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Who bears the costs of the corporate income tax? Evidence from state tax changes and accounting data

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ABSTRACT

We examine the incidence of the corporate income tax. Tax incidence theory suggests that corporate income taxation affects the supply of capital, resulting in changes to output, demand for supplies and demand for labor (Harberger 1962). Prior studies suggest that shareholders ultimately bear incidence (Gravelle and Smetters 2006). Based on these studies, we first hypothesize that tax changes affect firms' equity financing, consistent with taxes affecting the supply of capital. Next, we hypothesize that tax changes affect firms' investment. Third, we hypothesize that consumers, suppliers, employees in addition to shareholders all bear the incidence of the corporate income tax. We also hypothesize that non-state governments bear incidence because firms will avoid more (less) non-state taxes in response to state tax rate increases (decreases). We use difference-in-differences regressions with state corporate income tax changes as plausibly exogenous shocks to test our hypotheses. We find that equity issuances and investment are both responsive to state tax rate increases, but not decreases. Similarly, we find that consumers, suppliers, employees and non-state governments bear incidence following state tax rate increases but not decreases. We also perform several cross-sectional tests and find results consistent with our hypotheses. In an additional test, we find that large tax decreases lead to higher wages, suggesting that labor captures some of the benefits of a tax decrease. Our study contributes to the literature on the incidence of the corporate income tax.

1. INTRODUCTION

Who bears the costs and benefits of the corporate income tax? Policymakers, practitioners, and academics have grappled with the incidence consequences of the corporate income tax but have found mixed results. Recent commentary echoes this confusion and suggests that corporate income tax incidence remains an enigma (Auerbach 2006).The classic work on tax incidence, Harberger (1962), suggests that the incidence of the corporate income tax should be singularly borne by capital (i.e. shareholders). In other words, shareholders should bear the costs of a tax rate increase and receive the benefits of a tax rate decrease. Subsequent empirical work is consistent with this result to a large extent (e.g., Gravelle 2013; Mankiw 2006). However, recent studies suggest that some of the burdens and benefits fall on employees (labor) (Arulampalam, Devereux and Maffini 2010; Cochrane 2017; Mankiw 2017; Fuest, Peichl and Sieghloch 2018).

In this study, we aim to identify who bears the costs and benefits of state corporate income taxes. Prior literature primarily focuses on the effects of corporate taxation on the taxed firm's shareholders and employees (Fuest et al. 2018).[1] We expand the potential set of stakeholders that bear incidence to consumers, suppliers and other governments, while also incorporating employees and the taxed firm's shareholders. To our knowledge, studies examining corporate income tax incidence on suppliers, governments and consumers are sparse.

[1] In addition, our study is consistent with prior literature on implicit taxes but is distinct in that we focus on changes in input prices and quantity demanded rather than pre-tax returns. Contrastingly, implicit taxes focus on the implicit taxes on inputs that corporations use and the resulting effects on pre-tax returns (e.g. Wilkie 1992, Jennings, Weaver and Mayew 2012). For example, Jennings et al. (2012) find evidence consistent with corporate taxes reducing pre-tax returns and suggest this decrease is due to higher input prices. Contrastingly, we focus on the consequences of the corporate income tax to the taxed firm's stakeholders. That is, we focus on the changes in input prices and quantity demanded induced by corporate tax changes. Thus, our study is consistent with studies on implicit taxes but is distinct in that we focus on changes in input prices and quantity demanded rather than pre-tax returns.

(Goolsbee 1998 and Kopczuk, Marion, Muehlegger and Slemrod 2013 examine suppliers, but focus on *non-corporate* tax incidence). Furthermore, prior literature hardly explores these questions using firm-level data which is often richer than aggregate data and allows for more powerful tests. Thus, we improve on prior studies by expanding the set of examined stakeholders and by using detailed financial statement information.

Consistent with the public economics literature, we define tax incidence as the change in welfare due to a change in taxes (Fullerton and Metcalf 2002; Black, Hashimzade and Myles 2012). Therefore, incidence may result from either 1) a change in the transaction price of a good, 1) a change in the quantity transacted of a good or 3) both. For example, assume the corporate income tax results in incidence on consumers. Consumers will 1) face a higher price to purchase the good, 2) purchase fewer goods or 3) some combination of 1) and 2). In any of these three cases, consumers lose welfare after the imposition of the tax. Consequently, we would conclude that the consumer bears the incidence of the tax.

Our hypotheses are consistent with the theory found in Harberger (1962) and reviewed in Auerbach (2006) but differ in that we include consumers, suppliers and other governments as potential bearers of incidence.[2] Contrastingly, Harberger (1962) and most of the theories reviewed in Auerbach (2006) analyze incidence effects on only labor and capital. We hypothesize that consumers, suppliers, and other governments in addition to labor (employees) and capital (shareholders) bear some incidence from state corporate income tax rate increases because a corporate income tax rate increase reduces the after-tax returns to shareholders, which results in a higher cost of capital. As a result, firms issue less equity, reduce their output and

[2] Auerbach (2006) reviews several theories on the incidence of the corporate income tax. All of the reviewed theories assume or conclude that capital flows to the taxed sector decrease to varying degrees due to the tax. However, the incidence of the corporate income tax on shareholders depends on portfolio allocations in equilibrium, substitution between equity and debt and the shareholder-level tax rate.

demand less supplies and labor. Prices rise because of the decreased output. Supply costs and labor costs decline because of the decreased demand. As a result, consumers, suppliers, employees and shareholders bear incidence.[3] Moreover, firms will take more aggressive tax positions (e.g., avoid more taxes) to offset an increase in the statutory tax rate. Therefore, other governments will also bear incidence.

Additionally, we examine whether incidence is asymmetric. Specifically, we examine whether these same set of stakeholders obtain the *benefits* of state corporate income tax rate decreases. A reduction in statutory tax rates increases the return to shareholders for a given amount of pretax income, reducing the cost of equity. Thus, firms will raise capital by issuing equity to increase investment, hire more workers, and purchase inventory. By doing so, firms will produce more goods and therefore increase profits. This increased demand results in more workers hired at a higher wage and more supplies purchased at a higher price. Consequently, suppliers and employees receive the benefits of a tax decrease. Moreover, firms' increased output will result in lower selling prices. Thus, consumers experience an increase in their welfare (i.e., they would receive some of the benefits of a tax decrease) because they purchase more goods at a lower price. Firms are also predicted to take less risk in avoiding non-state taxes because state tax rate decreases reduce the marginal benefits of tax avoidance. If firms reduce tax avoidance in response to a state tax rate decrease, then non-state governments will have benefitted from the state tax rate decrease.[4]

[3] Our explanation abstracts away from important assumptions for the sake of simplicity. However, we note that the mobilities of capital and labor and price elasticities facing the firm will also affect incidence.

