



# Tax Avoidance through corporate accounting: Insights for corporate tax bases

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## ABSTRACT

How do firms respond when a tax reform changes the relative costs of inputs? We exploit a reform in Texas that broadened the corporate tax base and created a 1% tax wedge favoring both cost of goods sold (COGS) and worker compensation over other types of expenses. We find no discernible real change in inputs, and little avoidance response into worker compensation, but find a large avoidance response reclassifying costs into COGS (a 4% base reduction, with elasticity -5). Our results highlight the importance of enforceable boundaries when designing broader corporate tax bases.

## 1. Introduction

Most corporate taxes are imposed on profits, a base defined as income less deductions for eligible expenses.<sup>1</sup> Reforms to raise additional revenue often broaden the corporate tax base, but doing so necessarily involves redrawing boundaries, which can create distortions that favor certain categories of expenses over others. How do firms respond to such changes? Do they alter their inputs in real terms, or reclassify expenses to take advantage of new rules? Understanding these responses is important for designing tax bases that are not only efficient but also enforceable in practice.

These questions are especially important in light of recent policy discussions about broadening corporate tax bases. Such exercises often involve drawing lines between different types of expenses, no longer allowing deductions for some expenses while allowing deductions for others. Although there is a rich literature about tax avoidance through income shifting or legal restructuring (see Carroll and Joulfaian, 1997; Slemrod, 1998; Gordon and Slemrod, 2000; Goolsbee, 2000; Maki, 2001; Saez et al., 2012; Kreiner et al., 2016; Harju and Matikka, 2016; Tazhitdinova, 2020), little is known specifically about how firms respond when certain broad categories of expenses are suddenly taxed differently.<sup>2</sup>

We investigate these questions by exploiting a unique corporate tax reform in Texas. As part of a base-broadening reform intended to raise revenue, the state eliminated deductions for many but not all expenses, thus creating a “tax wedge” between inputs that were previously treated equally. Categories of expenses that remained deductible became tax-advantaged over those that were no longer deductible.

In 2006, Texas replaced its tax on corporate profits (largely analogous to the U.S. federal corporate income tax) with a much broader tax on gross revenue. But the new broader tax base was complex. Corporations were generally assessed a 1% flat tax on their “total revenue” (a measure close to gross revenue), but were able to take a single deduction of their choosing, among three options: deduct only the cost of goods sold (COGS), deduct only compensation expenses, or take a flat deduction equal to 30% of reported total revenue. Most importantly for our purposes, this overhaul thus created a roughly 1% tax wedge favoring certain inputs over others (i.e., COGS or compensation), thus creating incentives for most corporations to either make real changes to their mix of inputs or to reclassify their expenses for tax accounting and reporting purposes to fit into the deductible category.

To measure firm responses, we conduct a differences-in-differences analysis using federal corporate tax returns comparing affected firms in Texas against similar firms in neighboring states.<sup>3</sup> This is a uniquely

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<sup>1</sup> For discussions of the structure of corporate taxes, in particular, see Loughead (2021), SOI (2020).

<sup>2</sup> To be clear, our discussion of accounting addresses tax accounting, as opposed to financial accounting and audited financial statements. The former are governed by applicable tax laws, while the latter are not, which can create some differences in the timing and quantity of income and expenses between the two. A comprehensive discussion of these differences is beyond the scope of this paper.

<sup>3</sup> Specifically, we use New Mexico, Oklahoma, and Arkansas as control states. We exclude Louisiana as a conservative measure: Hurricane Katrina hit on the eve of the reform and likely caused distortions in production inputs that could potentially bias our estimates. We do find that when including Louisiana our estimates are even larger for COGS margin firms and smaller for compensation margin firms. See Figure E.21.

rich setting to measure firm responses. Texas is economically large, with a gross state product that would make it the 8th largest economy in the world. Also, by using U.S. federal corporate income tax returns, we are able to observe firm reporting and responses across a large set of variables for the population of filers, offering enough power to precisely measure responses to even small tax changes.

We find no discernible real input changes by firms in response to the relative price changes of inputs caused by the new tax wedges. Nor do we find any notable reclassification of expenses into worker compensation. But we find a sharp and large reporting response by firms reclassifying previously non-COGS expenses into the COGS category. Our results thus highlight the importance of choosing the boundaries of base-broadening reforms carefully: while boundaries with extra reporting (such as W-2 information returns for workers) generate little avoidance through reclassification, boundaries that are less well policed (such as the distinction between COGS and non-COGS inputs) can generate significant reclassification responses, sizably reducing the corporate tax base.

While we find little response on the compensation margin, we estimate that firms able to adjust COGS reclassified roughly 5% ( $\pm 1\%$ ) of their otherwise ineligible expenses into COGS to qualify for the deduction, reducing the tax base by about 4% ( $\pm 1\%$ ) in response to the new tax wedge. We conduct numerous tests to confirm that this response is a reporting reclassification and not a real response, most importantly showing that the reporting changes on Form 1120 do not match changes in real inputs reported on separate information returns (see Section 6.2). These results are not only large but also economically significant, with the affected firms (i.e., those facing the COGS reclassification incentives) constituting 85% of corporate revenue in Texas.

We estimate an elasticity by exploiting variation in the size of the tax wedge across firms. We find a consistent response to the tax wedge with an elasticity of about  $-5$ . The economic interpretation is: for every 1% difference in deductibility between COGS and non-COGS expenses, the reclassification response between the two categories reduces the tax base by roughly 5%. The response is thus economically large. But even given these magnitudes, we believe these are lower-bounds, for reasons discussed in detail in Section 3.<sup>4</sup>

Why the large difference between the COGS and compensation responses? As noted above, we find ample evidence suggesting that the change in COGS is driven by avoidance through reclassification rather than by real changes. This finding makes sense, because the two categories have meaningfully different qualities that affect their amenability to reclassification. Accounting research discusses how categorizations of expenses into COGS are difficult to audit, which offers room for manipulation of earnings metrics (Fan and Liu, 2017; McVay, 2006; Poonawala and Nagar, 2019). COGS is a broad category that admits a range of different expenses, has scattered third-party reporting,<sup>5</sup> and ultimately relies heavily on the discretion and judgment of taxpayers and their accountants. In contrast, the worker compensation category under Texas law is much more restrictive, is governed by bright-line rules with less reliance on judgment, is subject to routine third-party information reporting (i.e., Form W-2), and as a result involves less taxpayer discretion and can be scrutinized more easily by tax authorities.<sup>6</sup>

Our results are economically important, with policy implications at both the state and federal level. In Texas, the effects of this shifting

<sup>4</sup> Note, however, that we suggest caution in extrapolating to substantially larger tax wedges, as our elasticity estimate is estimated from wedges between 0.2% and 1%, as discussed in Section 7.

<sup>5</sup> There is no information reporting specifically for COGS expenses, which instead would be captured both over- and under-inclusively on a combination of Form 1099s and W-2s.

<sup>6</sup> For a more thorough discussion of these points, see Section 9.

were large enough to contribute to budget shortfalls after enactment.<sup>7</sup> Across the United States, one quarter of all U.S. corporate income is subject to gross receipt taxes similar to Texas: nine states currently employ some form of a gross receipts tax, and three more states have recently proposed legislation to enact such taxes.<sup>8</sup> At the federal level, some policy changes and many proposals in recent years have involved corporate base-broadening, including domestic and international efforts to reduce corporate income tax base erosion. Although the details of the reforms are different than the Texas setting, all base-broadening projects fundamentally involve new line-drawing that denies previously favorable tax treatment to certain categories of items but not others.

Our findings make several contributions to existing research on corporate tax bases. Most directly, our research sheds new light on how firms' avoidance responses affect the corporate tax base (e.g., Clausung, 2016; Dowd et al., 2017; Klassen and Laplante, 2012; De Simone et al., 2019; Giroud and Rauh, 2019; Slemrod, 1995) and on the elasticity of the corporate tax base (Devereux et al., 2014; Gruber and Rauh, 2007; Dwenger and Steiner, 2012). In particular, our paper extends this literature by identifying a strong avoidance response along a dimension that has received scant attention by economists: the accounting classification of expenses. Thus, while many studies describe avoidance that involves shifting by legally structuring activities in a different way (Carroll and Joulfaian, 1997; Slemrod, 1998; Gordon and Slemrod, 2000; Goolsbee, 2000; Maki, 2001; Saez et al., 2012; Kreiner et al., 2016; Harju and Matikka, 2016; Tazhitdinova, 2020), our work identifies what is arguably an even easier and more direct form of avoidance: doing the same real activity as before with the same legal structure, but simply categorizing it differently for tax accounting purposes so that it is reported on a different line on the tax filing.

Our findings also complement previous research on inaccurate expense reporting by firms. In particular, we find that the strongest responses are by smaller firms and firms that appear to face additional cash-flow pressure after the reform, particularly unprofitable firms, firms in low margin industries, and firms facing larger tax liabilities after the reform—heterogeneity results that complement recent findings on tax evasion, often by smaller firms (Slemrod et al., 2017; Carrillo et al., 2017; Almunia and Lopez-Rodriguez, 2018; Naritomi, 2019; Li and Wang, 2020; Mascagni et al., 2021).

