very similar incidence estimates calculated in other years.

[32] Specifically, we assign workers below the 1st percentile of earnings and between the 1st and 5th percentiles the semi-elasticity estimate for the 1st percentile. We assign workers between 5th and the 10th percentiles of earnings the 5th percentile estimate, and so forth for the other percentile assignments.

quintile. Finally, when we calculate the incidence flowing to different segments of within-firm earnings distributions, we place owners of the firm – those individuals reported on Schedule G of Form 1120 as owning at least 20 percent of a firm – in their own bin and calculate their earnings benefit according to each owner's place in their within-firm earnings distribution for their size quintile of firm. (Most of these owners are for private firms but for public firm owners, we use the public firm earnings distribution semi-elasticity estimates). This last step is intended to separate the earnings benefits accruing to owners—part of the tax incidence of capital—from earnings benefits accruing to non-owners—purely labor incidence.

This method accounting for heterogenous effects across the earnings distribution by firm and worker type yields a labor incidence estimate of about 80 percent. While this total estimate is similar to the estimate using median earnings only, the distribution of this incidence within firms looks much different. In Figure IX, we show to what extent workers in various firm earnings brackets capture the fraction of aggregate earnings benefits of the DPAD rate cut. We show results again using the mean, median, and various percentile-by-firm-size and firm-type estimates of the earnings response; the bars in for each category sum to the aggregate incidence effects presented above. Results using the mean estimates show that workers in the 25th to 90th percentiles capture the majority of the dollar value of the tax benefits, while workers in the 90-99th percentile capture around twenty percent and 99th percentile workers capture about 10 percent.

Using the point estimates calculated taking into account heterogeneous effects by firm type, firm size, and worker within-firm earnings bins, in contrast, our results suggest that the top percentile of employees within-firms captured by far the largest share of the DPAD tax benefits as earnings—about 41 percentage points of the overall 80 percent wage earnings incidence or about

fifty percent of the benefit. In contrast, workers in the 50th to 75th percentile capture only 4 percentage points or about five percent of the benefit.

Owner-workers also capture a large share of incidence relative to their size. In 2014, we have roughly 9,000 owner observations who own 20 percent or more of a C corporation in our sample, and who are also employees receiving a W-2 from the corporation they own. Using our heterogenous coefficient estimates for the location of each owner in his or her within-firm earnings distribution, we find these owners receive nearly 5 percent of the earnings benefit associated with the DPAD. This suggests some of what appears to be labor income might actually be capital income, analogous to, but opposite of, the story with partnership income actually being labor income highlighted in Smith, Yagan, Zidar, and Zwick (2019). Further, the share accruing to owners is likely a substantial understatement, as these are limited to those individuals that directly hold (i.e., not through a separate entity) at least 20 percent of a corporation, a subset of individuals we might more broadly classify as "owners."[33]

These results highlight the importance of moving beyond incidence measures based on mean or median wage earnings if the goal is to estimate distributional effects or welfare effects of corporate tax changes. However, it is important to note that this incidence analysis has considerable limitations with respect to offering external validity to broader corporate income tax incidence and the DPAD has limitations as well. First, the DPAD has notable variation across industries. To the

[33] In untabulated results, we calculate standard error bands around the estimates of the earnings benefits captured by workers in each earnings bracket. To calculate the 5th and 95th percentile value of the earnings benefit, we follow the same procedure but use the 5th and 95th percentile semi-elasticity coefficient estimate of the earnings response. Earnings benefit estimates using the mean and median semi-elasticities are statistically significant in each wage bracket at the 95th percent confidence level. For the estimates taking into account heterogenous effects, the earnings benefit estimate is only statistically significant for workers at the 99th percentile and for firm owners. This result aligns with our finding that for public firms, which have a high weight in the economy, we only observe a statistical increase in earnings at the 99th percentile, and the suggestive evidence that earnings gains in small firms—which were particularly large at the upper end of the distribution—were accruing, at least in part, to firm owners (as discussed in Section IV.D).

extent that the DPAD effects do not generalize across industries, the DPAD incidence may be different from incidence of other corporate tax changes, such as a change in the marginal rate. Similarly, by using a sample exclusively comprised of C corporations and excluding pass-through businesses, we are potentially focusing on a subset of firms who are uniquely suited to take advantage of the DPAD.

VII. Conclusion

We analyze the impact of the Domestic Production Activities Deduction on the earnings distribution within a firm as well as firm-level employment, investment, and total earnings paid. Additionally, we investigate heterogeneity of this response both within and between firms. This deduction changed 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 dataset matching W-2 filings to corporate tax returns, we estimate that there was a substantial response among firms in our sample in terms of both average and total earnings, but a relatively small effect on median earnings. Diverging results between the median and mean are expected given the high degree of skewness of the within-firm earnings distributions. We investigate this further by estimating semi-elasticity for points along the distribution and find that the elasticities are highest at the upper ends of the earnings distribution. These effects are concentrated among smaller firms in our sample and are consistent with models of worker-level bargaining in setting wages. We also examine the extensive margin effects—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 change, analyzing differential responses across the earnings distribution, and documenting extensive margin effects. Our results highlight the importance of allowing for heterogeneity across workers and firms when estimating earnings responses to changes in business taxation. Finally, this work suggests corporate tax policy plays an important role in the evolution of firm-level earnings distributions, which may ultimately affect the distribution of aggregate wage earnings in the United States.

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Tables:

Table I: Summary statistics for analysis sample

	Mean	Median	p25	p75
	(1)	(2)	(3)	(4)
Firm Level Outcomes:				
Number of Workers	1,482	156	60	484
Total Earnings ($ Millions)	68	7	3	22
Mean Earnings	49,800	41,500	29,600	59,900
1st Percentile Earnings	5,300	4,700	4,000	5,500
5th Percentile Earnings	8,400	6,600	5,100	9,600
25th Percentile Earnings	22,500	19,500	12,000	29,100
Median Earnings	37,100	32,200	22,600	45,400
75th Percentile Earnings	57,700	48,500	35,300	69,700
90th Percentile Earnings	91,100	73,300	52,000	108,500
95th Percentile Earnings	128,600	97,800	67,500	149,900
99th Percentile Earnings	281,600	188,200	119,500	302,500
p75/p25	2.8	2.6	2.1	3.2
p90/p10	8.3	7.3	5.6	9.7
p95/p5	16.5	13.5	10.2	18.6
p99/p1	55.1	38.2	25.2	59.3
Firm Level Controls:				
Age (Years)	22	21	11	36
Revenue ($ Millions)	248	37	11	128
Profit Margin	-0.3	0.0	0.0	0.1
Revenue Growth	1.1	1.0	0.9	1.2
Observations (Firm-Years)		348,012		
Number of Firms		53,509		

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 percentile estimates are averages of the 10 observations around the percentile cutoff to preserve tax filing confidentiality. Variable definitions, including tax form line numbers, are found in Appendix B.

Table II: 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	0.24	0.57	1.12	2.40
Median	0.00	0.00	1.02	2.99
p25	0.00	0.00	0.74	1.81
p75	0.00	0.00	1.75	3.06
DPGR Share				
Mean	0.18	0.20	0.34	0.37
Median	0.09	0.09	0.36	0.41
p25	0.01	0.02	0.17	0.21
p75	0.32	0.39	0.49	0.51
QPAI Share				
Mean	0.42	0.45	0.70	0.73
Median	0.31	0.33	0.82	0.86
p25	0.06	0.08	0.44	0.50
p75	0.83	0.90	1.00	1.00
QPAI>Taxable income				
Mean	0.08	0.09	0.41	0.41
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)	98,974	115,859	20,533	26,436
Number of Firms	30,314	27,715	7,988	8,014

Notes: Statistics derived from SOI data and authors' calculations. All percentile estimates are averages of the 10 observations around the percentile cutoff to preserve tax filing confidentiality. Variable definitions, including tax form line numbers, are included in Appendix B.

Table III: Worker earnings and the Domestic Production Activities Deduction

Panel A: First Stage				
DPGR Share	**16.308*** **			
	[0.760]			
QPAI>Taxable Income	**1.297*** **			
	[0.019]			
Observations	348,012			
R-Squared	0.33			
Panel B: Second Stage				
	ln(Mean Earnings)		ln(Median Earnings)	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
DPAD Cut	**0.011*** **	**0.011*** **	**0.004*** **	**0.005*** **
	[0.001]	[0.002]	[0.001]	[0.002]
Observations	348,012	348,012	348,012	348,012
R-Squared	0.021	0.021	0.025	0.025

This table presents first-stage regression results from empirical specification (4) in Panel A and OLS and IV regression results from empirical specification (2) in Panel B—specifically, the coefficient on the DPAD Cut variable, with standard errors presented below in brackets. DPAD Cut is the percentage point reduction in the marginal tax rate due to the deduction—instruments are industry-by-firm-by-size-by-year average domestic production gross receipts share of total receipts and a dummy variable for whether a firm is subject to the DPAD 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 and an industry-by-year time trend. Regression results including the full set of control variables are shown in Appendix Table A1. Standard errors are clustered at the industry-size level. *, **, and *** indicate significance at the 1 percent, 5 percent and 10 percent level respectively.

Table IV: Earnings effects by within-firm earnings percentile, heterogeneous effects by firm size

	Log Earnings: Percentile of the Within-Firm Earnings Distribution									ln(Mean Earnings)
	ln(p1)	ln(p5)	ln(p10)	ln(p25)	ln(p50)	ln(p75)	ln(p90)	ln(p95)	ln(p99)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Full Sample	-0.001	0.003	0.004	**0.004***	**0.005*****	**0.006*****	**0.009*****	**0.013*****	**0.027*****	**0.011*****
	[0.001]	[0.002]	[0.003]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.004]	[0.002]
Employment Quintile										
Bottom/First	-0.004	0.011	0.01	**0.017***	**0.018*****	**0.011****	**0.021*****	**0.044*****	**0.057*****	**0.025*****
	[0.008]	[0.010]	[0.011]	[0.009]	[0.005]	[0.005]	[0.008]	[0.010]	[0.014]	[0.006]
Second	-0.003	0.000	0.007	0.004	0.001	0.004	0.005	0.006	0.014	0.007
	[0.004]	[0.006]	[0.007]	[0.006]	[0.004]	[0.004]	[0.004]	[0.006]	[0.011]	[0.004]
Third	-0.001	-0.004	-0.004	0.001	0.004	**0.005****	0.003	0.003	**0.015****	**0.006****
	[0.003]	[0.005]	[0.005]	[0.004]	[0.003]	[0.003]	[0.003]	[0.003]	[0.007]	[0.003]
Fourth	0.000	0.000	0.000	0.003	0.002	0.001	0.001	0.003	**0.015*****	**0.006*****
	[0.002]	[0.004]	[0.004]	[0.003]	[0.002]	[0.002]	[0.002]	[0.003]	[0.005]	[0.002]
Top/Fifth	**0.003*****	**0.009*****	**0.009*****	0.002	0.003	**0.005****	**0.007*****	**0.009*****	**0.022*****	0.007
	[0.001]	[0.003]	[0.003]	[0.003]	[0.003]	[0.002]	[0.002]	[0.002]	[0.004]	[0.004]

This table presents estimates of the DPAD rate cut's effect on wage earnings at various points in the within-firm earnings distribution for firms in the five firm size quintiles, calculated by total employment. The table shows IV regression results from empirical specification (2)—specifically, the coefficient on the DPAD Cut variable, with standard errors presented below in brackets. Outcome variables are log earnings of various points in the within-firm earnings distribution. DPAD Cut is the percentage point reduction in the marginal tax rate due to the deduction. Instruments are the industry-by-firm-by-size-by-year average domestic production gross receipts share of total receipts and a dummy variable for whether a firm is subject to the DPAD 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 and an industry-by-year time trend. Standard errors are clustered at the industry-size level. *, **, and *** indicate significance at the 1 percent, 5 percent and 10 percent level, respectively.