[4] Tax incidence need not be symmetric. That is, stakeholders that bear the costs of tax rate increases need not necessarily recoup the gains of tax decreases. Shareholders might prefer to withhold the benefits of lower corporate taxes for themselves. Moreover, firms might be unwilling or unable to renegotiate contractual obligations that provide favorable prices for inputs (such as supply or labor contracts) that were struck under the assumption of higher taxes. Thus, tax incidence might exhibit asymmetric behavior with respect to increases and decreases.

We begin by identifying whether state corporate income tax rate increases reduce equity issuances and whether tax rate decreases increase equity issuances. Incidence literature assumes that tax changes affect the provision of capital, resulting in supply shocks that change prices and, ultimately, economic incidence. We test whether this assumption is empirically valid. To do so, we perform a firm-level difference-in-differences regression using changes to state tax rates as plausibly exogenous shocks. We hypothesize that firms issue less equity following state corporate income tax rate increases and issue more equity following state corporate income tax decreases.[5]

Second, we test whether tax changes affect investment. Incidence theory assumes that changes in equity issuances alters investment, thus affecting the demand for various inputs. These demand changes result in incidence. Thus, we test another important assumption of incidence theory by analyzing whether state tax changes alter investment. We hypothesize that firms invest less following state tax rate increases and invest more following state tax decreases.

We use firm-level income statements to identify incidence on the various stakeholders. The income statement captures the following identity:

$$Net\ Income = Revenue - COGS - SGA - Interest - Nonstate\ Taxes - State\ taxes$$

If state tax rate increases are associated with changes to the firm's income statement accounts, this implies a change to the welfare of the stakeholder related to that account. We attribute stakeholder welfare to the income statement as follows: revenues measure incidence on consumer/customers, cost of goods sold expense measures incidence on suppliers, sales, general

[5] Tax rate changes can induce firms to trade-off debt for equity or vice versa. For example, tax rate increases induce firms to substitute debt for equity because debt is tax-deductible (Heider and Ljungqvist 2015 demonstrate that firms issue more debt following state tax rate increases). Thus, firms might mitigate the impact of a higher cost of equity by issuing debt. However, increased debt issuances will increase the cost of debt. Overall, firms' cost of capital (i.e. the cost of debt and equity combined) will be higher and they will issue less financing. Thus, firms will produce less output and incidence might be borne by any of our proffered stakeholders.

and administrative expense measures incidence on employees, non-state income taxes measure incidence on non-state governments, and net income measures the incidence on shareholders.[6] As an example, if shareholders bore the full burden of a tax rate increase we would expect to see a reduction in net income associated with the increase but no changes to the other accounts.[7] Similarly, we would conclude that consumers bear tax incidence if a state tax rate increase results in a revenue decrease.[8]

We use state tax changes rather than federal tax changes for several reasons. First, state-level corporate income taxes offer more cross-sectional and intertemporal variation in statutory tax rates than federal-level corporate income taxes. Second, we use state statutory tax rate changes in our difference-in-differences regressions as plausibly exogenous shocks to firm tax liabilities. By focusing on plausibly exogenous shocks, we reduce the likelihood that observed responses in outcome variables represent the effects of omitted variables.[9] Further, we rely on the fact that not all states change their tax rates at the same time for our difference-in-differences tests. Thus, we increase power and reduce potential bias by using state tax expense.

We estimate difference-in-differences regressions on a sample which contains firms experiencing state tax rate increases and decreases to examine whether tax incidence is asymmetric with respect to increases and decreases. In these regressions, our treated group comprises firms headquartered in states that increased or decreased corporate income tax rates in

[6] We scale each of our dependent variables by lagged total assets.
[7] This analysis applies symmetrically to state tax decreases.
[8] If revenues increase (and the increase is significantly different from zero), we would still infer that consumers bear incidence because prices rose and output fell. Per Harberger (1962), taxes reduce returns to shareholders, resulting in less capital raised and less output. Lower output raises prices. If the magnitude of the price rise exceeds the magnitude of the output drop, revenues would still rise. Therefore, the change in revenues is a function of elasticities in the market.
[9] State tax changes are not purely exogenous because they are generally induced by politics, local economic conditions, etc. However, state tax changes need only follow a random walk for difference-in-differences regressions to estimate average treatment effects. Heider and Ljungqvist (2016) find evidence that state tax changes follow a random walk.

the current year or a prior year. Our control sample consists of firms headquartered in states that have not yet raised or decreased corporate income taxes and also firms that will never experience a corporate income tax rate increase or decrease during our sample period. We then perform a staggered difference-in-differences regression to identify the marginal effect of a state tax change on the various income statement line items.[10]

Our first results are consistent with state corporate income tax rate increases *decreasing* equity issuances. Specifically, we find that equity issuances (the number of shares sold by firm *i* in year *t* multiplied by the selling price of those shares) and net equity issuances (equity issuances reduced by share repurchases) are negatively and significantly associated with state tax rate increases in a difference-in-differences framework. Therefore, our results support the assumption that increases to the corporate income tax reduce the supply of equity capital to firms. Interestingly, we find that the relationship is asymmetric: while tax rate increases reduce equity issuances, tax decreases have no significant association with equity issuances. Thus, our results suggest that firms do not respond to state tax decreases by issuing more equity.

Next, we find that state tax rate increases are negatively associated with investment. Specifically, we find that state tax rate increases significantly reduce capital expenditures and research and development. Along with our prior results, this result is consistent with tax rate increases increasing the cost of equity capital and decreasing equity financing which reduces firm-level investment. Thus, this result is consistent with traditional corporate income tax incidence theory (e.g. Harberger 1962). However, we do not find an association between tax decreases and either of our investment variables. Thus, our results are asymmetric again.

[10] Bertrand and Mullainathan (2003) employ the same approach to test whether governance shocks affect managerial preferences.

Next, we implement difference-in-differences regressions around state corporate income tax rate increases to identify incidence. We find results consistent with consumers, suppliers, and employees bearing the burden of the corporate income tax. Specifically, we find that sales, COGS, SG&A, and non-state taxes decrease following an increase to state tax rates. We find no association between state tax rate increases and shareholder welfare (earnings).