We also contribute to a growing literature, especially useful for policymakers and revenue estimators, that uses the states as laboratories to understand firm behavior and responses to tax policy more generally (DeBacker et al., 2019; Suárez Serrato and Zidar, 2018). We also complement existing research on the pyramiding effects of gross receipts taxes by measuring the effects of another distortion that can arise from their design (see, e.g. Hansen et al., 2022; Xing et al., 2024).

We also unite the public economics literature with a vast body of research by accountants and finance economists on the pliability of corporate accounting (e.g., Schipper, 1989; Stolowy and Breton, 2004; McVay, 2006; Healy and Wahlen, 1999), specifically in the context of tax.<sup>9</sup> In particular, our work contributes to this literature by exploiting

<sup>7</sup> We find corroborating evidence in a 2014 report to the Texas legislature that there was a surprising amount of COGS reported after the reform, contributing to revenue shortfalls below predictions.

<sup>8</sup> The states with gross receipts style taxes are Delaware, Michigan, New Mexico, Ohio, Oregon, Nevada, Tennessee, Texas, Washington. These represent 24% of total corporate receipts as of 2019. This estimate uses U.S. federal tax return data, winsorized at 99.9%. Note that state of headquarter is often distinct from the state of incorporation, so that Delaware only represents a tiny portion of this estimate. See a longer discussion in Section 9.

<sup>9</sup> See Dharmapala (2020), Desai and Dharmapala (2009), Hanlon and Heitzman (2010), Shackelford and Shevlin (2001), Dyreng et al. (2008), Balakrishnan et al. (2019), Blouin (2014), Chen et al. (2020), Armstrong et al. (2015), Dyreng et al. (2010), Armstrong et al. (2012), Desai and Dharmapala (2006), Shackelford et al. (2011), Erickson et al. (2004), Maydew (1997), Cloyd et al. (1996).

a unique natural experiment to estimate magnitudes of accounting responses and drawing upon administrative data to measure response behavior, notably among non-public firms.

Although our findings have important economic implications, readers also should be aware of the limits of our findings. First, our estimates are context-specific. Rules creating distortions along other dimensions in other settings may generate larger or smaller responses. Likewise, a change in an existing distortion (as opposed to the creation of a new distortion) may result in different intensive margin responses. Second, although federal tax data is the best data for this project, our results are likely attenuated for various reasons described in Section 3. But even with these caveats in mind, our findings strongly suggest that policymakers, tax administrators, and revenue estimators should be mindful of the incentives created by tax base changes that create reclassification incentives, especially where boundaries are difficult to police.

## 2. Background & theoretical framework

### 2.1. The Texas franchise tax reform

In 2006 Texas reformed its “franchise tax”, the state’s tax on business income. The reform was prompted by a Texas State Supreme Court ruling that found the existing school finance system was unconstitutional.<sup>10</sup> To cover the shortfall, the franchise tax was reformed: the existing 4.5% tax on corporate profits (similar to the federal corporate income tax) was replaced with a much broader 1% tax on business gross revenue.<sup>11</sup>

Importantly for our purposes, the new tax base created tax wedges between different type of inputs. That is, while the reform eliminated most deductions, some were still available causing certain inputs to become tax-favored. More precisely, the reform permitted firms to choose a single deduction out of three options: COGS, total compensation, or a flat 30% deduction from total revenue. Because taxpayers could select which “taxable margin” they would like to be taxed upon — revenue minus COGS, revenue minus total compensation, or revenue minus the flat deduction — the new tax was dubbed the “margin tax”. There was also an “EZ filer” category for small firms, where instead of choosing a margin they could select a lower flat rate on all revenue. The reform was effective for tax years beginning in 2007.<sup>12</sup>

### 2.2. What are COGS and worker compensation?

After the reform, two categories of input expenses were tax-favored: COGS and worker compensation. COGS includes the costs of material inputs, costs of and depreciation associated with equipment used for the production of goods, and research and design costs.<sup>13</sup> Importantly, COGS includes some but not all labor expenses: it includes the subset

<sup>10</sup> Neely v. West Orange-Cove Consol. Indep. Sch. Dist., 176 S.W. 3d 746, 751 (Tex. 2005). See Outenreath (2015), Vanderhider (2007), Olenforst (2006) for a more thorough discussion.

<sup>11</sup> The solution was proposed by a gubernatorial-appointed commission that recommended broadening the franchise tax to solve two problems in a single stroke: raising revenue for the school system while also reforming the franchise tax to eliminate loopholes and broaden the tax base. See the Sharp Commission Report (Sharp et al., 2006) and Outenreath (2015). The reform not only applied to corporations, but all limited liability companies, including LLCs and LPs. We focus solely on corporations because the changes in incentives faced by other firms are significantly less clear after interacting with various federal tax rules.

<sup>12</sup> The reform technically applied to tax returns due on or after January 1, 2008, thus covering the 2007 tax year. Note that firms can choose in each taxable year which margin applies. Thus there is no influence of past choices of the firm on future choices, and no penalty for switching margins in any given year.

of wages, payroll taxes and benefits, and other labor costs associated with the production of goods (reported on the “cost of labor” line of the COGS worksheet), but excludes officer compensation and any wages or related labor costs not associated with goods-production.

Worker compensation, the second deduction option, includes the sum of (a) federally-defined Medicare wages, stock options or awards, and distributive shares of passthrough income capped at \$300,000 per employee, plus (b) employee benefits, including retirement and pensions benefits. It does not include payments to contractors.

Importantly, many expenses may qualify as both COGS and compensation. For example, salary paid to a production line worker is COGS, but it is also compensation. The categories are not mutually exclusive. But firms can only choose one of these margins to deduct.<sup>14</sup>

### 2.3. Formalizing the tax incentives

We use a simple mathematical model to describe the incentives created by the new tax wedges. For the sake of simplicity, we model only a firm on the COGS margin, but the same results apply to the compensation margin, where firms face the same incentives.

Consider a firm that uses two categories of inputs to generate revenue in a setting without taxes:

$$\max_{c,n} \pi = R(c, n) - c - n \quad (1)$$

The firm generates profit ( $\pi$ ) by generating revenue ( $R$ ) from its production, using real inputs the cost of which is classified for accounting purposes as either COGS ( $c$ ) or non-COGS expenses ( $n$ ).

In a simplified pre-reform setting,<sup>15</sup> the firm faces a profits tax of  $\tau_0$ :

$$\max_{c,n} \pi = (1 - \tau_0)(R(c, n) - c - n) \quad (2)$$

The tax  $\tau_0$  allows firms to deduct both COGS and non-COGS inputs equally, so there is no incentive to make real changes to the mix of inputs used by the firm or to reclassify expenses between the two.

In the post-reform world, there is a tax wedge  $\tau_1$  between the choice of inputs:

$$\max_{c,n} \pi = (1 - \tau_1)(R(c, n) - c) - n \quad (3)$$

Now COGS expenses  $c$  are tax-preferred because a deduction is available, but not for  $n$ . This creates both an incentive for real changes in the input as well as an avoidance incentive.

To see these incentives, assume that the firm can choose to reclassify some amount  $a$  from non-COGS expenses  $n$  to COGS expenses  $c$ . As a result, what is reported on the tax return is now  $(c + a)$  for COGS

<sup>13</sup> The law defines “goods” as “real or tangible personal property” and explicitly includes software and virtual and print media. COGS can include a wide variety of expenses involved in the production of goods, including even certain depreciation and amortization expenses associated with the production process.

<sup>14</sup> So, for example, a firm choosing the COGS margin could deduct production line salaries and material inputs to produce goods, but not administrative salaries. On the other hand, a firm choosing the compensation margin could deduct both production and administrative salaries, but not material inputs to produce goods.

<sup>15</sup> The pre-reform setting was more complex than this, but our simplifications do not alter the incentives of firms. For example, the pre-reform franchise tax also included a potential tax on “taxable capital” (discussed above), but because “taxable capital” is not directly affected by input choices and thus does not alter the incentive analysis below, we exclude it for simplicity. We similarly exclude the apportionment factor and federal taxes for simplicity: although they are present in both the pre- and post-reform frameworks, they do not affect the analysis below. Also note that we exclude federal tax for simplicity, as it does not distort any incentives faced by firms under the state regime.

and  $(c - a)$  for non-COGS expenses. Further assume that there is some increasing cost of this reclassification given by  $A(a)$ , reflecting both transaction costs and the risks of audit or penalties.<sup>16</sup>

The firm's profit maximization equation is now given by:

$$\max_{a,c,n} \pi = (1 - \tau_1)(R(c, n) - (c + a)) - (n - a) - A(a) \quad (4)$$

Taking the first order conditions, we have:

$$\frac{\partial A}{\partial a} = \tau_1 \quad \frac{\partial R}{\partial c} = 1 \quad \frac{\partial R}{\partial n} = \frac{1}{1 - \tau_1} \quad (5)$$

In short, the tax wedge between  $c$  and  $n$  is reflected in both the real and reclassification incentives faced by the firms. While the firm will only use  $n$  until it delivers a return of  $\frac{1}{1-\tau_1}$  per \$1 spent, the firm will use  $c$  until it delivers a return of \$1 per \$1 spent, and it will reclassify an amount  $a$  from  $n$  to  $c$  until the marginal cost for  $a$  matches the tax benefit  $\tau_1$ .