Table V: Within-firm earnings distributions and the DPAD

ln of	p75/p25	p90/p10	p95/p05	p99/p01
	(1)	(2)	(3)	(4)
DPAD Cut	0.002	**0.005****	**0.011*****	**0.028*****
	[0.002]	[0.002]	[0.003]	[0.004]
Observations	348,012	348,012	348,012	348,012
R-Squared	0.007	0.007	0.007	0.013

This table presents IV regression results from empirical specification (3)—specifically, the coefficient on the DPAD Cut variable, with standard errors presented below in brackets. 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 industry-by-firm-by-size-by-year average domestic production gross receipts share of total receipts and a dummy variable for whether a firm is subject to the DPAD 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 and an industry-by-year time trend. Standard errors are clustered at the industry-size level. *, **, and *** indicate significance at the 1 percent, 5 percent and 10 percent level respectively.

Table VI: 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)
Worker earnings:						
ln(Mean Earnings)	**0.025*****	**0.010*****	0.006	**0.005***	**0.009*****	**0.016*****
	[0.006]	[0.002]	[0.004]	[0.003]	[0.002]	[0.003]
ln(p50)	**0.018*****	0.003	-0.001	-0.001	**0.005****	**0.008*****
	[0.005]	[0.003]	[0.003]	[0.002]	[0.002]	[0.003]
ln(p75)	**0.011****	**0.005****	-0.001	-0.001	**0.004****	**0.010*****
	[0.005]	[0.002]	[0.004]	[0.002]	[0.002]	[0.003]
ln(p95)	**0.044*****	**0.009*****	0.005	0.005	**0.011*****	**0.019*****
	[0.010]	[0.002]	[0.004]	[0.003]	[0.003]	[0.004]
Firm earnings distribution:						
ln(p75/p25)	-0.006	0.003	0.001	0.003	-0.001	0.004
	[0.008]	[0.002]	[0.003]	[0.002]	[0.002]	[0.003]
ln(p95/p05)	**0.034****	0.000	0.000	**0.007***	**0.009****	**0.011****
	[0.014]	[0.003]	[0.005]	[0.004]	[0.003]	[0.005]
ln(p99/p01)	**0.061*****	**0.018*****	**0.022*****	**0.020*****	**0.023*****	**0.030*****
	[0.016]	[0.004]	[0.007]	[0.005]	[0.004]	[0.006]
Observations	67,153	68,358	48,131	80,772	276,806	62,092

This table presents IV regression results from empirical specifications (2) and (3)—specifically, the coefficient on the DPAD Cut variable, with standard errors presented below in brackets. Outcome variables are the log earnings at various points in the within-firm earnings distribution and the ratio of various points in the within-firm earnings distribution. DPAD Cut is the percentage point reduction in the marginal tax rate due to the deduction. Instruments are the industry-by-firm-by-size-by-year average domestic production gross receipts share of total receipts and a dummy variable for whether a firm is subject to the DPAD 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 and an industry-by-year time trend. Standard errors are clustered at the industry-size level. *, **, and *** indicate significance at the 1 percent, 5 percent and 10 percent level respectively.

Table VII: The DPAD, firm employment, investment, and total earnings

Panel A: Overall firm effects

		Constant Sample			Constant Sample
	ln(Employment)	(Net Investment)/ (Installed Capital)	ln(Employment)	ln(Total Earnings)	ln(Total Earnings)
	(1)	(2)	(3)	(4)	(5)
DPAD Cut	-0.003	**0.008*** **	0.001	**0.009** **	**0.012*** **
	[0.004]	[0.002]	[0.004]	[0.004]	[0.004]
Observations	348,012	270,899	270,899	348,012	270,899
R-Squared	0.196	0.036	0.190	0.232	0.227

Panel B: Heterogenous effects

	Employment Size				Financial Constraints	
	Bottom Quintile	Top Quintile	Publicly Traded	Multinationals	No Payout Firms	Payout Firms
	(1)	(2)	(3)	(4)	(5)	(6)
ln(Employment)	**0.014** **	**-0.028*** **	**-0.016** *	-0.007	0.005	**-0.012** **
	[0.006]	[0.006]	[0.009]	[0.007]	[0.005]	[0.006]
Net Investment/ Installed Capital	-0.007	**0.014*** **	**0.016*** **	**0.011*** **	**0.007*** **	**0.010*** **
	[0.009]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
ln(Total Wages)	**0.039*** **	**-0.018*** **	-0.009	-0.002	**0.014*** **	0.004
	[0.008]	[0.006]	[0.008]	[0.006]	[0.005]	[0.006]
Observations	67,153	68,358	48,131	80,772	276,806	62,092

This table presents IV regression results from empirical specification (3)—specifically, the coefficient on the DPAD Cut variable, with standard errors presented below in brackets. Panel A presents results for the full sample and Panel B presents results for sample splits by size, publicly traded status, multinational status and measures of financial constraints. DPAD Cut is the percentage point reduction in the marginal tax rate due to the deduction. Instruments are the industry-by-firm-by-size-by-year average domestic production gross receipts share of total receipts and a dummy variable for whether a firm is subject to the DPAD 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 and an industry-by-year time trend. Standard errors are clustered at the industry-size level. *, **, and *** indicate significance at the 1 percent, 5 percent and 10 percent level respectively.

Table VIII: Alternative instruments and earnings response

Panel A: First stage

	DPGR Instrument	2005 Instrument	QPAI Instrument
	(1)	(2)	(3)
Primary Instrument	**16.308*** **	**16.755*** **	**7.163*** **
	-0.76	[1.360]	[0.451]
QPAI>Taxable Income	**1.297*** **	**1.325*** **	**1.314*** **
	-0.019	[0.018]	[0.019]
Observations	348,012	348,012	348,012
R-Squared	0.334	0.307	0.319

Panel B: Second stage

	ln(Mean Earnings)	ln(Median Earnings)	ln(Mean Earnings)	ln(Median Earnings)	ln(Mean Earnings)	ln(Median Earnings)
	(1)	(2)	(3)	(4)	(5)	(6)
DPAD Cut	**0.011*** **	**0.005*** **	**0.009*** **	**0.004** **	**0.009*** **	**0.003** **
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
Observations	348,012	348,012	348,012	348,012	348,012	348,012
R-Squared	0.021	0.025	0.021	0.025	0.021	0.025

This table shows robustness of the main results to alternative instruments. Panel A presents first-stage results from empirical specification (4) for the instruments used in the main specification in column 1 (the domestic production gross receipts (DPGR) share of total receipts and a dummy variable for whether a firm is subject to the DPAD taxable income limitation). Columns 2 and 3 show first-stage results for two alternative sets of instruments as described in Section V.F: 1) the DPGR share in 2005, the first year of the policy, and the taxable income limitation dummy, and 2) the qualified production activities income share of total income and the taxable income limitation dummy. Panel B presents OLS and IV regression results for the natural log of mean and median earnings as outcome variables from empirical specification (2) for these three variations on instruments—specifically, the panel shows the coefficient on the DPAD Cut variable, with standard errors presented below in brackets. DPAD Cut is the percentage point reduction in the marginal tax rate due to the deduction. All regressions include firm and year fixed effects as well as fourth-order polynomials of age, revenue, profit margin, and revenue growth and an industry-by-year time trend. Standard errors are clustered at the industry-size level. *, **, and *** indicate significance at the 1 percent, 5 percent and 10 percent level respectively.

Figures:

Figure I.A: Domestic Production Activities Deduction (DPAD) rate

Figure I.B: Qualified Production Activities Income (QPAI) and DPAD

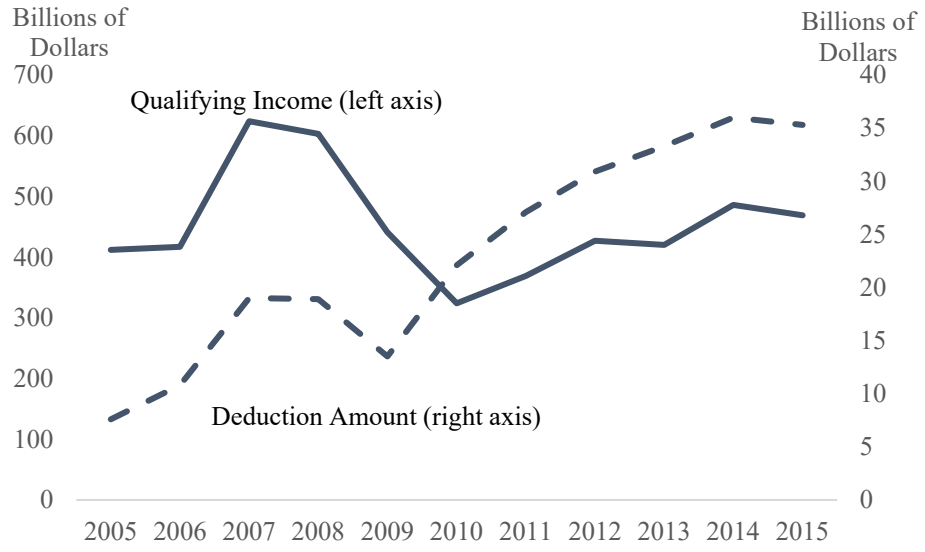


Figure I.A shows the phase-in of the Domestic Production Activities Deduction (DPAD) rate over the sample period. Figure I.B shows the value of C corporation income that qualified for the DPAD deduction as well as the total deduction amount claimed. Source: Internal Revenue Service.