In these same regressions, we also test for incidence asymmetry. Specifically, we examine whether state tax *decreases* enhance the welfare of various stakeholders. We find no association between state tax decreases and revenues, cost of goods sold, SG&A, non-state taxes or earnings. Thus, our results are consistent with consumers, suppliers, non-state governments and shareholders receiving none of the benefits of a corporate income tax decrease. Interestingly, our results are antithetical to theory in the area (e.g. Harberger 1962; Auerbach 2006; Mankiw 2006), which suggest that shareholders bear most, if not all, of the incidence of the corporate income tax.[11]

We suspect that our main findings of incidence asymmetry may be partially driven by small tax decreases. Tax cuts may have little or no effect on our various dependent variables because they are mostly small in magnitude.[12] To address this possibility, we perform the same difference-in-differences regressions but use only state tax rate decreases of 1% or more. With these specifications, we find null results except that corporate income tax decreases are significantly associated with increases in SG&A. This result is consistent with employees and/or other suppliers benefitting from tax rate decreases. Thus, employees and/or suppliers seem to

[11] We attribute differences between our study and theoretical results to assumptions in those studies. For example, Harberger (1962) assumes perfect mobility of labor. Thus, employees avoid the costs of a tax rate increase by merely switching jobs. However, labor is not perfectly mobile (e.g. Fuest et al. 2018, among others). Thus, workers face costs when demand for labor decreases due to tax rate increases.

[12] Small tax decreases may also explain asymmetric results found in other studies that use state tax changes (Heider and Ljungqvist 2015; Ljungqvist, Zhang and Zuo 2017).

suffer when corporate tax rates rise but benefit when corporate tax rates fall. Contrastingly, other stakeholders only seem to suffer when corporate tax rates rise, with no commensurate benefits when corporate tax rates fall.

We perform one cross-sectional test for each stakeholder for state tax rate increases. First, we hypothesize that tax rate increases reduce revenues more when the firm operates in an elastic product market compared to an inelastic product market. Second, we hypothesize that market power increases incidence on suppliers by nudging output levels towards monopsonistic levels following tax rate increases. Third, we hypothesize that union membership increases incidence on labor because tax rate increases reduce economic rents captured by union members via bargaining while also decreasing the demand for labor. Fourth, we hypothesize that tax rate increases lead to more incidence on non-state governments among firms engaging in risky tax avoidance because tax rate increases will encourage firms with high tax risk tolerance to avoid non-state taxes. Thus, firms engaging in risky tax avoidance will increase non-state tax avoidance more than firms engaging in less risky tax avoidance following tax rate increases. Finally, we hypothesize that shareholders at financially constrained firms suffer less from tax rate increases compared to shareholders at other firms because tax changes should not alter the financing and investment of constrained firms as they are already unable to access external financing for investment. In these tests, we also include state tax rate decreases. We do not offer directional predictions on tax rate decreases because we did not find significant results for decreases in our main tests. Our cross-sectional results are broadly consistent with our hypotheses.

This study contributes to the literature on tax incidence by providing a comprehensive examination of the effects of corporate income tax rate changes on firm stakeholders. To our

knowledge, we are the first to examine the effects of tax rate changes on equity issuances. Thus, our study is the first to test an important assumption of corporate income tax incidence theory. Moreover, we expand traditional incidence analyses by examining the effects of tax changes on a broader set of stakeholders. While prior literature identifies incidence effects only on shareholders and, to a lesser extent, employees, this study aims to identify effect on various corporate stakeholders. To our knowledge, our study is the first to examine corporate income tax incidence effects on suppliers (Goolsbee 1998 and Kopczuk et al. 2013 examine non-income tax incidence on suppliers). Furthermore, this study is the first to use firm-level data to identify tax incidence on shareholders, employees and consumers.

Perhaps most importantly, our study provides evidence to policymakers on corporate income tax incidence. Policymakers debated changes to the corporate income tax prior to and following the passage of the Tax Cuts and Jobs Act (TCJA) of 2017. As commenters have noted, incidence was central to these debates because policymakers likely did not intend to impose costs on non-shareholders, but did hope benefits would reach these same stakeholders (Mankiw 2017). Thus, we hope this study helps predict the consequences of TCJA's corporate income tax rate decrease and assists policymakers understand the consequences of future corporate income tax changes.

2. HYPOTHESIS DEVELOPMENT

Economic tax incidence refers to welfare changes in a market when a tax is imposed on any party in that market (Black, Hashimadze and Myles 2012). In other words, tax incidence refers to extra costs imposed on or benefits received by a party in a market due to changes in tax rates on any party in the same market. For example, firms may reduce output and raise sales

prices in response to an increase in tax rates. In this case, consumers bear tax incidence because they pay a higher price and consume fewer units due to the increase in taxes.

In this study, we explore the incidence of the corporate income tax by analyzing changes in state corporate income taxes. We hypothesize that firms pass on tax incidence to various stakeholders because the corporate income tax reduces the after-tax returns of shareholders in a firm facing a tax rate increase.[13] Consequently, shareholders will withdraw their capital from the firm and instead invest in a firm that does not face a tax rate increase. By doing so, shareholders deprive the firm facing a state tax rate increase of one of its production inputs. Thus, firms decrease their investment and reduce their demand for inputs such as inventory and labor. The prices and the market-clearing quantities of inputs should fall as a result of decreased demand, resulting in tax incidence on these various inputs. Moreover, the firm will reduce its overall output, resulting in decreased supply to the market and higher prices. Under this theory, shareholders, suppliers, consumers and labor might all bear incidence.

Symmetrically, income tax *decreases* should benefit shareholders, suppliers, consumers and employees because tax cuts increase after-tax returns to shareholders. Therefore, shareholders should provide capital to firms with low tax rates by purchasing such firms' equity. At the margin, firms should increase their investment because of the increased access to capital. At the same time, firms should purchase more supplies and employ more labor to increase production. As a result, consumers benefit from increased supply and lower prices. Increased sales also increase profits. Therefore, tax decreases benefit consumers, suppliers, labor and shareholders.

[13] Our theory is consistent with conventional theory on the corporate income tax incidence. See e.g. Harberger (1962); Gravelle (2013).

We acknowledge that our treatment of incidence is somewhat incomplete because we are unable to identify price elasticities. Price elasticities refer to the changes in demand or supply associated with a change in price. In other words, price elasticities represent the sensitivity of demand and supply to changes in price. Corporate income tax incidence depends on relative elasticities in the markets between firms and stakeholders (i.e. in the market between firms and consumers, the market between firms and suppliers, etc.). Intuitively, if demand is highly sensitive to price (i.e. elastic) while supply is not (i.e. inelastic), an increase in the price of a good will result in 1) a substantial decrease in quantity demanded but very little decrease in quantity supplied. Moreover, if demand (supply) is perfectly inelastic, then the full amount of the tax will be borne by producers (consumers). In this study, we are unable to identify elasticities, as are most incidence studies (e.g. Hassett and Mathur 2015; Fuest et al. 2018). For example, if demand for labor by firms is relatively elastic and the supply of labor to firms is inelastic, a corporate tax rate increase would result in incidence on labor and little incidence to the firm (and to its shareholders, ultimately). Thus, to the extent we identify incidence on a stakeholder, we infer that 1) the firm passes on taxes to the stakeholder *and* 2) stakeholder elasticity is relatively high.