The above framework is for firms on the COGS margin, but the same logic applies analogously to firms on the compensation margin: there is a real incentive to use more inputs that are compensatory in nature, and an incentive to reclassify from non-compensation to compensation expenses.

The above framework does *not* apply for firms choosing the 30% revenue margin or to EZ filers, because these options do not create a tax wedge between inputs. We thus exploit these as placebos to confirm our results below.

It is important to note that the framework here could be enriched with more detail if one wanted to make specific predictions about which firms are expected to respond, and by how much. For example, the model could describe  $A()$  in more detail, could assume nonlinear costs to firm owners (e.g. when facing insolvency or cash constraints), or might formalize the complexities faced by multi-state firms.<sup>17</sup> Our goal here is instead to simply describe the basic incentives created by the tax change.

### 3. Data

**Data sources.** We use anonymized tax data from Form 1120 (US Corporate Income Tax Return) and Form W-2 (Wage and Tax Statement) for firms from Texas and control states between 2000–2014.<sup>18</sup> This is the best data to conduct the analysis, because the data contain firms and workers from all states with consistent variables across time and geography, making it possible to construct a difference-in-differences estimator using firms in and outside of Texas. The data also enable us to compare amounts reported on the corporate return to the real inputs reported on workers' Form W-2s, enabling us to estimate reclassification responses.

**Measuring COGS and compensation.** Texas has precise definitions of COGS and worker compensation for purposes of the franchise tax that differ slightly from the federal definitions. We cannot observe these values directly, but the federal data enable us to closely approximate them.

<sup>16</sup> We thus assume  $A(0) = 0$  and that  $A(a)$  is convex and minimized at  $A(0)$ . Note that this cost function may include some initial fixed cost in moving away from  $a = 0$ , for example reflecting the costs of discussing with accountants or reviewing potentially low-hanging fruit for reclassification.

<sup>17</sup> In particular, we acknowledge the possibility that the form of the cost function  $A()$  may create incentives for firms to manipulate either revenue or total expenses. In light of this concern, we test this possibility, but do not find evidence of revenue manipulation.

<sup>18</sup> See Appendix B for figures containing images of Form 1120 highlighting the specific lines used in the analysis.

We measure COGS as Line 2 of Form 1120.<sup>19</sup> To match the Texas definition of compensation as closely as possible, we sum Medicare wages and tips, including stock options and grants, that are reported on Forms W-2 issued by the corporations, capped at \$300,000 per employee, plus employee pension plans and benefits reported on Lines 23 and 24 of Form 1120.<sup>20</sup>

As a reassurance of the accuracy of the data, a Texas commission investigating the franchise tax reform reported that 85% of firms (by revenue) took the COGS deduction (Combs, 2013)—we are able to replicate that result exactly using our calculators described below in Section 4.2.

**Data limitations that bias estimates down.** Despite the advantages of federal tax data, there are two important ways that federal tax data will lead to the magnitude of our estimates being biased down.

First, the definitions at the state and federal levels for measuring COGS and compensation are slightly different. As a result, some true responses at the state level will not be observable on federal returns, and will thus bias estimates downward.<sup>21</sup> Second, the Texas tax base for any given firm is scaled down by an apportionment factor that is not observed in our data: the percentage of the firm's total sales that are in Texas.<sup>22</sup> Although we attempt to limit firms to just those with significant operations in Texas (based on W-2 worker locations), our results are still biased down: Texas firms with low apportionment factors will not respond as much, while firms in control states with high apportionment factors *will* respond.<sup>23</sup> See Section 4.3 for discussion.

### 4. Empirical framework

We conduct a difference-in-differences event study comparing the behavior of firms in Texas against firms in control states. The identifying assumption is that the two groups would trend parallel in the absence of the Texas tax reform. The design allows us to control for national shocks, which is especially important given our period of observation includes the Great Recession. Our preferred specification is:

$$y_{it} = \gamma + \sum_{T \neq 2005} \beta_T \mathbb{1}[t = T] \cdot Texas_i + \theta Texas_i + \delta_{jt} + \eta_i + X_{it} + \varepsilon_{it} \quad (6)$$

where  $i$ ,  $j$ , and  $t$  index firm, industry, and year respectively,  $y_{it}$  is the outcome variable,  $\gamma$  is a constant,  $Texas_i$  is an indicator for being located in Texas,  $\delta_{jt}$  is a vector of industry-by-year fixed effects,  $\eta_i$  is a vector of firm fixed effects,  $X_{it}$  is a vector of additional firm-by-year controls that include order-of-magnitude dummies of lagged total revenue and lagged total assets. We weight our regressions by total revenue (total income plus COGS, lines 11 and 2), so that our estimates reflect the economic magnitude of the findings. The  $\beta$ s are

<sup>19</sup> Note that a schedule on Form 1120 existed (Schedule A, later replaced by Form 1125-A) on which firms reported the decomposition of COGS by labor, purchases, or other costs. These data would have enabled us to compare changes in labor attribution of COGS directly, rather than inferring from changes in the salary line, but these data are not available in the population data we use at the time of the reform.

<sup>20</sup> See the 2008 Texas Franchise Tax Report Information and Instructions for the precise definitions. <https://comptroller.texas.gov/forms/05-392.pdf>.

<sup>21</sup> Moreover, firms have an incentive to keep federal returns as consistent as possible to avoid triggering federal audit or requiring the firm to file a change in the method of accounting, which suggests an incentive to understate classification changes on the federal return.

<sup>22</sup> For example, if a firm has 80% of its sales in Texas, the apportionment factor applied to the firm's tax base will be 0.8.

<sup>23</sup> More precisely, the state of the firm does not mean that its sales are in the same state. It could be a firm with 100% of its operations in Texas has 100% of its sales in another state, and a control firm with 100% of its operations outside of Texas actually has 100% of its sales in Texas, and thus the control firm responds while the treatment firm does not, biasing the estimate down.



the coefficients of interest, and can be interpreted as a difference-in-differences estimate of the revenue-weighted average difference in the outcome variable in a given year between treated and control firms.

We also estimate a reduced form of Eq. (6) given by:

$$y_{it} = \gamma + \beta Post_t \cdot Texas_i + \theta Texas_i + \delta_{jt} + \eta_i + X_{it} + \varepsilon_{it} \quad (7)$$

where  $Post_t$  is a binary variable identifying tax years after the enactment of the reform. In general, unless specified, we exclude year 2006 from the regression because this is a year that reflects anticipatory changes rather than the full effect of the reform.

As discussed in Section 2.3, there are two critical considerations to keep in mind: (1) the incentive faced by a given firm will depend on which deduction margin the firm is on (COGS, compensation, or revenue) and whether the firm is a normal or EZ filer, and (2) real responses may confound estimation of any reclassification response. In light of these points, we choose both several outcome variables and several distinct subsets of firms to estimate the different types of responses.

#### 4.1. Key outcome variables

We consider a number of outcome variables for the above regressions, focusing on two: (1) the amount of shifting from ineligible to eligible expenses, and (2) the change in the tax base.

**A measure of input response.** First, to measure the change of reported inputs from ineligible to eligible expenses, we define a ratio of eligible expenses to “total expenses”, measured as COGS (line 2) plus total deductions (line 27). Integrating this concept with the theoretical framework laid out in Section 2.3, the variable can be written for firms on the COGS margin as:

$$y_{it} = \frac{COGS_{it}}{total\ expenses_{it}} = \frac{c_{it} + a_{it}}{c_{it} + n_{it}} \quad (8)$$

This formulation recognizes that reported COGS (or compensation, for firms on that margin) after the reform will reflect not only  $c$  but also any reclassification  $a$ . In a regression framework, the variable produces a simple and convenient interpretation of the  $\beta$ s: if the real response is approximately zero, the  $\beta$  can be interpreted as an estimate of  $a$  (the reclassification response) as a share of total expenses. We perform subsequent analyses of real responses and fail to document any real responses.

**A measure of the tax base.** Our primary interest is the effect of the reform on the corporate tax base. To measure the percent change in the tax base, we take the log of the firm’s tax base as a share of the firm’s total revenue:

$$y_{it} = \ln (Base_{it} / Total\ Revenue_{it}) \quad (9)$$

We calculate an estimated value of the tax base ( $Base_{it}$ ) for each firm using the rules under the post-reform tax-regime. We also left-censor the fraction at 0.01 so that observations with 0 tax base are not undefined, and (as a conservative measure) so that small moves near the extensive margin are not overly influential. Total revenue is constructed to approximate the definition under Texas rules post-reform. This variable offers a nice intuition within a regression framework: by taking the natural log of the base-to-total-revenue ratio, the  $\beta$  can be interpreted as the average percentage change in the tax base of the affected Texas firms versus the control firms in other states.

#### 4.2. Firm sample construction

To measure the response of Texas firms to the policy, we must (1) isolate the subset of firms in Texas that are affected by the policy, and (2) identify a corollary subset of firms outside of Texas that would exhibit parallel trends, but that are *not* subject to the same policy change. To do this, we program tax liability calculators to identify which firms are actually affected in Texas and which firms in other

states *would be affected*, but are not because they are located outside of Texas.

More precisely, we program a tax liability calculator that applies the post-reform Texas rules to all firms (in Texas and in control states). We calculate the tax liability under the COGS regime, the compensation regime, the EZ regime (if eligible), and the revenue regime. We assign each firm to the regime that minimizes the tax of the firm. For Texas firms, this determines which “margin” applies to the firm. For the control state firms, this identifies which margin the firm *would apply* had the Texas rules applied to those firms. Our design compares firms in treatment and control states on the same margin.