Figure II: Analysis of pre-trends

Figure II.A: Mean Earnings

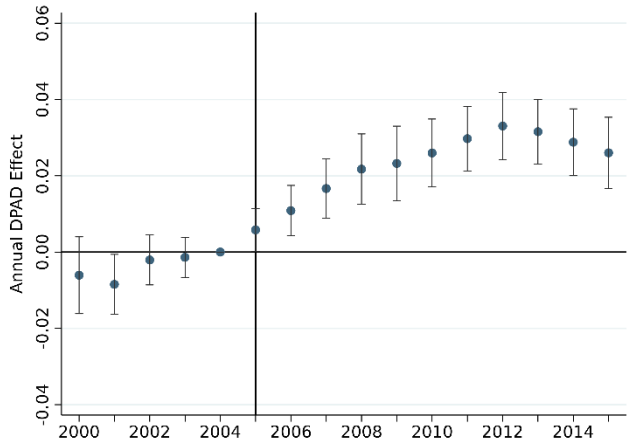


Figure II.B: Median Earnings

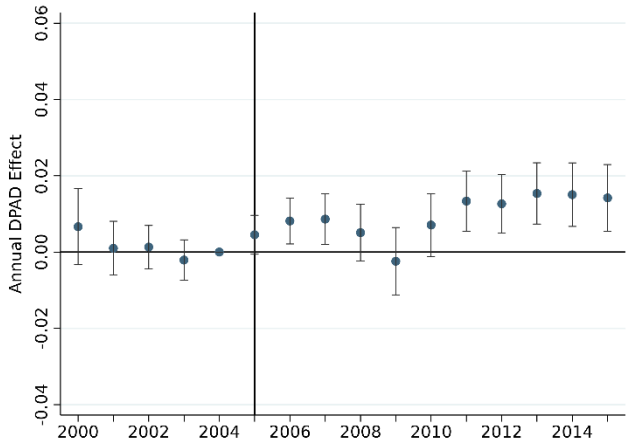


Figure II.C: Firm 5th Percentile Earnings

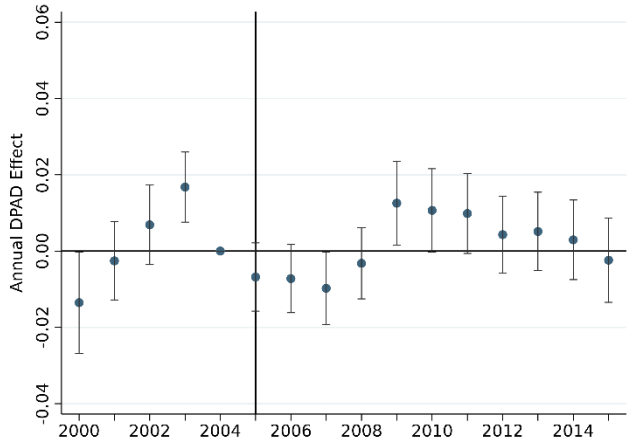
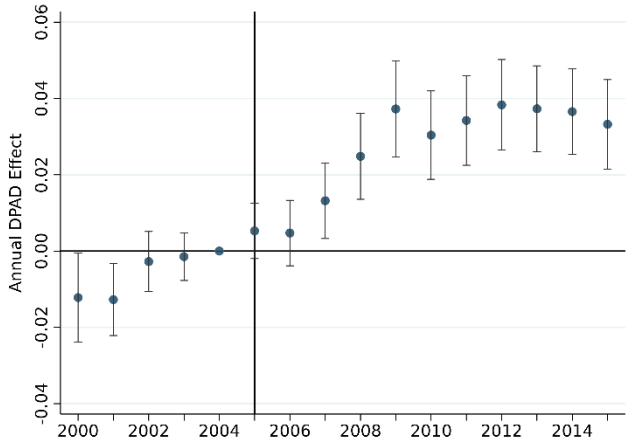
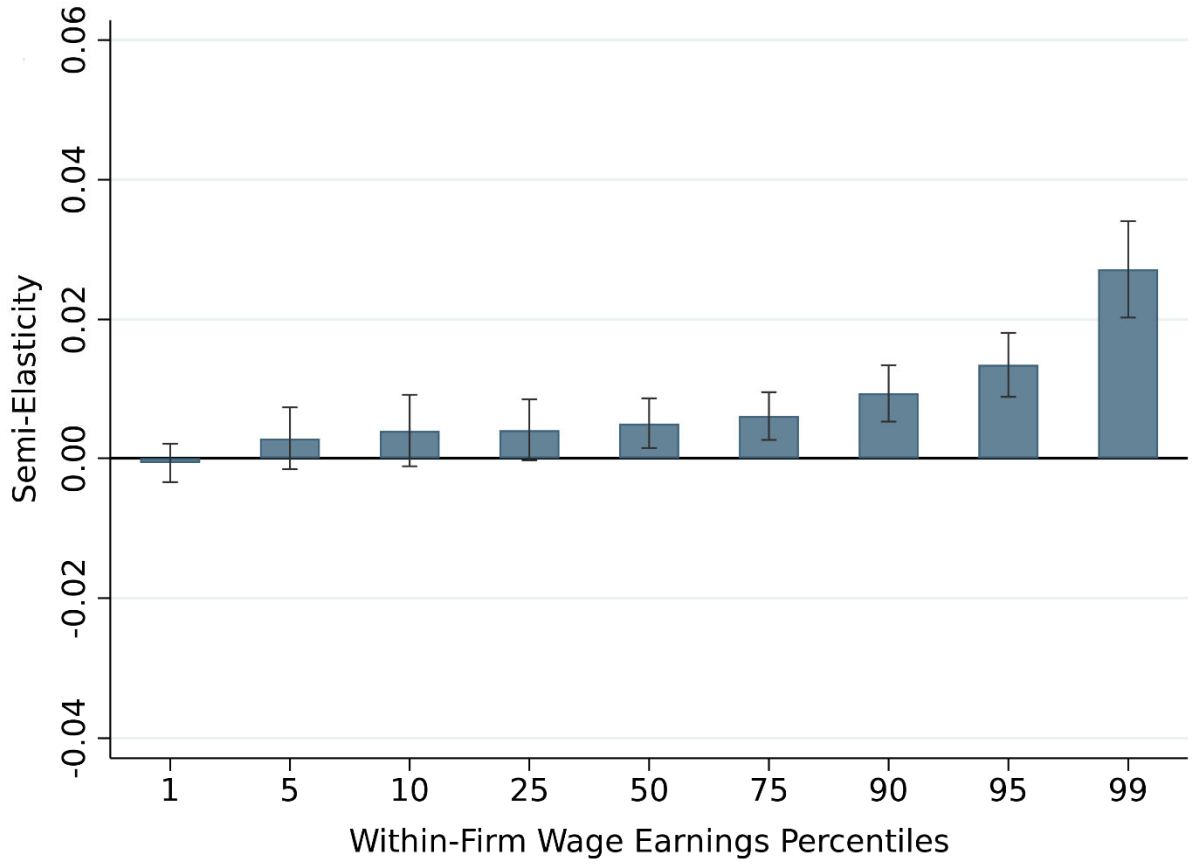


Figure II.D: Firm 95th Percentile Earnings



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

Figure III: Semi-elasticity of earnings across the within-firm earnings distribution



This figure presents coefficient estimates from an IV regression of the level of earnings at various points of the within-firm earnings distribution on the *DPAD Cut* and a variety of control variables, as in specification (2). The data include firms and employees observed from 2000 to 2015. The coefficient estimates (displayed as bars) are interpreted as the semi-elasticity of earnings to the *DPAD Cut*. *DPAD Cut* is the percentage point reduction in the marginal tax rate due to the deduction—instruments are the industry-by-size average share of eligible domestic production gross receipts and a dummy variable for whether a firm is subject to the taxable income limitation. 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 and an industry-by-year time trend. Regression results are presented in Table IV. Standard errors are clustered at the industry-size level.