Our study is closely related to the literature on implicit taxes. Implicit taxes refer to lower pre-tax investment returns to tax-favored assets (Scholes, Wolfson, Erickson, Hanlon, Maydew and Shevlin 2015). Implicit taxes arise because taxation of an asset causes the prices of untaxed assets to rise. In equilibrium, the expected pre-tax returns of untaxed assets falls due to this price increase. This decrease is referred to as an implicit tax. Several studies examine whether corporations face implicit taxes due to variation in the tax treatments of production inputs. For example, Wilkie (1992) finds evidence consistent with tax subsidies being associated with lower

pre-tax earnings. Jennings et al. (2012) find that implicit taxes faced by corporations decreased following the Tax Reform Act of 1986.

Our study and incidence analyses generally are consistent with this literature on implicit taxes faced by corporations. If we find that corporate income taxation affects input prices, we could infer that explicit corporate income taxation imposes implicit taxes on inputs because their prices rise (Chyz, Luna and Smith 2016). In this spirit, Jennings et al. (2012) note that implicit taxes facing a corporation are "…a special case of the incidence of corporate income taxes." However, studies focusing on the implicit taxes faced by corporations are different from incidence studies because implicit tax studies focus on changes in pre-tax returns to firms while we focus on changes in returns to various stakeholders in the firm.

Theoretically, we examine incidence on various stakeholders because firms contract with each of these stakeholders. Therefore, firms pass incidence onto any of these parties. Jensen and Meckling (1976) argue that a corporation can be viewed as a "nexus" of contracts between various stakeholders of the firm – shareholders, labor, suppliers, customers, governments (and perhaps other stakeholders, though we do not consider them in this study). Therefore, each of these various stakeholders will bear incidence if the corporate income tax affects demand for their good or service.

We begin by testing whether state tax changes affect equity issuances, as assumed by many incidence models (Harberger 1962; Gravelle 2013). We expect corporate income taxes to affect corporate after-tax returns. Therefore, in equilibrium, firms' equity issuances should vary with corporate income taxes because firms with high corporate income taxes have less access to equity capital than untaxed firms at the margin. Thus, corporate income tax rate increases should decrease equity issuances because investors should be marginally less willing to supply capital to

firms experiencing a tax rate increase. Symmetrically, corporate income tax cuts should decrease firms' cost of equity and increase equity issuance.[14] [15] Thus, our first hypothesis is as follows:

H1: Firms increase (decrease) equity issuances following state corporate income tax decreases (increases).

Second, we hypothesize that firms' investment change following state tax rate increases. Incidence theory posits that changes in equity issuances affect marginal firm-level investment which reduces input demand and output supply, thus leading to incidence. Thus, we expect marginal investment to decrease following tax rate increases and increase following tax decreases. Thus, our second hypothesis is as follows:

H2: Firms increase (decrease) investment following state corporate income tax decreases (increases).

Our next hypotheses posit that the various stakeholders identified above bear incidence. First, consumers are an important stakeholder in the firm because they commercially transact with firms. Consequently, we expect consumers to suffer when corporate income taxes rise and benefit when corporate income taxes fall because a tax rate increase reduces output to consumers and raises prices while a decrease increases output and lowers prices. Prior literature explores tax incidence on consumers (e.g. Fullerton and Metcalf 2002).[16] For example, McClure (1981) considers the incidence of state corporate income taxes in a theoretical setting. He argues that state residents bear the incidence of the tax – as workers, landowners, capital owners and, to an

[14] We do not examine the relation between corporate income taxes and debt financing because prior studies demonstrate a positive relation between taxes and corporate debt usage (e.g. Heider and Ljungqvist 2015; Graham 2003 provides a review).

[15] Firms will not fully substitute changes in equity issuance with debt issuance because increased debt imposes costs. For example, firms will not perfectly substitute debt for equity following a tax rate increase because high levels of debt increase bankruptcy costs (as noted in Graham 2003). Moreover, increased demand for debt will increase the cost of debt supplied to firms. Thus, overall financing will fall following tax rate increases.

[16] Firms will not raise their prices to recover lost after-tax profits in response to a tax rate increase in equilibrium. If firms did so, their price would be higher than their competitors' prices and they would be unable to sell their output.

extent, consumers. Empirically, Gordon (1967) and Krzyzaniak and Musgrave (1963) find that firms pass on the full burden of a corporate income tax to consumers. More recently, Hassett and Mathur (2015) use a spatial model to find little incidence on consumers. Notably, these studies use aggregate data to identify any effects. Contrastingly, we use firm-level data and natural experiments to identify effects on consumers. Thus, our tests should be more powerful than those used prior studies on consumer incidence. Our hypothesis is as follows:

H3: Consumers bear the incidence of the corporate income tax.

A similar rationale applies to employees. Harberger (1962) theoretically demonstrates that labor doesn't bear incidence because labor can costlessly shift to untaxed sectors where demand for labor is unbounded. However, empirical results are inconsistent with Harberger's theoretical results. Arulampalam et al. (2012) finds evidence that labor does bear some tax costs in a European setting. We expect labor to bear incidence because our theory predicts that changes in taxes affect investment which changes the demand for labor. For example, if corporate income taxes rise, firms should invest less because they are less able to access equity financing. Thus, they employ fewer workers or pay workers less, resulting in incidence on labor. This leads to our second hypothesis:

H4: Employees bear the incidence of the corporate income tax.

Suppliers are an external stakeholder in the firm and thus should bear incidence. For example, Goolsbee (1998) finds that firms pass on the tax benefits from an investment tax credit to suppliers while Kopczuk et al. 2013 find that excise tax incidence is borne along a supply chain. We use cost of goods sold to proxy for supplier welfare. Similarly, Brown, Fee and Thomas (2009) suggest that firms pass on costs associated with leveraged buy outs (not taxes) to suppliers in the form of reduced cost of goods sold. In our setting, we expect firms to respond to

tax rate increases (decreases) by reducing (increasing) their demand for supplies. Therefore, the price of supplies and the quantity sold should decline (rise), leading to incidence on suppliers.

H5: Suppliers bear the incidence of the corporate income tax.