Our main specification applies the calculator in each tax year to determine the margin of each firm for that year, because there is no restriction for firms switching regimes in any given year. But for robustness we also run a lagged specification (basing margin on the prior year calculation) and a balanced panel (basing margin on the calculation in 2005, prior to the reform). Our results are not affected by these altered specifications.

#### 4.3. Apportionment factor and downward bias

As discussed in Section 3, the tax base for any firm is multiplied by an “apportionment factor” equal to the percentage of gross receipts that are from sales in Texas. Although we do observe the headquarters of the firm, we cannot observe the apportionment factor because we do not observe the distribution of gross receipts within a firm across states. This creates an attenuation effect that biases down our estimate below the true effect: if we categorize firms by headquarters (which is binary for presence in Texas), firms headquartered outside of Texas (the control firms) with sales in Texas will nonetheless be subject to some amount of the Texas tax and will respond, while firms headquartered in Texas (the treatment firms) with sales outside of Texas will not have their full gross receipts subject to the tax, and thus will not respond as strongly—both effects will bias estimates down. This is conceptually similar to an intent to treat variable where there are both entities assigned treatment who do not completely take up the treatment and entities who are not assigned treatment, but nonetheless are partially treated.

There is also a downward bias from the allocation of inputs by multi-state firms. For example, a firm operating both in Texas and outside of Texas will have an incentive to book its COGS in Texas while booking other expenses elsewhere. Even though there is an avoidance response, we will not pick it up because such internal reallocation offsets when reported on the consolidated Form 1120.

We use W-2 data to mitigate this issue. Specifically, in our primary specification we restrict our treatment and control groups to firms that have at least 75% of their employees in the same state as the ultimate parent headquarters. We also perform robustness tests, showing that both unrestricted and fully restricted (100% of employees in same state) produce similar results. We also discuss in Appendix D how this approach does a reasonable job at avoiding significant downward bias without unnecessarily restricting our sample. But even with these assurances at reasonableness, because we cannot directly observe where sales are made or where COGS are booked, there likely exists at least some downward bias. As a result, our estimates should be considered conservative estimates of firm responses. We discuss our use of W-2 records to mitigate downward bias in greater detail in Appendix C.

#### 4.4. Selection of control states

Our specification uses geographic proximity to identify control states. That is, we use states adjacent to Texas as controls. Geographic proximity offers several important benefits over other choice of controls. First, to the extent there are natural similarities in economic activity that bleed across state borders, this approach automatically captures these similarities. Second, the approach provides a defensible

rule with clear boundaries that helps limit researcher discretion. Third, and perhaps most importantly, there are likely unobservable factors that make neighboring states similar in a way that non-neighboring states are not. Put another way, if a researcher tries to identify control states based upon a set of observable variables, this risks overemphasizing the observables while missing unobserved similarities that make the neighboring states more compelling controls.

Specifically, we use firms located in Arkansas, New Mexico, and Oklahoma as controls in our primary specification. We exclude Louisiana in the main specification because Hurricane Katrina hit on the eve of the reform in fall 2005. We observe that W-2 wages as a share of total firm expenses declined by 6% in 2005 in Louisiana, while remaining essentially stable in other states, and that the COGS share of expenses dropped in Louisiana by roughly 5% in 2005, which could bias our estimates upward.<sup>24</sup>

For robustness, we also run specifications that include Louisiana and specifications that exclude each state to ensure that no single state has outside effects that drive any results.<sup>25</sup>

## 5. Descriptive statistics and balance

In this section, we provide some descriptive statistics and compare the population of firms in Texas and firms in its neighboring states in 2005. These statistics produce two takeaways. First, the vast majority of revenue is reported by firms we predict to be on the COGS margin, as shown in Figure E.13 in the appendix. This fact is important in and of itself when considering the possible implications of the shifting behavior our theoretical model produces. We provide estimates for both the full population and for the restricted population of firms we use in our analysis, which excludes firms with more than \$100 million in total revenue and firms with a large number of out-of-state workers, as described in Section 4.3. Note that when removing these firms from the analysis, the percent of revenue accounted for by firms deducting COGS is lower both in Texas and its neighboring states, but also more balanced.

The commissioned report reviewing the Texas franchise tax reform Combs (2013) indicates that 85% of revenue was reported by firms who opted for the COGS deduction in 2008. We are able to reproduce that statistic for the years 2007–2013 (the time period under review in the report), reaffirming the reliability of our data and analysis.

Second, we find that firms in Texas are highly comparable to firms in neighboring states. Table 1 provides summary statistics of variables of interest for the COGS margin firms in our analysis, comparing firms in Texas and control states in 2005. Both firms in Texas and firms in control states are skewed right in terms of each of these variables, whether revenue-weighted or unweighted. COGS firms tend to be larger than other firms. A similar table for firms on the compensation margin is available in the appendix, but the key takeaway is that there is comparable similarity between Texas firms and firms in neighboring states.

<sup>24</sup> There are two reasons we are not concerned about the effect of Hurricane Katrina on Texas directly. First, we do not see an analogous decline in W-2 wages as observed in Louisiana. Second, the impacts on Louisiana appear to suggest that the hurricane tended to depress COGS, which would bias down our estimates, rather than bias them up.

<sup>25</sup> For example, New Mexico also has a gross receipts tax, but we are not concerned about its adequacy as a control for two reasons: there were no changes during the period of observation that would threaten parallel trends, and the New Mexico tax base is different from the Texas tax base, with no exclusions or deductions for COGS or compensation. We provide estimates of our primary specifications excluding Texas in Appendix E. Our results are robust to the exclusion of New Mexico.

## 6. Results: Shifting response

Consistent with the incentives described in Section 2.3, our results suggest that firms on the COGS margin reclassified non-COGS expenses as COGS in response to the new tax wedge. We provide supporting evidence that the response is a reporting response and not a real response. In contrast, we find no notable response by firms on the compensation margin (i.e., the estimate is noisy and close to zero).

### 6.1. Shifting of expenses

Fig. 1 presents our main estimate of the shifting of expenses by firms on the COGS and compensation margins. The coefficient estimates are generated using our primary specification in Eq. (6). Each panel plots two regressions. For the left panel, the dependent variables are COGS and non-COGS expenses as a share of total expenses; for the right panel, the dependent variables are compensation and non-compensation expenses as a share of total expenses. The  $\beta$ s thus represent the extra COGS, non-COGS, compensation, or non-compensation expenses as a share of total firm expenses by Texas firms relative to control firms over time.

For COGS margin firms, pre-trends are similar leading up to the reform, followed by a sharp divergence. After the reform, Texas firms reported more COGS as a share of their total expenses, approximately 1.1% more. Likewise, non-COGS expenses symmetrically (and mechanically) dropped as a share of total expenses.

The amount shifted from non-COGS expenses to COGS expenses is substantial economically. In the post-reform period, COGS accounted for over 77% of total expenses. A 1.1% increase in COGS expenses represents a 5% decline in non-COGS deductible expenses. And given that we estimate 85% of total revenue reported by Texas firms is from COGS firms, the tax revenue implications are significant.

Firms on the compensation margin, on the other hand, do not make statistically or economically meaningful changes after the reform. Although there appears to be slightly more compensation expenses by Texas firms after the reform, as reported in Fig. 1, the results are noisy and the magnitude is close to zero. A null result is a reasonable possibility.<sup>26</sup>

Next, we measure changes in specific line items on Form 1120, to better understand which categories of expenditure are the source of this COGS shifting. Wages and salaries reported on the Form 1120 (line 13) and the broad category of “other deductions” (line 26) both exhibit a material decline following the reform. The biggest single contributor is the other deductions category. Other deductions comprise 30% of total deductions, but account for 50% of the shift into COGS. Other deductions fall 8% as a share of total expenses after the reform. Wages and salaries contribute a smaller but sizable portion of the shift: they comprise 29% of total deductions, contribute about 32% of the shift, and fall by 5% as a share of total expenses after the reform.

### 6.2. Reclassification or real change?

Is this shifting into COGS a real or reclassification response? Seven different lines of evidence all suggest the response is driven by accounting reclassification.

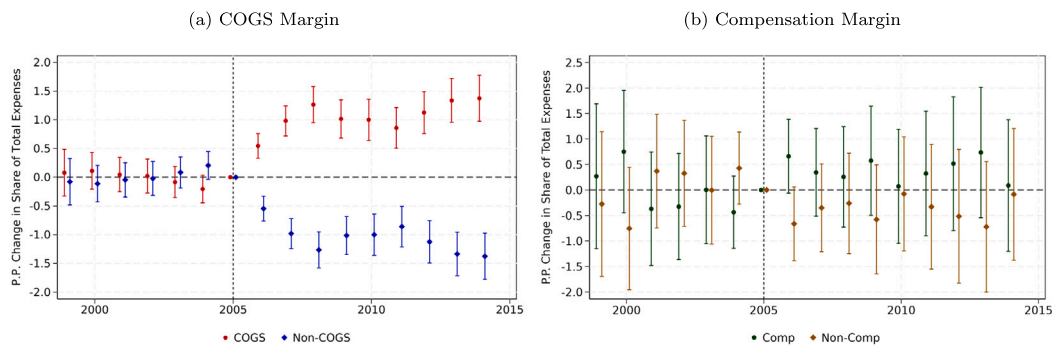
First, we use W-2s to measure real input changes in workers. We have worker-level identifiers in the W-2 data, and are able to measure turnover (separations and new hires) in the firm’s workforce. If the firm changes inputs by hiring or firing workers to devote more inputs to COGS, we would see an increase in employee turnover. However, as Fig. 3 documents, we do not see any notable increase in turnover by

<sup>26</sup> Note that part of this relatively larger noise is driven by the fact that there are fewer firms on compensation margin than the COGS margin, as seen in Table 1.