Figure IV: Heterogeneity of earnings effects by firm size and public ownership

Figure IV.A: Earnings effects by firm employment size

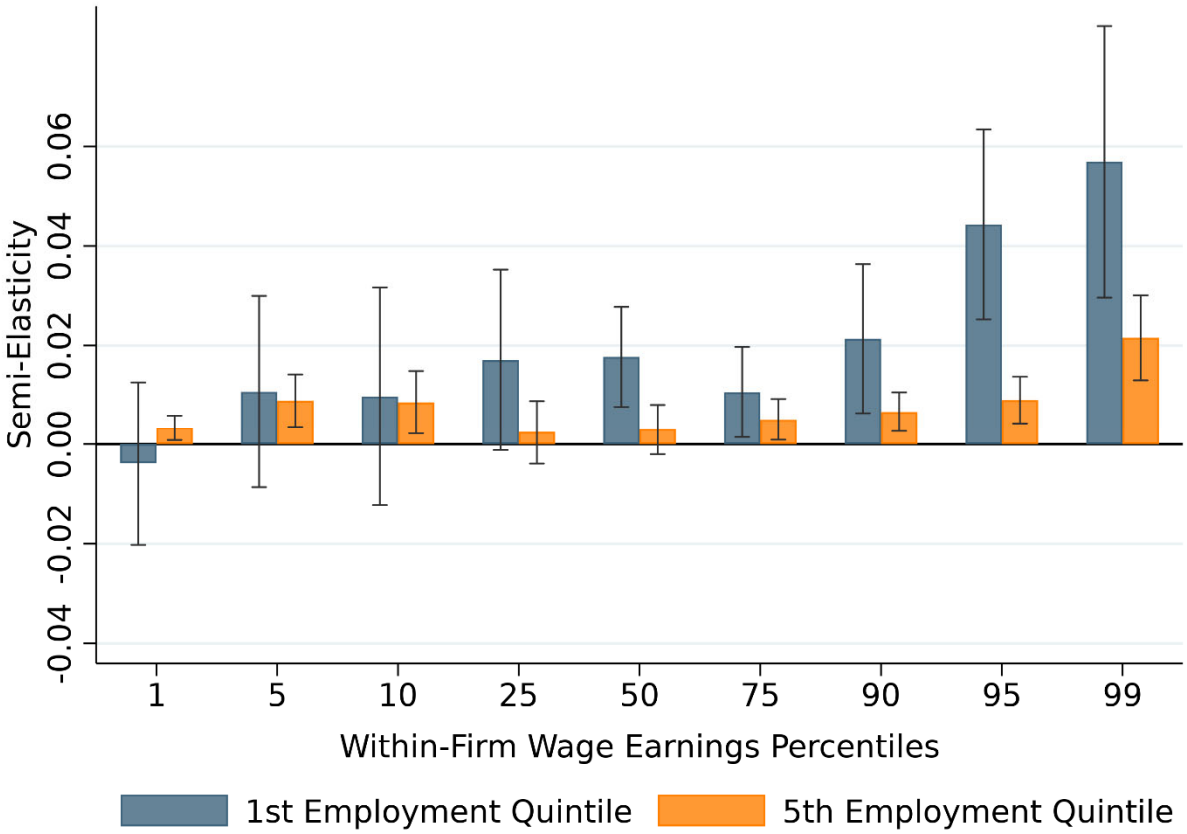
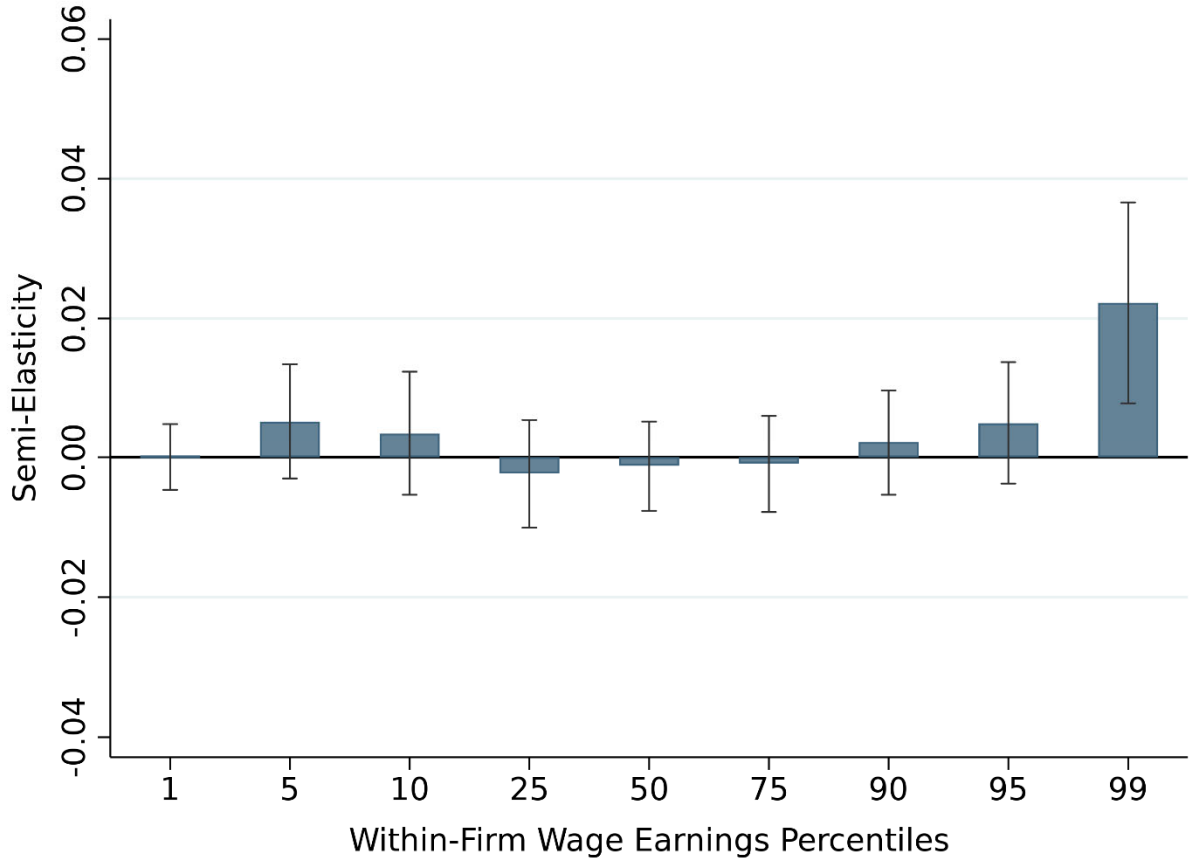
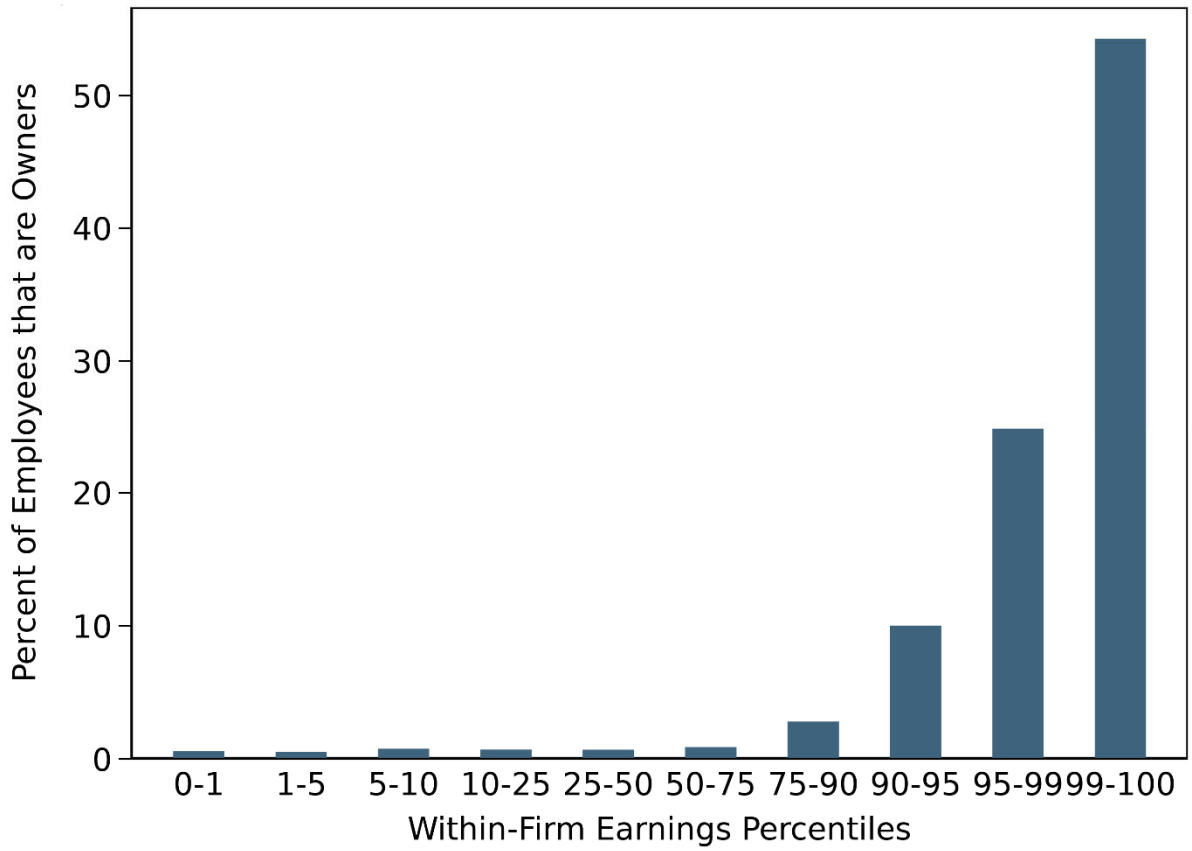


Figure IV.B: Earnings effects for publicly held firms



This figure presents coefficient estimates from an IV regression of the level of earnings at various points of the within-firm earnings distribution on the *DPAD Cut* and a set of control variables, as in specification (2). Figure IV.A shows results for firms in the first quintile of employment size in the sample (firms with fewer than about 50 employees) and the fifth quintile of employment size (firms with around 800 employees). Figure IV.B shows results for publicly listed firms. The coefficient estimates (displayed as bars) are interpreted as the semi-elasticity of earnings to the *DPAD Cut*. *DPAD Cut* is the percentage point reduction in the marginal tax rate due to the deduction. Instruments are the industry-by-size average domestic production gross receipts share of total receipts and a dummy variable for whether a firm is subject to the taxable income limitation. 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 and an industry-by-year time trend. Regression results for Figure V.A are presented in Table IV and for Figure V.B are presented in Appendix Table A3. Standard errors are clustered at the industry-size level.

Figure V: Fraction of owners across the within-firm earnings distribution: small firms



This figure shows the percent of firm owners in various bins of the within-firm earnings distribution for the lowest size quintile of firms in the sample (firms with below about 50 employees), for the sample of firm-years that reveal their owners on Schedule G of the corporate tax return, starting in 2011.

Figure VI: Firm-level effects across employment-size distribution

Figure VI.A: Effect on firm total employment

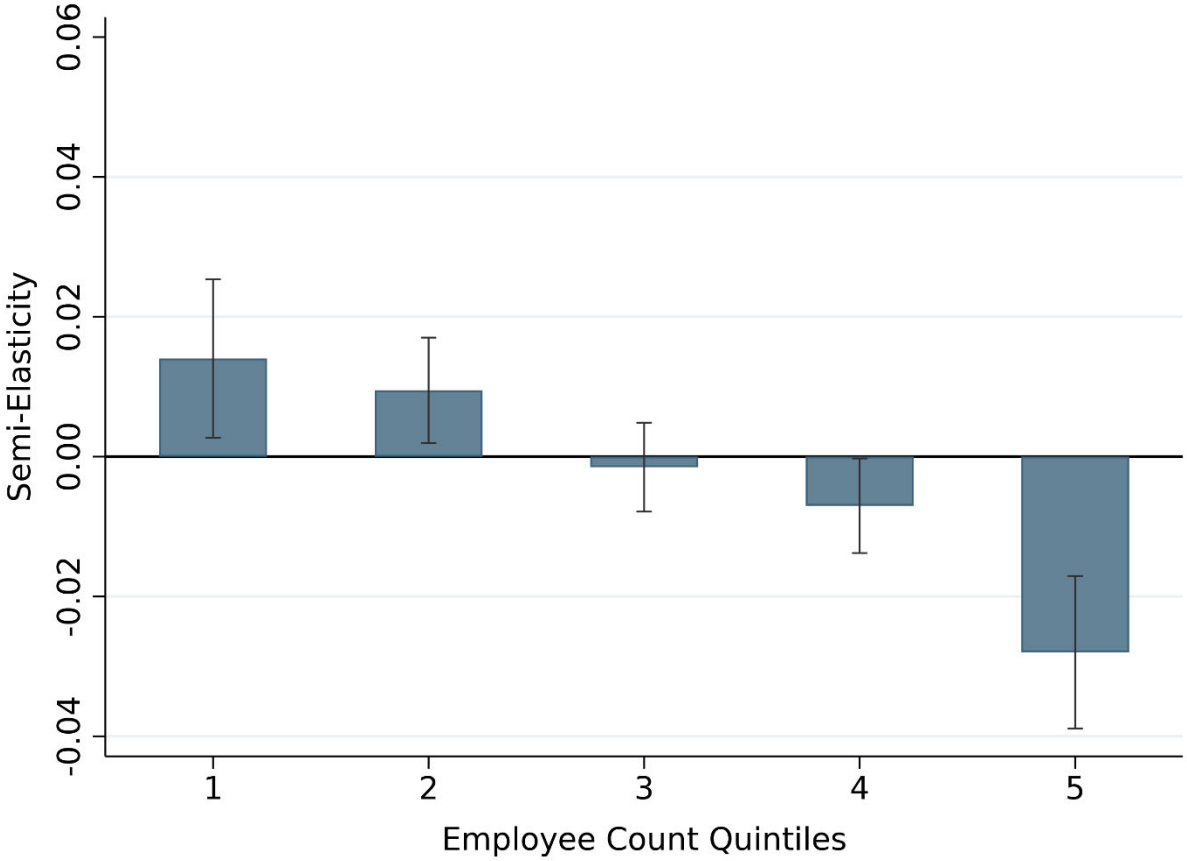
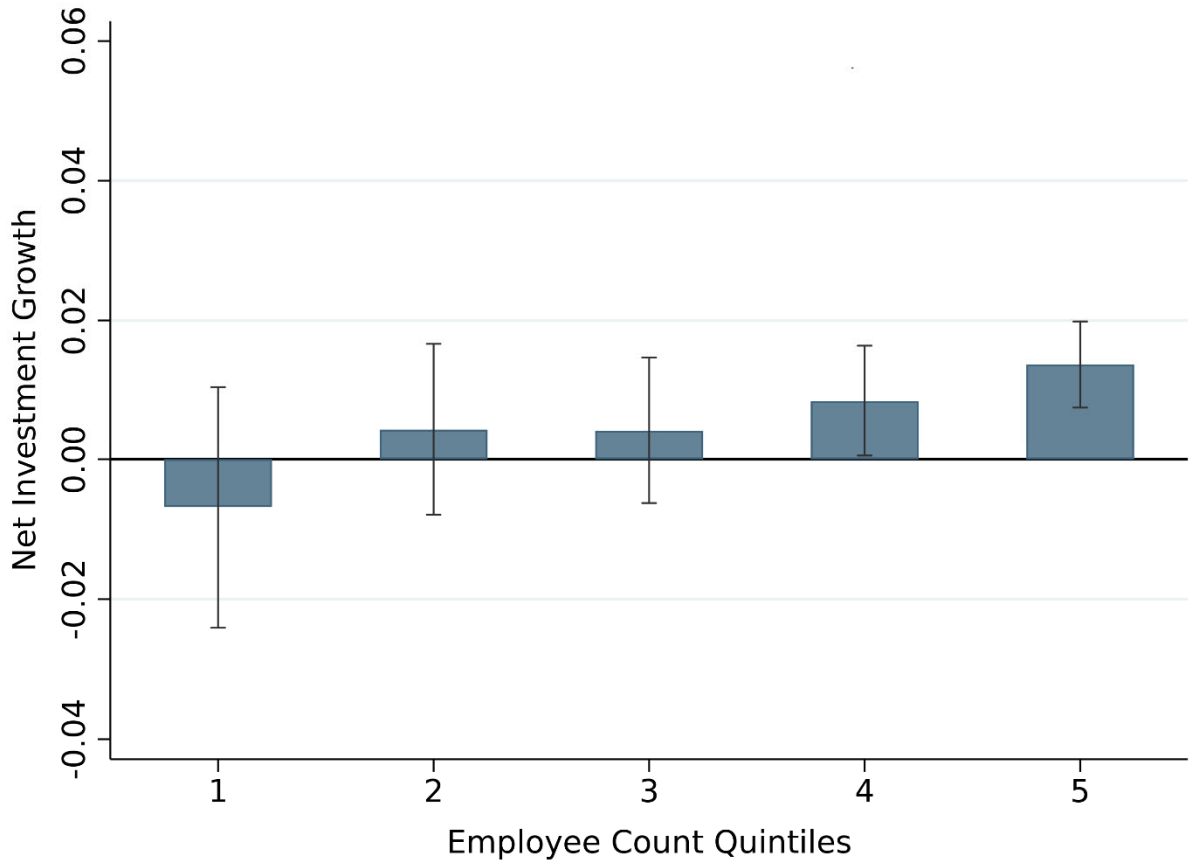