We also hypothesize that firms pay less (more) non-state income taxes when their state income taxes increase (decrease) because increased (decrease) state income taxes alter the optimal level of non-state tax avoidance. For example, firms should find that saving cash by avoiding non-state taxes is more valuable following an increase in state taxes than it was prior to the state tax rate increase. As a result, firms will bear increased risk in their non-state tax avoidance to ensure that they avoid more cash taxes. Therefore, we expect firms to reduce their non-state tax payments in response to state tax rate increases. Symmetrically, we expect firms to pay more in non-state taxes when their state taxes *decrease*. When state taxes are low, firms benefit less from taking risk to avoid taxes because they have ample cash tax savings. Consequently, firms' optimal level of tax avoidance should decrease as state tax rates fall. Our sixth hypothesis is as follows:

H6: Other governments bear the the incidence of the corporate income tax.

If the firm is unable to pass on tax costs to the other stakeholders, then the incidence of the tax will fall on the firm's current shareholders. Tax incidence falls on shareholders if they suffer from lower after-tax returns following a tax rate increase. Prior literature that shareholders bear the full incidence of the corporate income tax (e.g. Harberger 1962; Mankiw 2006; Serrato and Zidar 2016). However, our study benefits from a quasi-experimental setting and a larger dataset than prior studies. Therefore, we re-analyze whether shareholders bear incidence. As such, our seventh and final hypothesis is as follows.

H7: Current shareholders bear the incidence of the corporate income tax.

In addition, we make cross-sectional hypotheses on incidence for each stakeholder in section 5. Our cross-sectional hypotheses are intended to further evaluate our theory of incidence.

3. EMPIRICAL DESIGN

3.1. Sample

Our sample consists of firm-year observations for publicly-traded firms with data on Compustat. In our main tests, our sample spans 1989 to 2012 (due to the state tax change data provided in Heider and Ljungqvist 2015). We remove financial services firms and utilities because their operating decisions are restricted by regulators. We remove firms headquartered outside the United States or in Guam, Puerto Rico and the Virgin Islands. We remove observations with missing total assets, negative book value of equity or with missing head quarter states. Finally, we drop all observations with missing values for our dependent variables. We collect headquarter data from Bill Mcdonald's website (available at https://www3.nd.edu/~mcdonald/). We collect state-level economic data from the St. Louis Federal Reserve's Economic Data (FRED) database. All variables are winsorized at the 1st and 99th percentiles.

In implementing our difference-in-differences regressions, we rely on the state tax rate increases and decreases identified in Heider and Ljungqvist (2015) (see Appendix A and B in Heider and Ljunqvist 2015). We use 43 state corporate income tax rate increases across 24 states and 78 state corporate income tax cuts across 27 states. Our first treatment event occurs in 1989 and our last occurs in 2011. On average, state tax rate increases raise rates by 93 basis points and state tax decreases lower rates by 55 basis points on average (both numbers are consistent with Heider and Ljungqvist 2015).

3.2. Incidence Measures

We rely on income statement line items to detect incidence on various stakeholders. First, revenues represent the welfare of consumers/customers. If consumers bear incidence following a state tax rate increase, prices should increase and output should fall. Revenues roughly represent the price times the quantity sold. Therefore, revenues represent the welfare of consumers. However, if prices rise and output falls following a tax rate increase, we cannot predict whether revenues will increase or decrease. If the magnitude of a price rise is *larger* than the magnitude of a quantity decrease, revenues will increase. Contrastingly, if the magnitude of a price rise is *smaller* than the magnitude of a quantity decrease, revenues will decrease. In both cases, consumers suffer a loss of welfare. A symmetric analysis applies to revenues following a state tax decrease. In both cases, the change in revenues depends on the relative price elasticities. Therefore, we predict that revenues differ significantly from zero following a state tax rate increase and decrease. In other words, we do not make a directional prediction because revenues can increase or decrease following state tax changes if consumers bear incidence.

Second, cost of goods sold represents the welfare on suppliers. Cost of goods sold is loosely the expense firms pay for inventory and related expenses. If firms demand less inventory from their suppliers, the price of that inventory should also fall. Therefore, cost of goods sold expense should decrease if suppliers bear incidence. Third, we use SG&A expense to represent employee welfare. SG&A expense includes many operating expenses, wages are likely a large portion of SG&A. Moreover, prior studies use SG&A to capture employee wages (Babenko and Tserlukevich 2009; Bova, Kolev, Thomas and Zhang 2015). We use non-state taxes to represent incidence on non-state governments, including the federal government, foreign governments and local governments. If non-state governments bear incidence, we expect firms to avoid more non-

state taxes and firms' non-state tax expense to decrease. Finally, we use net income to represent shareholder welfare because net income represents after-tax returns available for distribution to shareholders.

3.3. Methodology

3.3.1. Equity financing effects

Our first test examines the effect of state tax changes on equity financing. We implement difference-in-differences regressions to test whether tax rate increases and decreases affect the amount of firms' equity financing. We estimate the following regression:

$$Equity\ Financing_{it} = \alpha + \beta_1 TaxIncrease_{it} + \beta_2 TaxDecrease + \sum \beta_k Controls_{it} + \epsilon_{it} \quad (1)$$

Equity Financing is defined in two ways. First, we use *net* equity issuances following Chang et al. (2006). Net equity issuances are the proceeds from the sale of common stock minus the amount of share repurchases. Second, we use *gross* equity financing. Gross equity issuances are the proceeds from sale of common stock and ignores any share repurchases. *Increase* takes a value of 1 if firm *i* experienced a corporate income tax rate increase in its headquarter state in year *t* or prior to year *t*.[17,18] *Decrease* is coded to 1 if the state that firm *i* is headquartered in decreased corporate income taxes in year *t* or a prior year. We include both *Increases* and *Decreases* in our regressions following the approach in Heider and Ljungqvist (2015). By doing so, we control for the effects of a tax decrease (increase) when examining the effects of a tax rate increase (decrease) on equity financing. β_1 represents the effect of a state tax rate increase on equity financing relative to equity financing at firms that do not experience state tax rate increases and relative to equity financing at firms that experience a state tax rate increase later in

[17] Following Heider and Ljungqvist (2015), we do not limit our pre- and post-periods.
[18] We examine only the first corporate income tax rate increase and decrease in a state. By construction, *Tax rate increase* (*Tax Decrease)* takes a value of 1 for any subsequent state tax rate increase that occurs during our sample because *Tax rate increase* is coded to 1 following the first state tax rate increase

the sample period (i.e. β_1 represents the difference-in-differences estimate of a state tax rate increase on equity financing, as noted in Bertrand and Mullainathan 2003). We expect $\beta_1$to be negative and significant, consistent with corporate income tax rate increases decreasing equity issuances. Similarly, β_2 is the difference-in-differences estimate of a state tax decrease on equity issuances. We expect β_2 to be positive and significant, consistent with firms issuing more equity financing after a corporate income tax decrease.