**Table 1**  
Descriptive Statistics for Firms on the COGS Margin (2005)

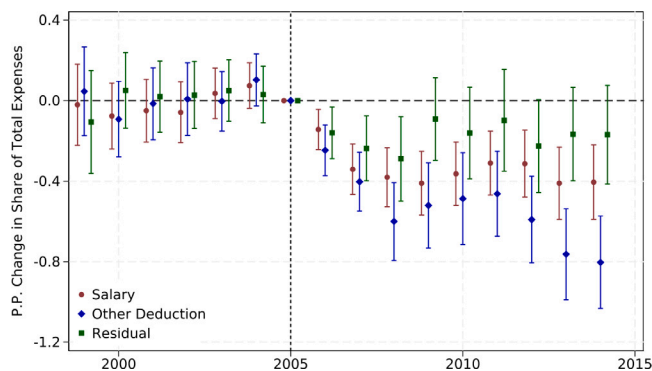
	10th		Median		90th		Mean (weighted)		Mean (unw.)	
	Texas	Control	Texas	Control	Texas	Control	Texas	Control	Texas	Control
Gross Revenue (\$1k)	95	91	934	971	7,126	7,709	22,437	22,385	3,237	3,337
Total Income (\$1k)	18	23	255	286	1,695	1,766	4,759	4,479	777	796
COGS (\$1k)	62	57	626	651	5,461	5,839	18,128	18,388	2,512	2,601
Wages (\$1k)	24	27	177	196	1,245	1,248	2,637	2,662	551	557
Tot. Comp. (\$1k)	0	0	90	127	944	1,056	2,259	2,555	404	455
Tot. Deductions (\$1k)	27	30	253	279	1,580	1,632	4,157	4,023	733	735
Tot. Assets (\$1k)	7	10	236	314	2,458	2,695	10,432	13,100	1,495	1,469
Employees (num.)	1	1	7	8	38	42	76	85	18	20
Profit Margin (%)	-55	-39	2	3	26	25	-19	-8	-113	-84
Sales Growth (%)	-31	-26	8	6	91	64	27	20	21	16
Count									47,905	13,407

Notes: This table reports the means and approximations of the 10th, median, and 90th percentiles to protect confidentiality. We include a selection of variables for firms on the COGS margin in Texas and in the controls states (Arkansas, Oklahoma and New Mexico) in 2005. The means are weighted by total revenue. These variables are gross revenue (Form 1120 line 1a), total income (line 11), COGS (line 2), W-2 Medicare wages, total compensation under the Texas definition, total deductions (line 27), total assets (line D), total employees (from W-2s), profit margin (profit as a percentage of total income) and year over year growth in gross sales. Ratios (profit margin and sales growth) are winsorized at the 5th/95th percentiles.



**Fig. 1.** Change in COGS and compensation as a share of total expenses.

Notes: These figures display the estimated percentage point changes in the share of total expenses represented by COGS, non-COGS, compensation, and non-compensation expenses for COGS margin firms and compensation margin firms in Texas vs. firms in control states. Point estimates and ninety-five percent confidence intervals are estimated using a difference-in-differences specification given by Eq. (6) with dependent variables defined as in Eq. (8). The sample is limited to firms we define to be on the COGS and compensation margins as described in Section 4.2. We further limit the population to Texas firms with at least 75% of W-2 wages paid in Texas, non-Texas firms with no more than 25% of wages paid in Texas, or firms with no W-2 matching. We exclude firms with more than \$100 million in total revenue (total income + COGS) in a given year. Estimates are weighted by total revenue.



**Fig. 2.** Changes in certain deductions as a share of total expenses.

Notes: This figure displays the estimated percentage point changes in several measures from Form 1120: the share of total expenses represented by salary and wages (line 13), other deductions (line 26), and the residual of total deductions. Point estimates and ninety-five percent confidence intervals are estimated using a difference-in-differences specification given by Eq. (6) with dependent variables defined as in Eq. (8). The sample is limited to firms we define to be on the COGS margin as described in Section 4.2. We further limit the population to Texas firms with at least 75% of W-2 wages paid in Texas, non-Texas firms with no more than 25% of wages paid in Texas, or firms with no W-2 matching. We exclude firms with more than \$100 million in total revenue (total income + COGS) in a given year. Estimates are weighted by total revenue.

affected firms. If anything, there is a slightly counter-cyclical pattern to the Texas firms relative to the control firms, but no shock or change around 2006 at the implementation of the reform. Thus, changing real worker inputs cannot explain the large shift in salary observed in Fig. 2.<sup>27</sup>

We also use W-2s to count the number of employees and measure wage compensation. Employers can report this compensation on different parts of corporate tax return, for example, salaries and wages on Form 1120 or “cost of labor” on Schedule A of Form 1120. Wages reported on Form W-2 are not affected by these accounting decisions. If there is a real change in the number of workers or their compensation, we would expect to see a response in W-2s filed by the firm. The estimates contained in Figure E.15 are not consistent with a meaningful, real response in wages paid to employees. Although pre-trends are not as clean as in other settings, the implications are clear: there is no noticeable drop in W-2 wages paid by affected Texas firms relative to control firms, suggesting that the reclassification from salary to COGS on Form 1120 is not a real decrease in the wages and salaries paid by

<sup>27</sup> One might point out that 2007 saw higher (but not statistically significant) turnover by Texas firms, but after considering magnitudes this cannot explain the change in salaries reported. Even if the turnover observed in 2007 is 100% attributable to increasing COGS by affected firms, the magnitude is still only about one-quarter of the size needed to explain the change in salaries reported at that time.

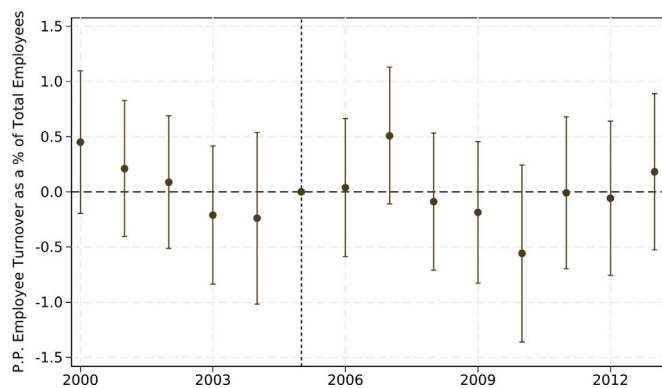


Fig. 3. Employee turnover measured with W-2s.

Notes: This figure displays the estimated percentage point turnover of employees (employees departed + employees added) as a share of total employees. The sample is limited to firms we define to be on the COGS margin as described in Section 4.2. We further limit the population to Texas firms with at least 75% of W-2 wages paid in Texas, non-Texas firms with no more than 25% of wages paid in Texas. We exclude firms with more than \$100 million in total revenue (total income + COGS) in a given year. Estimates are weighted by total revenue.

these firms. We also consider the change in the number of employees measured by the number of W-2s issued by the firm, and similarly find no evidence of a drop after the reform.

Second, we consider the category of officer compensation (Form 1120, line 12). Officer compensation faces the same tax incentives as salaries after the reform, but unlike salaries under Texas law officer compensation cannot be categorized as COGS. Unlike salaries, there is no response in officer compensation (see Figure E.15 in the appendix). This result provides further assurance that the observed responses are reclassification rather than real responses.

Third, as depicted in Fig. 2, we observe that half of the shift to COGS comes from the “other deductions” category (Form 1120, line 26), even though these only represent 30% of total deductions. Nearly half of total deductions are line items like rent, maintenance, and advertising, but little of the shifting comes from these categories, despite facing the same tax incentives. This pattern suggests that blurry lines are important in the shifting, and, again, that most is reclassification rather than real changes.

Fourth, as discussed in our heterogeneity analysis below, we find that smaller firms respond more aggressively than larger firms. If the response is real, this is counterintuitive, because larger firms presumably have greater capacity to handle finer input adjustments. But smaller firms face less scrutiny and oversight, which is consistent with a reclassification story. This result is in line with accounting research that finds smaller firms engage in greater manipulation of financial reporting due to generally lower disclosure requirements, less stringent controls, and increased asymmetric information (Bhattacharya, 2001; Bisogno and De Luca, 2015).<sup>28</sup>

Fifth, we investigate the responses of corporations that are under investigation by the IRS. If the behavior is driven by reclassification, a firm might be less willing to reclassify if it is under scrutiny by tax authorities, a result consistent with prior literature establishing firms under tax scrutiny take less aggressive tax positions (Hoopes et al., 2012; DeBacker et al., 2015). To test this, we conduct a balanced panel comparison between (a) firms that received a notice of examination or began litigation with the IRS in 2005, versus (b) firms that did not. We find that the firms under additional scrutiny generated much weaker

<sup>28</sup> We also attempted to investigate whether public companies (which are subject to more strict reporting rules) behaved differently than private companies, but the number of public companies in Texas and neighboring states was too small to produce meaningful estimates.

estimates of COGS reclassification responses on average, and in particular generated essentially no reclassification from the “other deductions” category. Our results are reported in Figure E.18 in the appendix. These results are consistent with the reclassification explanation rather than real input changes.<sup>29</sup>

Sixth, our main results in Fig. 5 are also consistent with reclassification over real effects. For reasons discussed above, COGS are much more manipulable than the compensation margin. We observe a large response by firms on the COGS margin, but not the compensation margin, despite facing the exact same tax wedge.