Figure VI.B: Effect on firm net investment



These figures present coefficient estimates from an IV regression of the log number of firm-level total employees (VI.A) and net investment (VI.B) 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 industry-by-firm-by-size-by-year average domestic production gross receipts share of total receipts 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 and an industry-by-year time trend. Regression results are presented in Appendix Table A5. Standard errors are clustered at the industry-size level.

Figure VII: Effect of the DPAD on new and separating employee earnings

Fig VII.A: Effect of the DPAD on the location of new employees in the within-firm earnings distribution

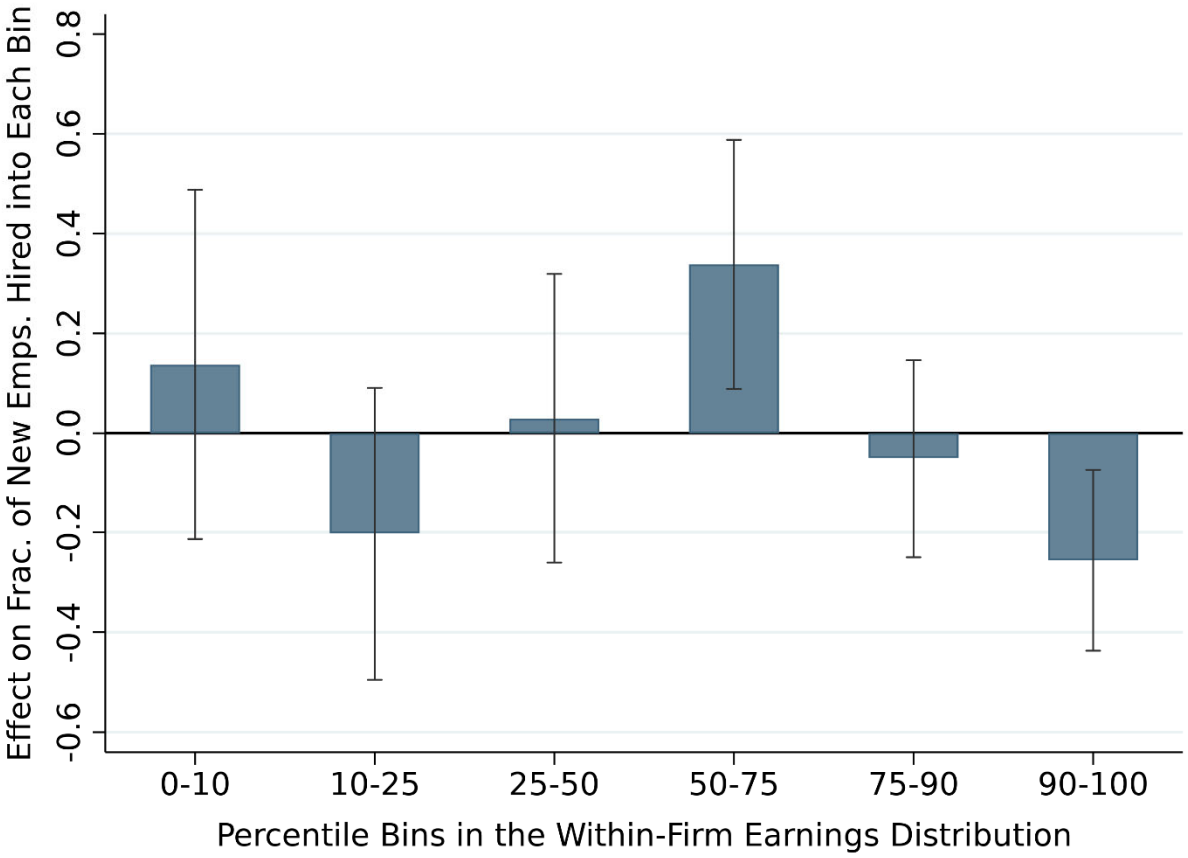
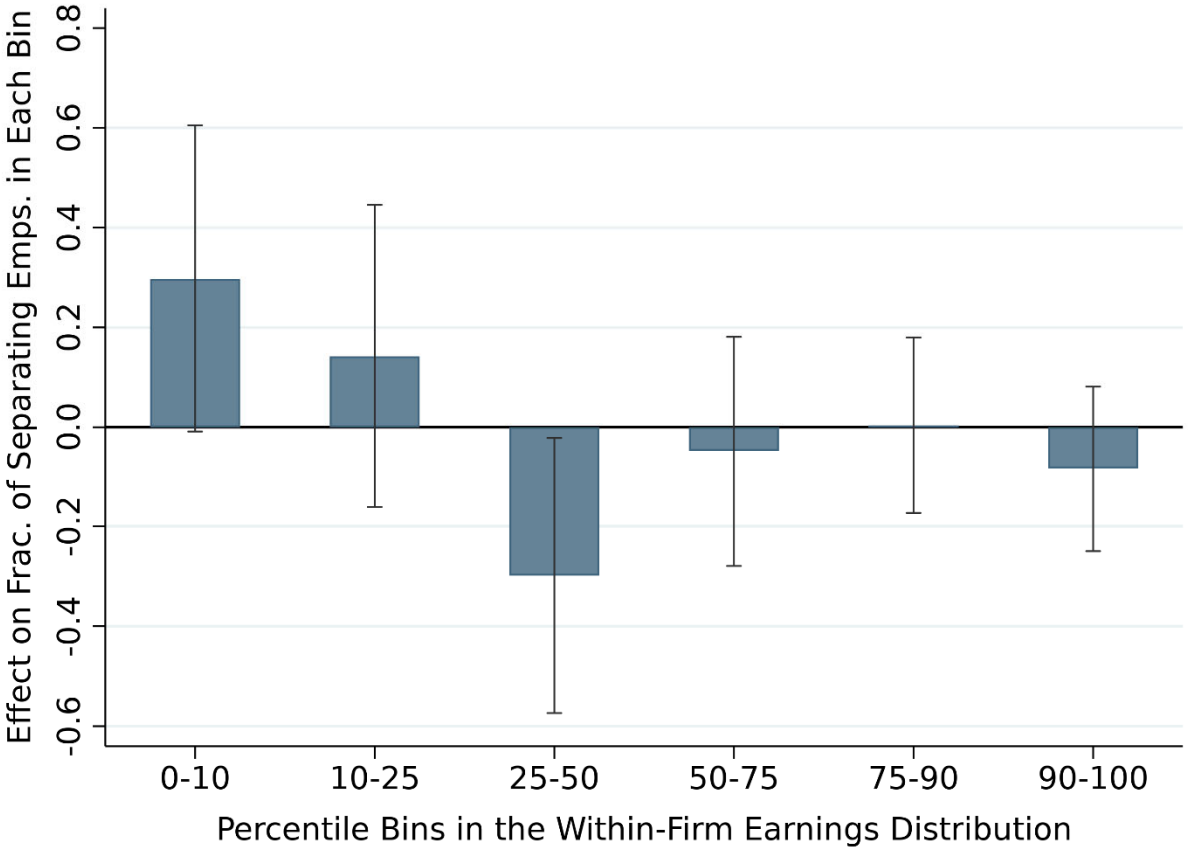
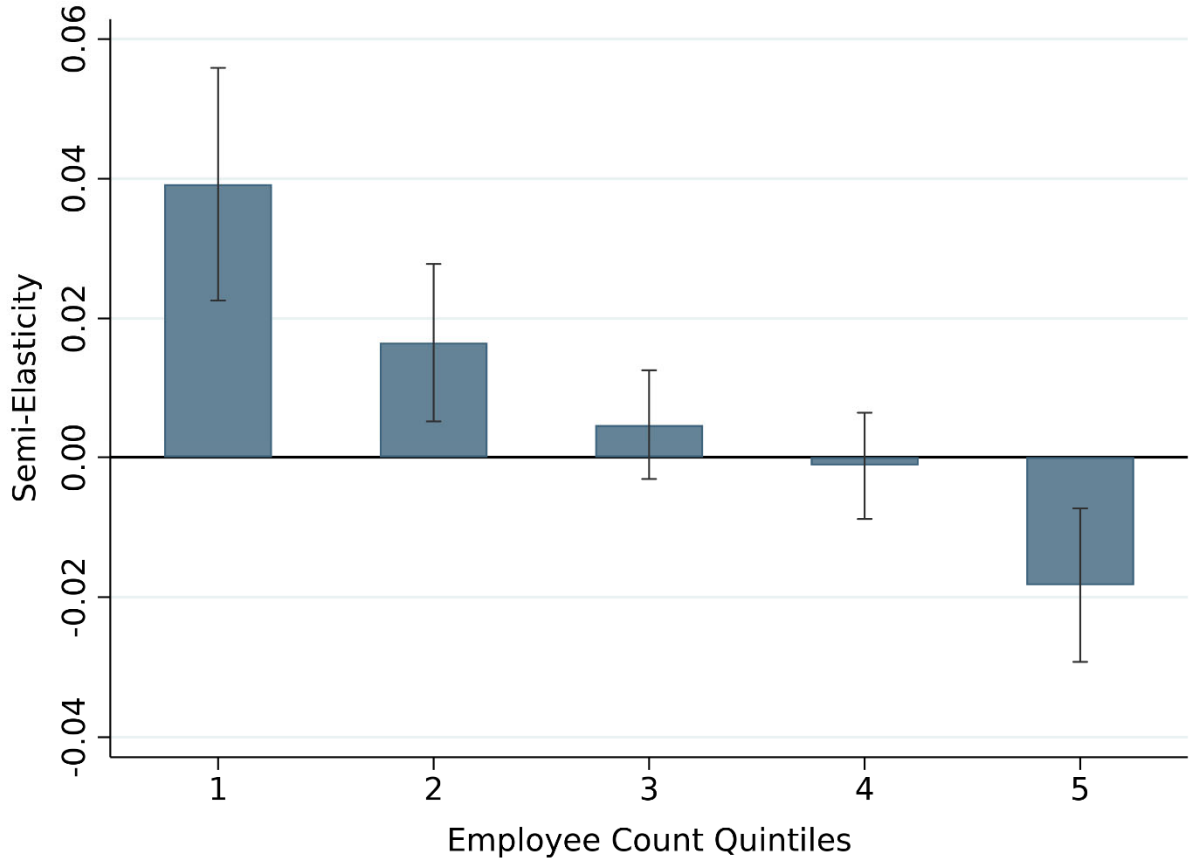