Controls is a vector of fixed effects and firm-level controls that affect equity financing decisions. We control for state, year and firm fixed effects to remove any invariant effects that can confound our results. We control for firms' book-to-market (*Book-to-market)* ratio because firms issue more equity when their shares are overvalued (Chang, Dasgupta and Hilary 2009). We control for common dividends (*ComDiv*) because firms with more shares will issue more total dividends. We control for capital expenditures (*CapEx*) because firms often issue equity to fund capital expenditures. We control for SG&A (*SG&A)* because growth firms can have higher SG&A expenses and also issue more equity. We control for tax avoidance (*TaxAvoidance)* because firms issue more as they avoid taxes (Lee, Shevlin and Venkat 2018). We control for total debt (*TotalDebt)* because firms with high leverage may prefer equity to debt (Chang et al. 2009). We control for size (*ln(Assets))* because larger firms issue more equity (Chang et al. 2009). We control for intangibles (*Intangibles)* because firms issue more equity to finance intangible development (Chang et al. 2009; Goh, Lee, Lim and Shevlin 2016). Finally, we control for net operating losses *(NOL)* because the marginal benefits of debt decline as firms have more non-debt tax shields, such as NOL's (Goh et al. 2016). Thus, they should prefer to issue equity. We also control for two state-level economic variables. First, we control for the state's economic growth rate (*GSP Growth*) because growth rates can induce state legislatures to

change corporate income taxes and can also affect equity financing decisions. Second, we control for the state's unemployment rate (*Unemployment*) because state legislatures often change taxes in response to unemployment (Ljungqvist et al. 2017). Furthermore, unemployment can affect firms' decision to issue equity financing because high unemployment suggests that economic conditions are poor thus will deter firms from issuing equity financing to fund investment. In all regressions, we cluster standard errors by firm and year to preclude time-series or cross-sectional correlation from affecting our inferences.

3.3.2. Investment effects

In our second test, we examine whether state corporate income tax changes affect investment. We implement difference-in-differences regressions using state corporate income tax changes as exogenous shocks to corporate income taxes. Our specification is as follows:

$$Investment_{it} = \alpha + \beta_1 TaxIncrease_{it} + \beta_2 TaxDecrease + \sum \beta_k Controls_{it} + \epsilon_{it} \quad (2)$$

We measure *Investment* in two ways. Both measures are consistent with prior studies (e.g. Hanlon, Lester and Verdi 2015). First, we use capital expenditures scaled by lagged total assets (*CapEx*). Capital expenditures are a common form of investment. Thus, we expect firms to alter capital expenditures following corporate income tax changes. Second, we use research and development expenses scaled by lagged total assets (*R&D*). R&D is another important form of investment. Thus, we expect R&D to change as corporate income taxes change. Specifically, we expect β_1 to be negative and significant because we hypothesize that tax rate increases reduce investment. We expect β_2 to be positive and significant becaue we hypothesize that tax decreases reduce investment. *Increase, Decrease* and *Controls* are defined in the same way they were defined in equation (1).

3.3.4. Incidence analyses

We employ a difference-in-differences methodology to test for incidence. *Increase* and *Decrease* are defined as before. We estimate whether state statutory corporate income tax rate increases and decreases are associated with other income statement accounts:

$$Revenue_{it} = \beta_0 + \beta_1 Increase_{it} + \beta_2 Decrease + \sum \beta_k Controls_{it} + \varepsilon_{it} \quad (3)$$

$$COGS_{it} = \beta_0 + \beta_1 Increase_{it} + \beta_2 Decrease + \sum \beta_k Controls_{it} + \varepsilon_{it} \quad (4)$$

$$SG\&A_{it} = \beta_0 + \beta_1 Increase_{it} + \beta_2 Decrease + \sum \beta_k Controls_{it} + \varepsilon_{it} \quad (5)$$

$$Non - state\ Taxes_{it} = \beta_0 + \beta_1 Increase_{it} + \beta_2 Decrease + \sum \beta_k Controls_{it} + \varepsilon_{it} \quad (6)$$

$$Net\ Income_{it} = \beta_0 + \beta_1 Increase_{it} + \beta_2 Decrease + \sum \beta_k Controls_{it} + \varepsilon_{it} \quad (7)$$

Revenue is defined as sales scaled by lagged total assets. *COGS* is defined as cost of goods sold scaled by lagged total assets. *SG&A* is defined as firms' sales, general and administrative expenses scaled by lagged total assets. *Non-state Taxes* is defined as total tax expense reduced by state tax expense scaled by lagged total assets. Net income is defined as net income scaled by lagged total assets.

If β_1 is negative in equation (3), our results would be consistent with state tax rate increases decreasing revenues. We would interpret this result as suggesting that consumers bear the incidence of the state tax rate increase because the average price of the sold good rises by less than the decrease in quantity sold. If β_1 is positive, we would still interpret the result as consistent with consumers bearing incidence because the average price of sold goods rises by more than the decrease in quantity sold. Therefore, we conduct two-sided t-tests on β_1 to reflect our non-directional alternative hypothesis. In all other regressions, we perform one-sided t-tests because we proffer directional hypotheses. In equations (4) and (5), we expect a negative and significant β_1 because we hypothesize that a tax rate increase results in fewer supply purchases, fewer employees hired and falling prices for supplies and labor overall. In equation (6), we

expect a negative β_1 because firms should pay less nonstate taxes as their state tax bills rise. Similarly, we expect β_1 in equation (7) to be negative because a state tax rate increase should result in falling profits for shareholders.

In these regressions, *Controls* comprises 1) firm-specific control variables, 2) year fixed effects, 3) firm fixed effects and 3) state fixed effects. Our set of fixed effects are intended to control for any invariant year-, firm- or state-specific effects that might explain our results. We use a parsimonious set of firm-specific controls to avoid confounding our results. Our theory is broad: we suggest that tax rate increases result in higher cost of equity, lower equity issuances, lower investment and, ultimately, incidence on various stakeholders. Therefore, common control variables can lead to overcontrol issues(see Swanquist and Whited 2018 for a discussion of appropriate controls). Still, we incorporate firm-level controls to demonstrate that our results are robust and for consistency with prior studies in accounting. We specifically control for firms' leverage, foreign income, property, plant equipment and size. Each variable is lagged by a year to mitigate the possibility that they confound our results. We also control for two state-level economic variables. First, we control for the state's economic growth rate (*GSP Growth*) because growth rates can induce state legislatures to change corporate income taxes and can affect sales and expenses. Second, we control for the state's unemployment rate (*Unemployment*) because state legislatures may change taxes in response to unemployment. Furthermore, unemployment can affect firms' revenues and expenses.