Seventh, we also investigate whether firms are manipulating revenue or total expenses rather than reclassifying existing expenses. For example, firms could be over-reporting expenses (as opposed to reclassifying them), or under-reporting revenue, to avoid the tax. We examine as a response variable the ratio of total expenses to total revenue (as defined in Section 4), and do not see that firms are increasing expenses or reducing revenue relative to control firms (Figure E.23). And this makes sense: over-reporting expenses or under-reporting revenue evades federal tax in addition to state tax, and likely faces more severe penalties in expectation. Coupled with the other evidence in the paper, this is more consistent with a reclassification response than an under- or over-reporting response.

### 6.3. Robustness

We find that our results for the observed shifting in COGS are highly robust to a number of changes to either controls or specification. Note that our primary specification above already includes a number of stringent controls: firm fixed effects, industry-by-year fixed effects, as well as quintile dummies for lagged total assets and lagged total income. To further test robustness, we also take additional measures, which are presented in the appendix.

First our results are robust to the inclusion of a variety of additional economic controls. We add quadratic, cubic, and quartic controls of the firm’s profit margin, sales growth, and sales-to-assets ratio, seen in Figure E.19. Our results are unaffected.

We next run our primary specification above as a balanced panel between a narrower set of years, 2001 and 2010. We define inclusion in the regression and a firm’s treatment status based upon its status in 2005. We estimate similar results here as we do in our primary specification (Figure E.20).

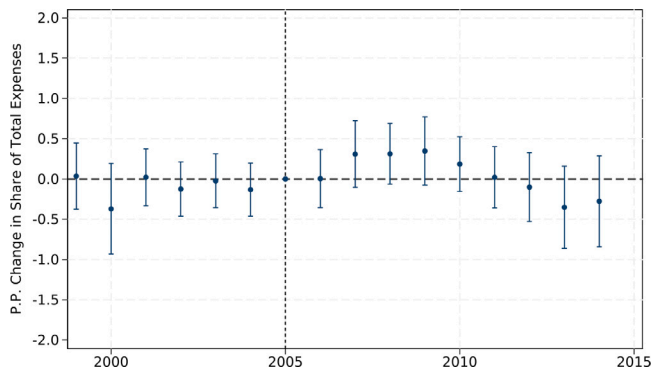
We also use different combinations of states as controls, including excluding any of our primary control states or including Louisiana. We obtain similar results (see Figure E.21 and E.22 for final results on tax bases).

Our results are also robust to a number of additional specification changes. These include: changing the threshold of our share of in-state workers restriction, even up to 100% or dropping it altogether; running unweighted regressions; dropping our size threshold to a lower total revenue; basing eligibility for the margins on the prior tax year rather than the current tax year; and changing our definition of the measure of total compensation for the compensation margin.

However, while our results are robust to these many specification changes, our findings *do not* hold when making substantial compositional changes to the sample. For instance, if we weight by revenue and include firms with greater than \$100 million in revenue, or exclude small and medium firms, our results become noisier, more variable, and often cannot be distinguished from zero. We explore the explanation and implications of this finding further in our heterogeneity analysis (Section 8) and discussion (Section 9) below, but the basic insight is that our results are driven by smaller and medium-sized firms.

<sup>29</sup> Note that even though an IRS audit does not directly implicate Texas taxes, for a firm to engage in reclassification that would lower tax liabilities under the new regime the firm must either (a) submit a return to the IRS with substantively different COGS than a previous year, or (b) submit returns to the IRS and to Texas authorities that substantively differ, either of which might be discouraged by additional scrutiny from a federal audit.





**Fig. 4.** Changes in COGS reporting as a share of total expenses, revenue and EZ filers. *Notes:* This figure displays the estimated percentage point change in the share of total expenses represented by COGS for revenue margin firms and EZ filers in Texas vs. firms in control states. Point estimates and ninety-five percent confidence intervals are estimated using a difference-in-differences specification given by Eq. (6) with dependent variables defined as in Eq. (8). The sample is limited to firms we define to be on the revenue margin or EZ filers as described in Section 4.2. We further limit the population to Texas firms with at least 75% of W-2 wages paid in Texas, non-Texas firms with no more than 25% of wages paid in Texas, or firms with no W-2 matching. We exclude firms with more than \$100 million in total revenue (total income + COGS) in a given year. Estimates are weighted by total revenue.

#### 6.4. Placebo: Revenue margin & EZ filers

To further test the validity of the results above, we consider whether the reform affected the reporting of firms either on the revenue margin or filing EZ returns. As explained in Section 2.3, although these firms faced the same reform, they did not have a reclassification incentive because there was no single expense eligible for deduction. Thus, these firms should not respond. As shown in Fig. 4, we find that there was no reclassification response.

### 7. Economic effects

In this section, we describe the economic effects of the shifting described above by measuring two things: (1) the impact on the tax base, (2) the elasticity to the tax wedge.

#### 7.1. Effects on the tax base

First, we estimate the percent change in the tax base as a result of the avoidance response driven by the tax wedge. We run our standard regression, but where the dependent variable is the log of the firm's tax base as a share of the firm's total revenue defined in Eq. (9). To produce accurate estimates, we use weights that estimate the tax base in the absence of the reform (although our estimates are robust to a variety of reasonable weights).<sup>30</sup> Our point estimates can thus be interpreted as the weighted average percentage change in the tax base of the affected Texas firms versus the control firms in other states.

Our results are presented in Fig. 5 and reported in Table 2. We estimate that the tax base for the affected firms on the COGS margin is 4.1% ( $\pm 1.1\%$ ) smaller than it would have been without the reclassification response.

<sup>30</sup> For example, consider a firm that, as a result of the reform, reclassified enough expenses so that its tax base is reduced to zero. If we were to weight by the observed tax base, this observation would have zero weight. To address this concern, our preferred weight increases the tax base of Texas firms in the post-reform period by an amount equal to the estimated average shift of expenses produced by Fig. 1, on a year-by-year basis. As robustness checks, we also test other weights (specifically, total revenue and no weights). The results are consistent, producing estimates of roughly 4% to 5% base reduction in each instance.

#### 7.2. Elasticity to the tax wedge

Second, we estimate the responsiveness of firms by measuring the elasticity of the tax base to the tax wedge. We exploit variation in the size of the tax wedge across firms to provide a nuanced discussion of this responsiveness. In short, we find that even though the tax wedge varied in size across firms, an overall elasticity of  $-5$  appears consistent across responses.

We use a two-stage least squares regression to estimate the elasticity of the tax base with respect to the tax wedge. Our first and second stages are given by:

$$\Delta \ln \left( \frac{1}{1-\tau} \right) \cdot Post_t = \gamma + \beta Post_t \cdot Texas_t + \theta Texas_t + \delta_{jt} + \eta_i + X_{it} + \epsilon_{it} \quad (10)$$

$$y_{it} = \gamma + \epsilon \Delta \ln \left( \frac{1}{1-\tau} \right) \cdot Post_t + \theta Texas_t + \delta_{jt} + \eta_i + X_{it} + \epsilon_{it} \quad (11)$$

where  $\epsilon$  is the elasticity and  $\tau$  represents the tax wedge, and so the  $\Delta \ln \left( \frac{1}{1-\tau} \right)$  term represents the percent difference in the rates of deduction for COGS versus non-COGS expenditures caused by the wedge. Intuitively, we instrument for the firm's available deduction using their status as a Texas or non-Texas corporation, which helps prevent contamination from endogenous factors. The standard identifying assumptions apply: exogeneity, relevance, monotonicity, and exclusion.

Our headline estimate of the elasticity is presented in Table 2. The responsiveness of the firms, although somewhat noisy, is quite large: we estimate an elasticity of the tax base of  $-5.5 (\pm 1.5)$ . Intuitively, for every 1% change in the net-of-tax-wedge between COGS and non-COGS expenses, we estimate that firms reclassify a sufficient amount of expenses to reduce the tax base by roughly  $5\% \pm 1\%$ . And as discussed above in Section 6, our results are robust to numerous specification changes.

We exploit variation in the size of the tax wedge to show consistent results across firms. The reform included two nuances that generated variation in the size of the wedge. First, wholesale and retail firms were subject to a 0.5% tax rate rather than 1%. Second, between 2007 and 2009 the rates were graduated for small firms, ranging from 0.2% to 1%.<sup>31</sup> The combination of these two features created seven different tax wedges in the first three years of the tax.