Figure VII.B: Effect of the DPAD on the location of separating employees in the within-firm earnings distribution



Figures VII.A and VII.B present estimates of the share of new employees (exiting employees) hired into (exiting from) various points of the existing-employee within-firm earnings distribution as a result of the DPAD. Figure VII.A presents coefficient estimates of the share of employees that joined the firm in year *t* in various bins of the firm-level earnings distribution of existing employees in year *t*. Figure VII.B presents estimates of the share of employees that exited the firm in year within various bins of the firm-level earnings distribution of existing employees in year *t*. All coefficients are estimated from an IV regression of the percent of new employees hired, or exiting employees leaving on the *DPAD Cut* (specification 3). *DPAD Cut* is the percentage point reduction in the marginal tax rate due to the deduction. Instruments are the industry-by-firm-by-size-by-year average domestic production gross receipts share of total receipts and a dummy variable for whether a firm is subject to the taxable income limitation. The lines in both charts 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 and an industry-by-year time trend. Standard errors are clustered at the industry-size level.

Fig VIII: Effect on firm total earnings across employment-size distribution



This figure presents coefficient estimates from an IV regression of the log firm-level total wage earnings on the *DPAD Cut* and a variety of control variables, detailed below and summarized by specification (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 industry-by-firm-by-size-by-year average domestic production gross receipts share of total receipts 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 and an industry-by-year time trend. Regression results are presented in Appendix Table A5. Standard errors are clustered at the industry-size level.

Figure IX: Incidence estimates: Wage earnings change as a percent of the total DPAD, by within-firm earnings percentile

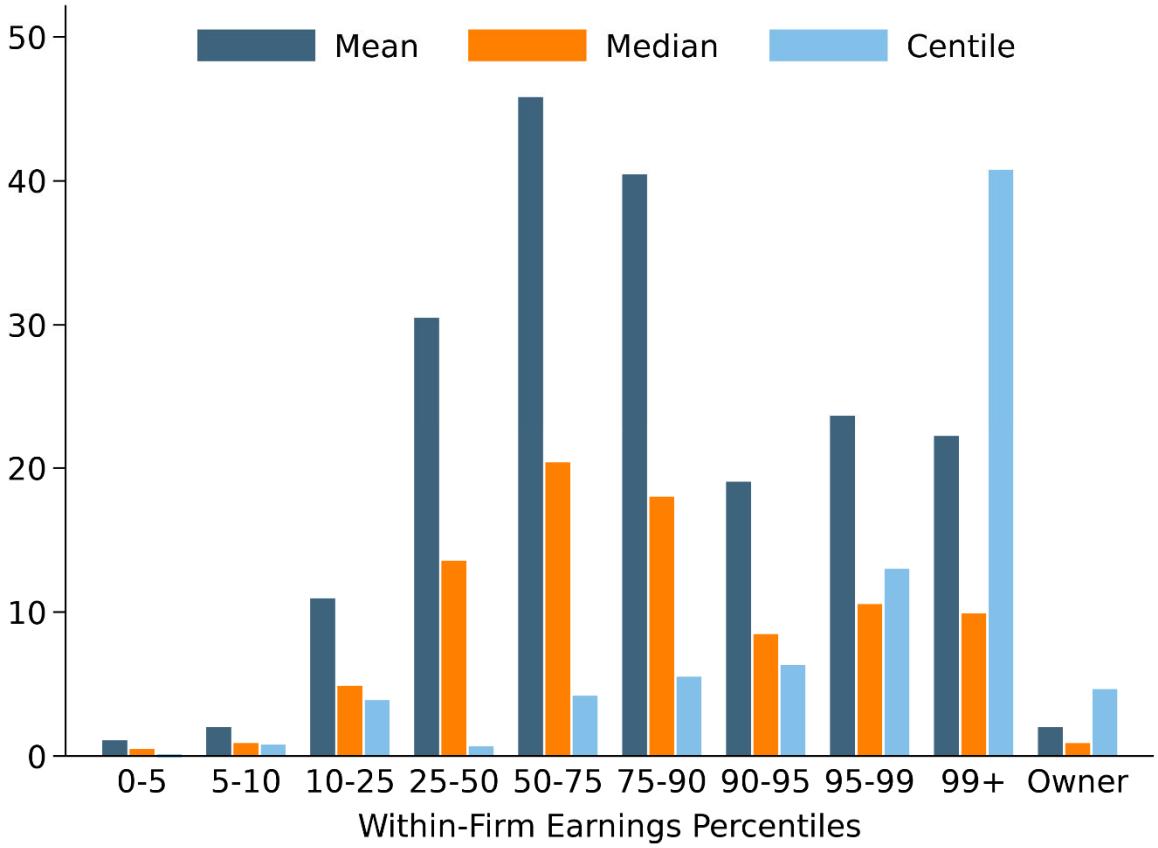


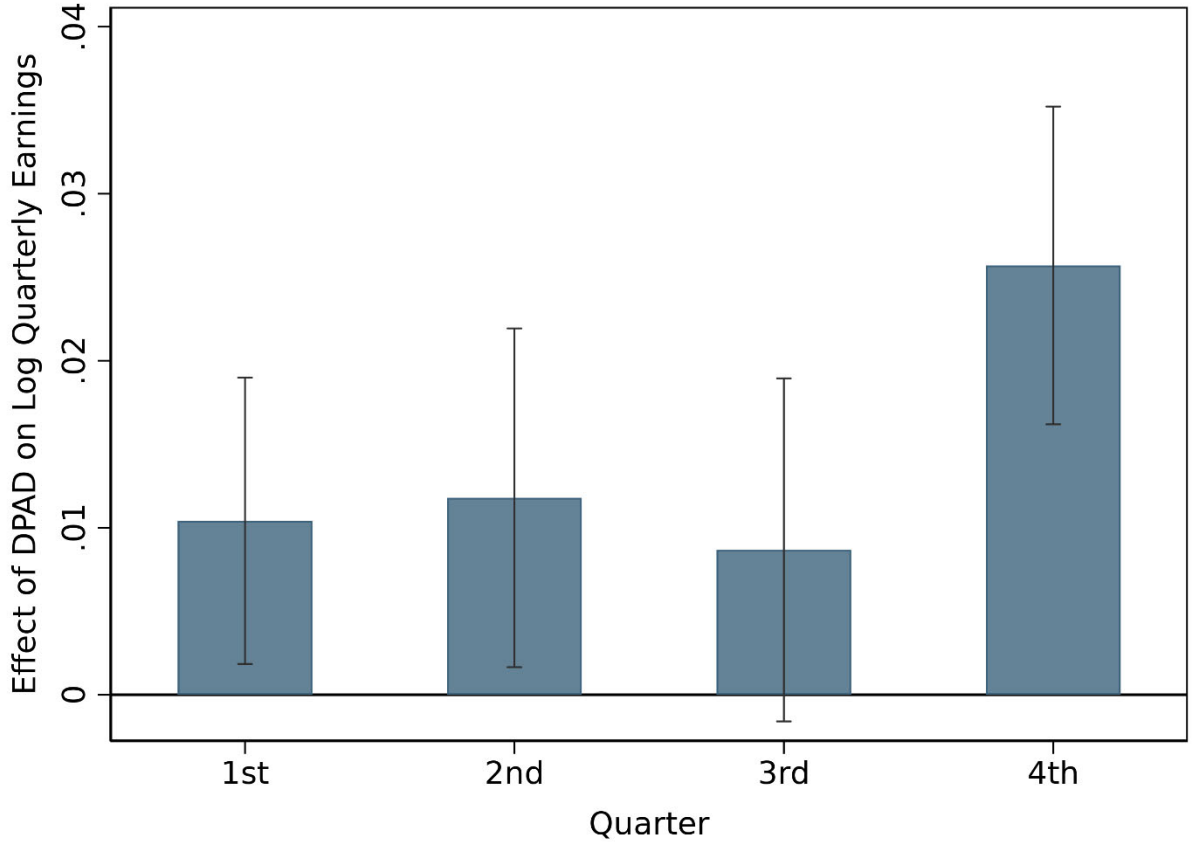
Figure IX displays the estimates of labor income incidence of the DPAD for employees in each within-firm earnings percentile, i.e., the total earnings changes received by employees in each percentile, as a percent of the total DPAD benefit received by the firm. The figure displays results using three types of semi-elasticity estimates of the earnings increases—the mean worker estimate, the median worker estimate, and estimates calculated taking into account heterogeneous effects by a worker's percentile of the earnings distribution, a firm's public or private status, the firm employment size quartile for private firms, and whether a worker is also a firm owner or not. To arrive at this back-of-the-envelope incidence measure (as described in Section VI), we divide the percentile-specific wage earnings benefits for workers in the sample by a rough calculation of the total tax savings attributable to the DPAD for firms in the sample, which is the magnitude of the DPAD for a given firm times the top statutory corporate income tax rate during this time period (35 percent).