4. RESULTS

4.1. Descriptive Statistics and Correlations

In Table 1, we report descriptive statistics from our sample. *Equity Issuances* and *Net Equity Issuances* have mean values of .07 and .057, respectively. These values suggest firms

issue equity between 5.7% and 7% of lagged total assets across all firm years. Average sales amount to 1.359 times lagged assets. Average cost of goods sold amounts to 89% of lagged assets while average SG&A amounts to 37% of lagged total assets. Non-state taxes take an average value of .020 in our sample, suggesting that the average firm pays 2% of its lagged assets in non-state taxes in an average year. Average firm-year after-tax earnings are negative at -2.6% of lagged total assets.

Increase takes a mean value of .309, implying that 30.9% of firm-year observations experience a state corporate income tax rate increase in the current or a prior year. Similarly, *Decrease* takes a mean value of .422 implying that 42.2% of firm-year observations experience a state corporate income tax decrease in the current or a prior year. We are unable to compare our state tax rate increase and decrease summary statistics to Heider and Ljungqvist (2015) because they do not report summary statistics on their state tax change variables.

In Table 2, we report Spearman (Pearson) correlations above (below) the diagonal among our incidence variables, our difference-in-difference variables and our controls. We find that *Increase* is negatively and significantly correlated with contemporaneous *Sales*, *COGS* and *SG&A*. These preliminary results are consistent with state tax rate increases resulting in incidence on consumers, suppliers and workers. *Increase* is uncorrelated with *Non-state Taxes* and is positively correlated with *Earnings*, suggesting that tax rate increases do not affect non-state taxes and that tax rate increases are associated with higher earnings. We also find that *Decrease* is negatively and significantly correlated with contemporaneous *Sales*, *COGS*, *SG&A*, *Non-state Taxes* and *Net Income* suggesting negative associations between tax cuts and all of our income statement line items. These univariate results are likely infected by omitted variable bias and are unlikely to represent causal relationships.

4.2. Equity financing effects

In Table 3, we report the result of testing our first hypothesis: We predict that tax rate increases (decreases) reduce (increase) equity financing. In column (1), we find that the difference-in-differences estimate on *Increase* is negative and significant at the 1% level when using net equity issuances as our dependent variable. In economic terms, our estimate implies that corporate income tax rate increases reduce equity issuances by 1.5% of total assets relative to equity issuances at firms that never experience corporate income tax rate increases and relative to equity issuances at firms that have not yet experienced a corporate income tax rate increase. We also find evidence consistent with state tax decreases having no effect on net equity issuances, *ceteris paribus.* Specifically, we find that the coefficient on *Decrease* is insignificant at conventional levels. Thus, the effect of corporate income taxes on net equity issuances appears to be asymmetric.

In column (2), we find that the coefficient on *Increase* is negative and significant at the 5% level when using gross equity issuances as our dependent variable. Our results suggest that firms reduce equity issuances by .7% of total assets following state tax rate increases compared to equity issuances prior to the state tax rate increase and compared to equity issuances by firms in state that have not raised their corporate income tax. On the other hand, the coefficient on *Decrease* is insignificant at conventional levels, as was the case in column (1). Similar to our results in column (1), our results are consistent with corporate income taxes having an asymmetric effect on equity issuances: while tax rate increases reduce equity financing, tax decreases have no effect.

Our controls are mostly consistent with predictions. We find that the coefficient on book-to-market is negative and significant in columns (1) and (2), suggesting that firms issue more

equity when market value of equity is high relative to book value of equity. We find that the coefficient on *ComDiv* is positive and significant, suggesting that firms with more equity issuances have to pay more in dividends. We find that the coefficient on *CapEx* is positive and significant in both columns, suggesting that firms issue more financing as they purchase more capital assets. The coefficient on *SG&A* is positive and significant in both columns, consistent with firms issuing more equity as they increase their *SG&A.* We find that leverage (*Leverage*) is negatively and significantly associated with equity issuances in both columns, suggesting that firms with more leverage issue less equity. We find that the coefficient on *Intangibles* is positively and significantly associated with equity issuances, consistent with firms issuing more equity as they acquire more intangibles. We find that the coefficient on *PPE(Net)* is positive and significant, consistent with firms issuing more equity when they report large amounts of property, plan and equipment. We find that the coefficient on *Foreign Income* is negative and significant, implying that firms with large levels of foreign income use equity financing less. We also find that state economic growth is associated with firms issuing more equity, consistent with firms financing projects via equity when investment in the state is likely to be profitable due to high economic growth.

These results are novel to the incidence literature in two ways. First, we are the first to directly examine whether tax changes affect equity financing. Incidence theory generally assumes that tax changes affect the supply of capital (Harberger 1962; Gravelle 2013). We are the first to test this explicitly. Second, we offer evidence that tax effects on the supply of capital are asymmetric: tax decreases do not affect equity financing while increases actually reduce equity financing.

4.3. Investment effects

In Table 4, we report the results of testing our second hypothesis. Specifically, we report the results of testing whether tax decreases (increases) increase (decrease) investment. In column (1), we report the results of testing whether corporate income tax rate increases (*Increase*) and decreases (*Decreases*) affect capital expenditures (*CapEx*). We find that the coefficient on *Increase* is negative and significant at the 5% level while the coefficient on *Decrease* is insignificant at conventional levels. In economic terms, our estimate of the effect of state tax rate increases on *CapEx* implies that state tax rate increases reduce capital expenditures by .4% of total assets relative to prior to the tax rate increase and relative to firms that never experience a tax rate increase. We find no association between state tax decreases and capital expenditures. Thus, our capital expenditure results are asymmetric.

In column (2), we report difference-in-differences estimates of the effect of *Increase* and *Decrease* on *R&D*. The coefficient on *Increase* is negative and significant at the 1% level. This result is consistent with firms decreasing their research and development expenditures following state tax rate increases. However, we find that the coefficient on *Decrease* remains insignificant at conventional levels. Thus, the effects of taxes on investment are asymmetric. Overall, our results are consistent with corporate income tax rate increases reducing investment, as predicted by corporate income tax incidence theory. However, we find that tax decreases have no effect on investment.