We run a separate balanced panel regression between years 2003 and 2009 for each of the seven different tax wedges to estimate the elasticity of the tax base across different size wedges.<sup>32</sup> Our results are reported in Fig. 6, which includes a line of best fit (in blue) and an associated 95 percent confidence interval (shaded gray). We find that despite variance in the tax wedge from 0.2% to 1.0%, the elasticity estimated for each group of firms is similar. More precisely, the change in tax base grows larger as the wedge is larger.

We interpret these results as confirming that an elasticity is an appropriate measure for similar small tax wedge effects. We of course cannot say, however, whether the elasticity would extrapolate to tax wedges significantly beyond the range of the wedges we actually observe (e.g., to a 10% tax wedge rather than a 1% tax wedge).

### 8. Heterogeneity: Which firms reclassify expenses?

We next consider which types of firms appear to have exhibited the strongest responses to the reform. To do this, we estimate the percentage change in the tax base as in Fig. 5, but isolate subsets of firms to identify responses by group. Our results are presented in Fig. 7. Firms that reclassified expenses the most tended to be smaller,

<sup>31</sup> Specifically, firms received a progressive rate discount if they were smaller. Firms between \$400k and \$500k gross revenue paid only 40% of the normal rate, firms between \$500k and \$700k paid 60%, and firms between \$700k and \$900k paid 80%.

<sup>32</sup> The panel is balanced based on the tax wedge that would be faced by the firm based on its 2005 characteristics.

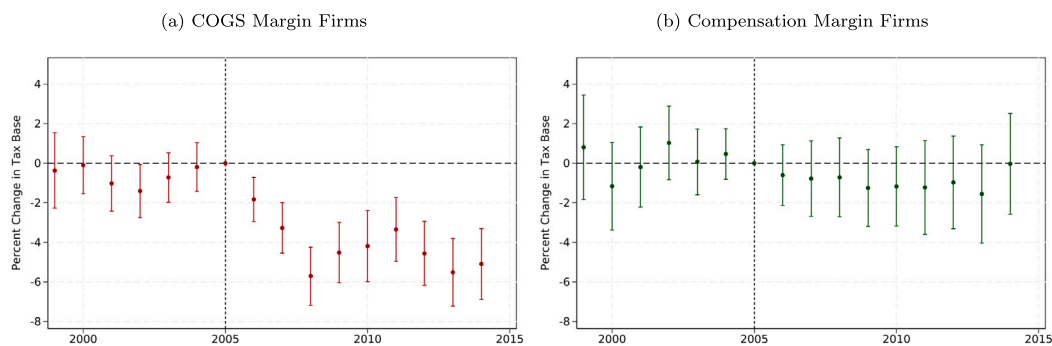


Fig. 5. Percent change in corporate tax base.

Notes: These figures display the estimated percent changes in the corporate tax base for COGS margin firms and compensation margin firms in Texas vs. firms in control states. Point estimates and ninety-five percent confidence intervals are estimated using a difference-in-differences specification given by Eq. (6) with dependent variable defined by Eq. (9). The sample is limited to firms we define to be on the COGS and compensation margins as described in Section 4.2. We further limit the population to Texas firms with at least 75% of W-2 wages paid in Texas, non-Texas firms with no more than 25% of wages paid in Texas, or firms with no W-2 matching. We exclude firms with more than \$100 million in total revenue (total income + COGS) in a given year. Estimates are weighted by total revenue.

Table 2  
Change in Tax Base and Elasticity of Tax Base.

	COGS Margin		Compensation Margin	
	ln(Base/Revenue)	2SLS ln(Base/Revenue)	ln(Base/Revenue)	2SLS ln(Base/Revenue)
Texas x Post	-4.06 (0.57)		-1.28 (1.05)	
$\Delta \ln(1/(1-\tau)) \times \text{Post}$		-5.46 (0.76)		-1.42 (1.17)
Obs.	705,868	705,868	331,890	331,890
R-squared	0.85	n.a.	0.74	n.a.
Clusters (Firms)	108,563	108,563	56,354	56,354

Notes: This table corresponds to Fig. 5. It reports the estimated percent changes in the corporate tax base for COGS margin firms and compensation margin firms in Texas vs. firms in control states. Point estimates are from the difference-in-differences specification given by Eq. (7) with dependent variables defined as in Eq. (9). Clustered standard errors in parentheses. We exclude data from the year 2006, which only reflects anticipatory changes and thus biases down the estimate. The sample is limited to firms we define to be on the COGS and compensation margins as described in Section 4.2. We further limit the population to Texas firms with at least 75% of W-2 wages paid in Texas, non-Texas firms with no more than 25% of wages paid in Texas, or firms with no W-2 matching. We exclude firms with more than \$100 million in total revenue (total income + COGS) in a given year. Estimates are weighted using an approximation of the tax base as it would be in the absence of the reform, that is we weight by the approximated tax base plus an amount equal to the estimated shifting by affected firms. For a more thorough discussion of weighting in this regression, see Section 7.1.

unprofitable, in low-margin industries, and faced net tax increases as a result of the reform.

First, we see that smaller firms are associated with a stronger response, especially firms with revenue or assets below \$5 million. We also find that the response is strong and widespread across many small firms: when we decompose small firms, we find strong responses across all categories, whether broken down by industry, profitability, growth, employee counts, or whether the firm experiences a tax reduction or increase as a result of the reform (see Figure E.24 in the Appendix).

We suspect there are several reasons for this finding. One, smaller firms often face less information disclosure and oversight, and represent settings with higher degrees of information asymmetry, facilitating manipulation. Two, because the Texas tax is calculated in a way that considers revenue and COGS across all states, and because larger firms are more likely to have operations in multiple states, larger firms would likely face much higher costs to reclassify expenses for a smaller reward (as they owe taxes in not just Texas, but other states too). Third, larger multi-state firms have only a portion of their revenue in Texas, attenuating the incentives created by the reform on account of the Texas apportionment factor.

Second, in addition to small size, we tend to see that firms that appear to face cash flow issues as a result of the tax have stronger reclassification responses. This appears in several dimensions. We find that low-margin, high-COGS industries tend to be highly responsive. These notably include agriculture, food and accommodation (e.g., restaurants, and similar establishments), and construction, industries whose high

input costs and low margins create extra strain under a gross receipts tax.<sup>33</sup>

We also see a much stronger response by firms facing a net tax increase rather than a net tax reduction.<sup>34</sup> The pattern is fairly strong: when we decompose these groups further, we find that those experiencing a net tax increase have widespread and strong responses (whether larger or small, profitable or unprofitable, growing or not), but the response by firms experiencing a net tax increase is much more narrow, mostly concentrated among small firms (see Figure E.26 and Figure E.25 in the Appendix). Similarly, we also see that unprofitable firms tend to have larger responses than profitable firms.

<sup>33</sup> But one industry that exhibits a large response is perhaps less anticipated: professional and scientific services. One might not have expected that professional service industries even had COGS. But for tax reporting purposes, service businesses that charge customers for costs of materials regularly used in the business report these costs as COGS. We suspect that the strong response by this industry is driven by the fact that for most of these firms keeping track of COGS is not a primary concern, and prior to the reform there was zero incentive to classify an expense as COGS if it was possible to do so. But after the reform, doing so became a salient issue with clear impacts on the firm's bottom line.

<sup>34</sup> To estimate this we apply the post-reform tax to firms in 2005, to see which firms experience a net tax increase versus decrease under the post-reform rules relative to pre-reform rules.

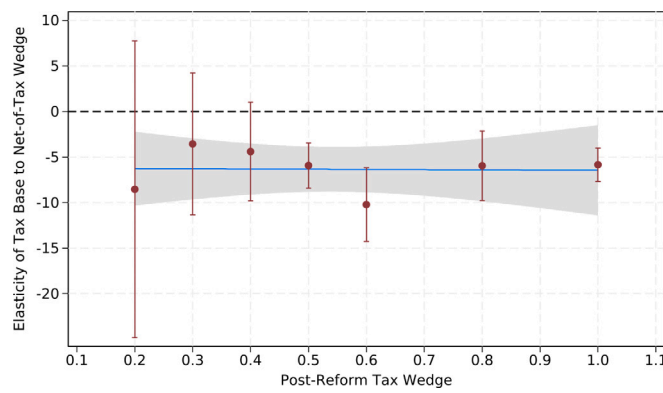


Fig. 6. Elasticities across different size tax wedges.

Notes: This figure displays the estimated elasticities of firms facing different size tax wedges during the initial three years of the reform. The panel is balanced based on the tax wedge that would be faced by the firm based on its 2005 characteristics. Point estimates and ninety-five percent confidence intervals are estimated using a balanced difference-in-differences specification given by Eq. (6) with dependent variables defined as in Eq. (8). The sample is limited to firms we define to be on the COGS as described in Section 4.2. We further limit the population to Texas firms with at least 75% of W-2 wages paid in Texas, non-Texas firms with no more than 25% of wages paid in Texas, or firms with no W-2 matching. We exclude firms with more than \$100 million in total revenue (total income + COGS) in a given year. Estimates are weighted by total revenue.

Taken together, these responses suggest that the patterns of behavior cannot be explained by a simple model that looks only at tax incentives, but rather require a richer theoretical framework that incorporates non-linearities in costs or benefits with size and with cash flow. In that regard, are findings are consistent with prior research on tax evasion and cash constraints (see, e.g., Edwards et al., 2016; Alm et al., 2019).