Supplemental Materials for "Corporate Taxes and the Earnings Distribution: Effects of the Domestic Production Activities Deduction"

Intended for Online Publication

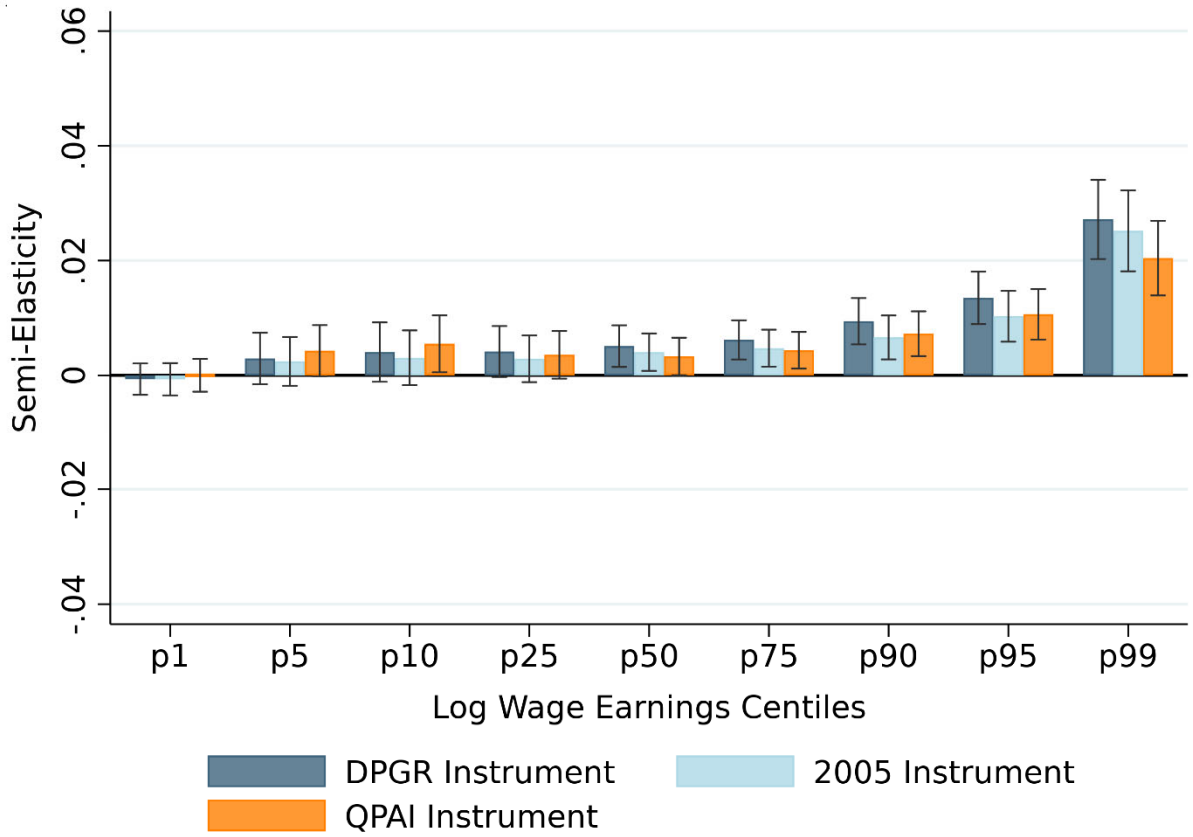
Appendix A: Additional Figures and Tables

Figure A1: Calendar-quarter average earnings effects



This figure shows estimates of the effect of the DPAD rate cut on average firm wage earnings in the four calendar quarters of the year, using data on firm quarterly total wages reported on IRS Form 941; average earnings are calculated as quarterly reported earnings divided by total employment for the year, with total employment calculated from W-2 data as described in Section V.E. The figure presents coefficient estimates from an IV regression of the level of total wage earnings at a firm in a given quarter on the *DPAD Cut* and a variety of control variables, detailed below and summarized in specification (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 industry-by-firm-by-size-by-year average domestic production gross receipts share of total receipts 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 and an industry-by-year time trend. Standard errors are clustered at the industry-size level.

Figure A2: Alternative instruments and the earnings distribution



This figure presents estimates of the effect of the DPAD rate cut on worker earnings at various points in the within-firm earnings distribution using alternative instrumental variables. The figure presents coefficient estimates from an IV regression of the level of earnings at various points of the within-firm earnings distribution on the *DPAD Cut* and a variety of control variables, detailed below and summarized in specification (3). Results for three sets of instruments are shown. First, results are presented for the instruments used in the main specification: the industry-by-firm-by-size-by-year domestic production gross receipts (DPGR) share of total receipts and a dummy variable for whether a firm is subject to the taxable income limitation (results presented in dark blue). Next, results are presented for the two alternative instruments: 1) the DPGR share in 2005, the first year of the policy, and the taxable income limitation dummy (results in light blue), and 2) the qualified production activities income share of total income and the taxable income limitation dummy (results in orange). 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. 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 and an industry-by-year time trend. Standard errors are clustered at the industry-size level.

Table A1: Worker earnings and the DPAD, with full controls

	First Stage	ln(Mean Earnings)		ln(Median Earnings)	
		OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)
DPGR Share	**16.308*** **				
	[0.760]				
QPAI > Taxable Income	**1.297*** **				
	[0.019]				
DPAD Cut		**0.011*** **	**0.011*** **	**0.004*** **	**0.005*** **
		[0.001]	[0.002]	[0.001]	[0.002]
Bonus	**0.206*** **	**-0.043***	**-0.043***	**0.049*** **	**0.049*** **
	[0.066]	[0.023]	[0.023]	[0.023]	[0.023]
ETI	**-0.102*** **	-0.004	-0.004	0.002	0.003
	[0.013]	[0.004]	[0.004]	[0.004]	[0.004]
Age	**-0.012*** **	0.002	0.002	-0.001	-0.001
	[0.004]	[0.002]	[0.002]	[0.002]	[0.002]
Age^2	-0.001	0.000	0.000	**0.000***	**0.000***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Age^3	**0.000** **	0.000	0.000	0.000	0.000
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Age^4	**-0.000*** **	0.000	0.000	0.000	0.000
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Revenue	**1.107*** **	**0.367*** **	**0.366*** **	**0.199*** **	**0.197*** **
	[0.110]	[0.039]	[0.039]	[0.030]	[0.029]
Revenue^2	**-0.817*** **	**-0.295*** **	**-0.294*** **	**-0.158*** **	**-0.156*** **
	[0.119]	[0.039]	[0.039]	[0.029]	[0.029]
Revenue^3	**0.259*** **	**0.095*** **	**0.095*** **	**0.051*** **	**0.051*** **
	[0.045]	[0.015]	[0.014]	[0.011]	[0.011]
Revenue^4	**-0.028*** **	**-0.010*** **	**-0.010*** **	**-0.006*** **	**-0.006*** **
	[0.006]	[0.002]	[0.002]	[0.001]	[0.001]
Profit Margin	**0.036*** **	**0.013*** **	**0.013*** **	0.004	0.004
	[0.009]	[0.004]	[0.004]	[0.003]	[0.003]
Profit Margin^2	**0.006*** **	**0.002*** **	**0.002*** **	**0.001*** **	**0.001*** **
	[0.001]	[0.000]	[0.000]	[0.000]	[0.000]
Profit Margin^3	**0.000*** **	**0.000*** **	**0.000*** **	**0.000*** **	**0.000*** **
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Profit Margin^4	**0.000*** **	**0.000*** **	**0.000*** **	**0.000*** **	**0.000*** **
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Revenue Growth	**0.068*** **	**0.368*** **	**0.368*** **	**0.628*** **	**0.628*** **

	[0.026]	[0.028]	[0.028]	[0.034]	[0.034]
Revenue Growth^2	-0.009	**-0.243*** **	**-0.243*** **	**-0.440*** **	**-0.440*** **
	[0.019]	[0.019]	[0.019]	[0.023]	[0.023]
Revenue Growth^3	-0.003	**0.059*** **	**0.059*** **	**0.111*** **	**0.111*** **
	[0.005]	[0.005]	[0.005]	[0.006]	[0.006]
Revenue Growth^4	0.001	**-0.005*** **	**-0.005*** **	**-0.009*** **	**-0.009*** **
	[0.000]	[0.000]	[0.000]	[0.001]	[0.001]
Constant	**-0.256*** **	**10.447*** **		**10.006*** **	
	[0.095]	[0.033]		[0.037]	
Observations	355,545	348,012	348,012	348,012	348,012
R-Squared	0.333	0.021	0.021	0.025	0.025

This table presents results shown in Table 3, including coefficients for the full set of control variables. The table presents first-stage results from specification (4) and OLS and IV regression results from empirical specifications (2). DPAD Cut is the percentage point reduction in the marginal tax rate due to the deduction. Instruments are the industry-by-firm-by-size-by-year average domestic production gross receipts share of total receipts 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 and an industry-by-year time trend. Standard errors are clustered at the industry-size level. *, **, and *** indicate significance at the 1 percent, 5 percent and 10 percent level respectively.

Table A2: Earnings distribution, heterogeneous effects by firm size

	ln(p75/25)	ln(p95/p05)	ln(p99/p01)
	(1)	(2)	(3)
Full Sample	0.002	**0.011*** **	**0.028*** **
	[0.002]	[0.003]	[0.004]
Employment Quintile			
Bottom/First	0.002	**0.009*** **	**0.017***
	[0.003]	[0.003]	[0.009]
Second	**0.008** **	0.004	0.004
	[0.004]	[0.005]	[0.006]
Third	0.01	-0.004	0.001
	[0.011]	[0.003]	[0.004]
Fourth	0.007	0.004	0.003
	[0.007]	[0.003]	[0.003]
Top/Fifth	-0.004	0.007	0.002
	[0.005]	[0.004]	[0.003]

This table presents estimates of the DPAD rate cut's effect on the within-firm earnings distribution for firms in the five size quintiles, calculated by total firm employment. The table presents IV regression results from empirical specification (3)—specifically, the coefficient on the DPAD Cut variable, with standard errors presented below in brackets. Outcome variables are the log of the ratio of the 75th to 25th percentile of within-firm earnings (column 1), the 95th to 5th percentile of within-firm earnings (column 2), and the 99th to 1st percentile of within-firm earnings (column 3). DPAD Cut is the percentage point reduction in the marginal tax rate due to the deduction. Instruments are the industry-by-firm-by-size-by-year average domestic production gross receipts share of total receipts and a dummy variable for whether a firm is subject to the DPAD 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 and an industry-by-year time trend. Standard errors are clustered at the industry-size level. *, **, and *** indicate significance at the 1 percent, 5 percent and 10 percent level, respectively.