Separately, we perform heterogeneity on the compensation margin firms to test if any subset of firms were responsive along the margin. Our results, reported in appendix Figure E.27, confirm that there was essentially no identifiable response along the compensation margin. The only net reduction is observed in the food and accommodation industry, and it is small.

## 9. Discussion: COGS and Fuzzy boundaries

We observe starkly different behavior in the reclassification response between firms on the COGS margin and firms on the compensation margin. We suspect this divergence is driven by how the two deductions are defined under Texas and federal law, with COGS being a more porous and “fuzzier” boundary for enforcement than compensation. A lesson emerges from the findings of this paper: policymakers should proceed with caution when delimiting tax bases to avoid relying on fuzzy boundaries that might be difficult to enforce.

First, while COGS is a broad category that admits a range different expenses, compensation is much more narrowly tailored with less flexible delineations. On the one hand, compensation for C-corporations includes only three types of expenses: (1) Medicare wages reported on W-2s, (2) stocks and options, and (3) employee benefits, including health and retirement benefits. In contrast, COGS broadly includes all direct costs in acquiring or producing goods. While the federal tax measure of COGS is less explicit (arrived at through a net change in inventories), items in the Texas definition include employee wages, employee benefits, contractor payments, storage, handling, depreciation, rental costs, maintenance and repairs, research and development, maintenance and repair, spoilage and loss, utilities, insurance, and taxes, among others. It is no doubt easier to make the case that an ancillary expense can be classified as COGS than be classified as compensation.

Second, COGS has scattered information reporting that is harder for tax authorities to review. Wages, the bulk of the compensation

deduction, is reported directly on Form W-2s to tax authorities. Stock options exercised (but not stock option awards) are also reported on W-2s. In contrast, expenses that are classified as COGS will be reported on a myriad of information returns, from W-2s to 1099s. It is impossible to tell from the information return alone whether the item is a COGS or non-COGS expense.

Third, there is more potential variability in timing for COGS than for compensation, making it more difficult for authorities to scrutinize reporting. Wage and salary costs are generally reported in the period when paid or when service is performed. But costs to produce goods that are ultimately categorized as COGS are generally capitalized into inventory and may be reported in a tax period different than when the economic cost was paid by the firm.

Fourth, because the determination of what expenses count as COGS is governed by rules that are less bright-line than for compensation, there is more reliance on the judgment and good faith of managers and accountants. Does a particular rental of equipment count as being used for the production of goods or not? Does a particular employee or contractor’s work count? In the case of compensation, the categorization is more standardized and less flexible: is the payment of a wage to the employee reported as a Medicare wage on Form W-2?

Our findings complement a body of accounting research detailing how COGS is a category that is vulnerable to reclassification. McVay (2006), Fan and Liu (2017), Poonawala and Nagar (2019) discuss how managers actively move items of expense into and out of COGS, to manipulate various measures of earnings and expenses for financial statements reported to markets and investors. Our work measures the magnitude of these responses when firms face tax incentives to do reclassify.

Our findings also add nuance to existing evasion literature. Unlike other recent studies, we do not find evidence that firms are over-reporting expenses, as discussed in Section 6.2, but are instead reclassifying existing expenses (for comparison, see Slemrod et al., 2017; Carrillo et al., 2017; Almunia and Lopez-Rodriguez, 2018; Naritomi, 2019; Li and Wang, 2020; Mascagni et al., 2021). We interpret our result as reflecting how COGS represents a fuzzy boundary within expenses reporting that is subject to weak enforcement, and thus lower risk of adjusting, whereas the overall amount of expenses is likely subject to greater scrutiny.

## 10. Conclusion

We exploit a natural experiment created by a unique tax reform in Texas to test how firms respond to the creation of tax wedges between input expenditure choices. In an effort to raise revenue, in 2006 Texas replaced its corporate profits (largely analogous to the US federal corporate income tax) tax with a much broader gross revenue tax that eliminated almost all deductions. However, the new regime still allowed corporations to choose to deduct a single expense, either COGS or total worker compensation, thus creating a tax wedge that incentivized either real adjustment of inputs or reclassification of expenses for tax reporting purposes. We use a subset of the population of U.S. corporate tax returns to conduct a differences-in-differences analysis between affected Texas firms (i.e., firms we calculate to have likely faced the incentives described here) and similar firms in neighboring states.

We find no discernible real response, in terms of the magnitude or mix of production inputs, but a large avoidance response to the tax wedge favoring COGS. We estimate that affected corporations reclassified 1.1% of their total expenses from ineligible expenses into COGS. This corresponds to a large share of non-COGS expenses, roughly 5 percent, as on average COGS represents roughly 77 percent of the firms’ total deductions. We confirm using ancillary tests that this response is a reporting reclassification response and not a real response. We further estimate that this reduced the new tax base for these firms by about 4%, reflecting an elasticity of the tax base with respect to

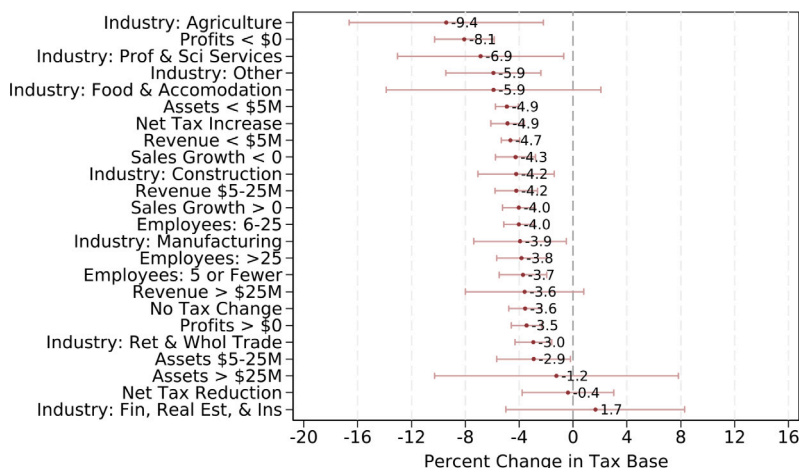


Fig. 7. Percent change in tax base, heterogeneity across firms.

Notes: This figure displays the estimated percent change in the corporate tax base among COGS margin firms, broken down by various characteristics of the firm. Point estimates and ninety-five percent confidence intervals are estimated using a difference-in-differences specification given by Eq. (7) with dependent variables defined as in Eq. (9). The sample is limited to firms we define to be on the COGS margin as described in Section 4.2. We further limit the population to Texas firms with at least 75% of W-2 wages paid in Texas, non-Texas firms with no more than 25% of wages paid in Texas, or firms with no W-2 matching. We exclude firms with more than \$100 million in total revenue (total income + COGS) in a given year. Estimates are weighted by total revenue.

this particular deduction of roughly  $-5 \pm 1$ . Given that roughly 85% of the total revenue reported by taxpaying firms in Texas was reported by firms affected by this incentive, the reduction in the tax base is a substantial amount.

But we find little response to the tax wedge favoring worker compensation. We estimate a noisy response that includes zero response, with point estimates suggesting at most a 1% shift in expenses.

What can reconcile the stark difference in response between the two sets of firms? Evidence suggests this is driven by the breadth of the COGS category (compared to the narrower definition of compensation expenses). We find most of the shifting into COGS comes from the nebulous catch-all “other deductions” on the corporate tax return, and that the largest responses are by smaller firms, who generally have higher asymmetric information and often face less strict reporting and disclosure requirements in practice. We also find that firms under examination or in litigation with the IRS exhibit a much smaller response.

Our results reveal that reclassification responses to tax reforms of corporate tax bases can be large, but they are also highly context dependent. How easy is it to reclassify expenses into a new category to take advantage of such an arbitrage opportunity? When the categories are broad and oversight is more difficult, the avoidance response can be striking. But when it is challenging to reclassify without making real changes in inputs, the response is muted.

Our results have important implications for researchers, policymakers, tax administrators, and revenue estimators. The Texas reform was intended to raise revenue by broadening the base, but this unique design of the available deductions undercut that goal by presenting an avenue for avoidance. Corporate taxes are an important source of revenue for many governments, and there is a widespread policy discussion about broadening tax bases to curb avoidance. Given that doing so necessarily involves drawing new lines delineating which income or deductions are included or not, our findings highlight the importance of taking care not to create opportunities for taxpayers to reclassify their income or deductions to avoid the broader base.

These results shed new light on public economic research on corporate taxation, and present opportunities for future research. Our findings highlight a potential avenue of behavioral response that was well known in the accounting and finance literature, but that has yet received scant attention by public economists: classification of accounting items. The reason we were able to uncover this phenomenon is because a natural experiment existed that enabled a relatively clean

identification of the response. But that does not mean this is the only setting particularly amenable to reclassification—it is simply one we could cleanly test. What other categories of income or deduction present similar opportunities? How easy or difficult would it be for taxpayers to avail themselves of those opportunities? Our findings and the follow-on questions they present suggest a rich avenue for future research that finds complementarities between finance and accounting research and public economics research.

#### Declaration of competing interest

The authors declares that they have no relevant material financial interest in the research described in this paper.

#### Appendix A. Supplementary data

Supplementary material related to this article can be found online at <https://doi.org/10.1016/j.jpubeco.2025.105336>.

#### Data availability

The data that has been used is confidential.

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