Table A3: Earnings effects by within-firm earnings percentile—heterogeneous effects by public listing status, multinational status and financial constraint measures

	Log Earnings: Percentile of the Within-Firm Earnings Distribution									ln(Mean Earnings)
	ln(p1)	ln(p5)	ln(p10)	ln(p25)	ln(p50)	ln(p75)	ln(p90)	ln(p95)	ln(p99)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Full Sample	-0.001	0.003	0.004	**0.004***	**0.005*****	**0.006*****	**0.009*****	**0.013*****	**0.027*****	**0.011*****
	[0.001]	[0.002]	[0.003]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.004]	[0.002]
Publicly Traded	0.000	0.005	0.004	-0.002	-0.001	-0.001	0.002	0.005	**0.022*****	**0.006****
	[0.002]	[0.004]	[0.005]	[0.004]	[0.003]	[0.004]	[0.004]	[0.004]	[0.007]	[0.003]
Multinational	-0.001	-0.002	-0.004	-0.003	-0.001	-0.001	0.001	0.005	**0.019*****	**0.006*****
	[0.002]	[0.003]	[0.003]	[0.003]	[0.002]	[0.002]	[0.003]	[0.003]	[0.005]	[0.002]
Financially Constrained: No Payout	-0.001	0.002	0.004	**0.005***	**0.005****	**0.004****	**0.006*****	**0.011*****	**0.022*****	**0.010*****
	[0.002]	[0.003]	[0.003]	[0.003]	[0.002]	[0.002]	[0.002]	[0.003]	[0.004]	[0.002]
Financially Unconstrained: Payout	0.003	**0.008****	0.007	0.006	**0.008*****	**0.010*****	**0.014*****	**0.019*****	**0.033*****	**0.016*****
	[0.003]	[0.004]	[0.004]	[0.004]	[0.003]	[0.003]	[0.003]	[0.004]	[0.006]	[0.003]

This table presents estimates of the DPAD rate cut's effect on wage earnings at various points in the within-earnings wage distribution for publicly traded firms, multinational firms, and financially constrained and unconstrained firm. The table shows IV regression results from empirical specification (2)—specifically, the coefficient on the DPAD Cut variable, with standard errors presented below in brackets. Outcome variables are log earnings of various points in the within-firm earnings distribution. DPAD Cut is the percentage point reduction in the marginal tax rate due to the deduction. Instruments are the industry-by-firm-by-size-by-year average domestic production gross receipts share of total receipts 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 and an industry-by-year time trend. Standard errors are clustered at the industry-size level. *, **, and *** indicate significance at the 1 percent, 5 percent and 10 percent level, respectively.

Table A4: Financial outcomes and the DPAD

ln of	Dividends	Share Repurchases	Total Payouts	Debt
	(1)	(2)	(3)	(4)
DPAD Cut	0.002	0.011	**0.0435***	**-0.0459*****
	[0.0185]	[0.0526]	[0.0225]	[0.0129]
Observations	45,635	21,885	62,092	286,478
R-Squared	0.022	0.032	0.022	0.033

This table presents IV regression results from empirical specification (3). DPAD Cut is the percentage point reduction in the marginal tax rate due to the deduction—instruments are the industry-by-firm-by-size-by-year average domestic production gross receipts share of total receipts and a dummy variable for whether a firm is subject to the DPAD 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 and an industry-by-year time trend. Standard errors are clustered at the industry-size level. *, **, and *** indicate significance at the 1 percent, 5 percent and 10 percent level respectively.

Table A5: Total employment, net investment, and total earnings effects, by firm employment size quintile

	ln(Employment)	Net Investment/ Installed Capital	ln(Total Earnings)
	(1)	(2)	(3)
Full Sample	-0.003	**0.008*** **	**0.009** **
	[0.004]	[0.002]	[0.004]
Employment Quintile			
Bottom/First	**0.014** **	-0.007	**0.039*** **
	[0.006]	[0.009]	[0.008]
Second	**0.009** **	0.004	**0.017*** **
	[0.004]	[0.006]	[0.006]
Third	0.000	0.003	0.006
	[0.003]	[0.005]	[0.004]
Fourth	**-0.007** **	**0.008** **	-0.001
	[0.003]	[0.004]	[0.004]
Top/Fifth	**-0.028*** **	**0.014*** **	**-0.018*** **
	[0.006]	[0.003]	[0.006]

This table presents estimates of the effect of the DPAD rate cut on firm employment, investment and total earnings for firms in the five firm size quintiles, calculated by total employment. The table shows IV regression results from empirical specification (3)—specifically, the coefficient on the DPAD Cut variable, with standard errors presented below in brackets. Outcome variables are log total firm employment (column 1), net investment as a share of installed capital (column 2), and log total firm earnings (column 3). DPAD Cut is the percentage point reduction in the marginal tax rate due to the deduction. Instruments are the industry-by-firm-by-size-by-year average domestic production gross receipts share of total receipts and a dummy variable for whether a firm is subject to the DPAD 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 and an industry-by-year time trend. Standard errors are clustered at the industry-size level. *, **, and *** indicate significance at the 1 percent, 5 percent and 10 percent level, respectively.

Table A6: Firm earnings measures and the DPAD

ln of	Total Compensation	Officer Compensation	Non-Officer Compensation
	(1)	(2)	(3)
DPAD Cut	**0.0159*** **	**0.0441*** **	**0.0128** **
	[0.00476]	[0.00572]	[0.00506]
Observations	347,557	297,761	346,530
R-Squared	0.296	0.083	0.266

This table presents IV regression results from empirical specification (3). DPAD Cut is the percentage point reduction in the marginal tax rate due to the deduction—instruments are the industry-by-firm-by-size-by-year average domestic production gross receipts share of total receipts and a dummy variable for whether a firm is subject to the DPAD 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 and an industry-by-year time trend. Standard errors are clustered at the industry-size level. *, **, and *** indicate significance at the 1 percent, 5 percent and 10 percent level respectively.

Appendix B: Variable Creation

Specifics of variable creation, including the relevant line items on IRS 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 1 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:

Earnings 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.

Employee compensation is measured as the sum of lines 13, 23, 24 from Form 1120 plus line 3 from Schedule A of Form 1120.

Officer compensation is measured as line 12 from Form 1120.

Total compensation is measured as the sum of employee compensation and officer compensation.

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 C: Constructing Firm-Level Earnings Distributions using Tax Filings

We construct taxpayer-level earnings distributions using the population of W-2 filings from 2000 to 2015.[34] We then merge these earnings distributions with our panel of corporate tax returns. The primary contribution of our earnings 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 earnings varies across EINs for a given firm, median earnings may be biased as well.

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

Our process of constructing parent-level earnings 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 use the Form 851 ("Affiliations Schedule" attachment to a Form 1120) to identify parent-subsidiary relationships.[35] On Form 851, a taxpayer will list all subsidiary corporations as well as their parent corporation. An entity is identified as a parent on this filing if the corporation

[34] 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.

[35] 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.

owns at least 80 percent of the subsidiary.[36] Parent-subsidiary relationships identified in a given year are not transferred to future or prior years, as subsidiaries may be bought, sold, or spun-off. However, if a firm is listed as a subsidiary in year t and is again claimed as a subsidiary by that company in year $t+k$—but is not claimed by another company during those k years and does not file its own return—it is designated as a subsidiary of the company during the intervening k years. We also use both manual and fuzzy name matching to incorporate linkages not included in Form 851.

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 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 governments or 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. Table C1 contains the number of employees and amount of compensation by entity

type in 2015. We are able to match 86 percent of employees that are associated with for-profit entities to an entity level tax return, which includes around 89 percent of compensation.

B.2. Generating Firm-Level Earnings 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 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. Medicare wages are used instead of taxable wages (Box 1) because the former is a broader measure of wages, while the latter is net of exemptions such as employer flexible spending accounts. Finally, W-2s deemed to belong to non-profits or state, local, federal, or tribal governments are dropped. The product of this process is a file that is unique by parent EIN and tax year, and contains information on the firm earnings distribution, number of workers, and average earnings.

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 earnings 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 after incorporating the bridge file 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 feature substantial compensation deductions. To address such mismatches, we augment our mechanical parent-subsidiary matching effort using manual, name-based matches. This sub-process operates 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 the cost of labor deduction included in the cost of goods sold. However, there are generally timing differences in the measurement of these deductions compared to annual wages paid reported on W-2s. 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 occurs when a firm does not have a December accounting year end, as discussed above. Despite these measurement issues, the difference between these two items should give us a rough idea of which taxpayers pose problems 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 earnings 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.

Upon completion of the manual, name-based matching process, we further expand our parent-subsidiary matching process with both an exact and a fuzzy name-based matching procedure. We begin with set of all W-2 EINs which we have not yet matched to an entity-level return each year and our corporate panel each year. For each W-2 EIN and corporate tax return, we apply identical cleaning procedures to their firm names so that each firm name exists in a similar format without upper case letters and extraneous words such as "corp" or "inc." Next, we match a given W-2 EIN to a specific corporate tax return if the cleaned firm names of each observation exactly match each other. In this process, we alter the matched W-2 EINs to that of their matched corporate observation. Finally, using the same cleaned firm names, we apply a fuzzy name matching

procedure to our set of unmatched W-2 EINs and our panel of corporate tax returns. Here, we use a bigram-based approach and a token-based approach in conjunction and check our fuzzy name matches by searching for discrepancies in wages. We also weight our fuzzy-matching approach by the uniqueness of each word or bigram in each firm name,[37] and we produce similarity scores for every possible pair of W-2 EINs and corporate panel observations. All matching pairs with similarity scores below 95 percent are removed from consideration and only the highest scored match for each W-2 EIN is considered viable. If a match survives this process, then we replace the W-2 EIN within the match with that of their corporate panel observation. Lastly, we test a subsample of our fuzzy matches and find greater than 95 percent to be valid. From these processes, for each year, we possess a set of parent-subsidiary matches which include mechanical; manual, name-based; and programmatic, exact and fuzzy name-based parent-subsidiary matches.

Once we have compiled a list of these "corrected" EIN pairs, we return to the beginning of step 2 ("Generating Firm-Level Earnings 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.

[37] For example, a specific firm name like "xerox" will be highly unique and therefore weighted more than a more common work like "and" or a state name like "Florida." If our fuzzy matching process finds that a W-2 EIN and corporate panel observation both share the word "xerox", that match will be scored more highly than if two observations contain "and" or "Florida."

Table C1: Employees and compensation by entity type, 2015

	Employees		Compensation	
Entity Type	Count (Thou.)	Percent	Sum (Millions)	Percent
Form 1120	55,536	33.1%	$ 3,052,084	41.5%
Form 1120-S	36,100	21.5%	$ 1,239,982	16.8%
State or Local Gov't	16,457	9.8%	$ 721,852	9.8%
Form 1065	13,932	8.3%	$ 548,060	7.4%
Business	10,333	6.2%	$ 356,949	4.9%
Non-profit	7,949	4.7%	$ 281,050	3.8%
Form 990-T	7,864	4.7%	$ 408,214	5.5%
Federal Gov't	5,749	3.4%	$ 292,059	4.0%
IRS: 1120 Sub.	3,283	2.0%	$ 132,541	1.8%
Form 1040-C	3,028	1.8%	$ 66,741	0.9%
IRS: 1065	1,482	0.9%	$ 50,585	0.7%
IRS: 1120	1,260	0.8%	$ 40,345	0.5%
Religious	1,154	0.7%	$ 31,600	0.4%
IRS: 1120-S	1,053	0.6%	$ 30,446	0.4%
Non-profit or Gov't	975	0.6%	$ 49,389	0.7%
Other	1,488	0.9%	$ 60,263	0.8%
Total	167,643		$ 7,362,160	

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.