4.4. State tax rate increases and decreases

In Table 5, we report the results of examining the incidence of corporate income tax rate increases. We reports estimates from regressions of *Sales, COGS, SG&A, Non-state Taxes* and *Earnings* (respectively) on *Increase* and *Decrease* using a difference-in-differences design. In column (1) of Panel A, we find that *Sales* are negatively and significantly associated with

Increase at the 1% level. In other words, tax rate increases are associated with reductions in sales. This result is consistent with tax rate increases resulting in 1) a decrease market-clearing quantity and a decrease in market-clearing sales price, 2) an increase in sales price but a larger decrease in quantity or 3) an increase in quantity but a larger decrease in sales price. In cases 1) or 2), incidence is borne in part by consumers. In case 3, consumers receive benefits from a tax rate increase. We posit that the probability of cases 1) and 2) is higher than the probability of 3) because 1) and 2) are consistent with accepted economic theories of incidence while 3) is difficult to explain. Therefore, we interpret our results as consistent with consumers bearing some corporate income tax incidence. We also find that the coefficient on *Decrease* is insignificant. This result is consistent with consumers receiving none of the benefits of tax decreases (e.g. in the form of increased output and/or lower prices).

In column (2), we find that *COGS* is negatively and significantly related to state tax rate increases at the 5% level. Contrastingly, we find that *COGS* is not significantly associated with tax decreases. Our results are consistent with a state tax rate increase resulting in lower prices and/or lower quantities supplied to firms but with a state tax decrease having no effect on suppliers. As such, we interpret our results as consistent with suppliers bearing the burden of corporate income tax rate increases but receiving none of the benefits of a corporate income tax decreases.

In column (3), we find that *SG&A* is negatively related to state tax rate increases. The coefficient on *Increase* is significant at the 1% level. Our result is consistent with employees bearing a portion of the corporate income tax. Contrastingly, we find that *SG&A* is unassociated with state tax decreases. We interpret our results as consistent with employees bearing some of

the costs of corporate income tax rate increases, but receiving little of the benefits of a corporate income tax decrease.

In column (4), we examine the relation between non-state taxes and state tax rate increases and decreases. We find that *Increase* is negatively and significantly related to non-state taxes. This result is consistent with firms avoiding more non-state taxes when facing a corporate income tax rate increase. Thus, our results are consistent with non-state governments, including the federal government, bearing the burden of a state tax rate increase. Contrastingly, we find that non-state taxes are unassociated with state tax decreases. Specifically, the coefficient on *Decrease* is insignificant at conventional levels. We infer that firms do not alter their non-state tax avoidance when benefitting from a state tax cut.

Our final result is consistent with shareholders bearing little incidence. We find that earnings are insignificantly related to either state tax rate increases or decrease. Specifically, the coefficients on both *Increase* and *Decrease* are insignificant when earnings is our dependent variable. We interpret this result as suggesting that shareholders are able to pass on tax rate increases but receive none of the benefits of tax decreases. Moreover, our result is consistent with the results pertaining to *Increase* in columns (1) through (3): while revenues fall following state tax rate increases, COGS and SG&A do as well. Therefore, earnings are not affected by the state tax rate increase.

Overall, our results are consistent with various stakeholders bearing the incidence of corporate income tax rate increases. Specifically, we infer that consumers, suppliers and labor all bear some portion of the corporate income tax. Contrary to Harberger (1962), we find that shareholders bear *none* of the incidence, likely because consumers, suppliers and labor are not perfectly mobile and cannot perfectly substitute away from taxed companies. Interestingly, our

results are consistent with incidence asymmetry. That is, our results are consistent with consumers, suppliers, employees and shareholders benefitting little from state tax *decreases* but suffering from tax rate incr*eases*.

5. CROSS-SECTIONAL TESTS

We perform one cross-sectional test for each of our dependent variables. We identify variables that we expect to moderate or enhance incidence on each, respective stakeholder. We then perform the same difference-in-differences regressions as before but incorporate interactions between *Increase* and a variable that captures cross-sectional variation in incidence on particular stakeholders (*XsecVar*). Each variable is defined below and in Appendix A. We also interact *XsecVar* with *Decrease* but do not offer hypothesis on tax rate decreases because we found insignificant decrease results in our main tests. Our results are reported in Table 6.

5.1 Sales – Price elasticity of demand

First, we hypothesize that firms in more elastic product markets experience a greater decrease in revenues than firms in inelastic markets following a tax rate increase. When firms reduce output in elastic markets due to tax rate increases, output will fall by more than prices rise. Contrastingly, output will fall less than prices rise when firms cut output in inelastic markets. Consequently, overall revenues should fall more following tax rate increases when markets are elastic compared to when markets are inelastic.

To measure elasticity, we split our sample based on industry by estimated elasticity. We use estimates of demand elasticities from Anderson, McLellan, Overton and Wolfram (1997). Anderson et al. do not provide comprehensive estimates of elasticities across industries. Thus, we rely on intuition to code industries as elastic and inelastic based on their estimates. We code agriculture/mining, transportation and manufacturing as elastic because Anderson et al. suggest

that the markets for fresh tomatoes, air transportation and automobile parts are highly elastic. We code retail trade and services as inelastic because Anderson et al. suggest salt, matches and physician and legal services are all inelastic.[19] We expect that the coefficient on the interaction between *Increase* and our elasticity variable is negative.

We report results of this test in column (1) of Table 6. We find that the coefficient on the interaction between *Increase* and elasticity (as represented by *XsecVar*) is negative and significant at the 5% level. We also find that the coefficient on the interaction between *Decrease* and profit margins is positive and significant at the 1% level. These results are consistent with firms in elastic product markets generating lower revenues following tax rate increases compared to firms in inelastic markets.

5.2 Suppliers – Market power

Next, we hypothesize that market power increases incidence on suppliers. We expect that firms in imperfect competition will decrease their output towards monopolistic levels following tax rate increases (Auerbach 2006). Thus, their demand for supplies and inventory will fall tend towards monopsonistic (single-buyer) levels following tax rate increases. Consequently, market-clearing price and quantity will fall incrementally more when firms are imperfectly competing for supplies and inventory.

We use profit margins to represent market power in supply markets (Kubick, Lynch, Mayberry and Omer 2014). Firms with high markups likely have high market power in supply markets and are thus able to reduce their inventory costs. We expect that the coefficient on the interaction between profit margins and *Increase* is negative.

[19] We recognize that mislabeling industry elasticities might introduce noise into our measure. However, comprehensive, industry-wide elasticity estimates are not readily available.

We report results of this test in column (2) of Table 6. We find that the coefficient on the interaction between *Increase* and profit margins (*XsecVar*) is negative and significant at the 1% level. We find that the coefficient on the interaction between *Decrease* and profit margins is insignificant. These results are consistent with tax rate increases reducing the demand of supplies and inventory incrementally more when competition is imperfect compared to when markets are competitive. However, we find that tax decreases do not benefit suppliers more when competition is imperfect compared to when markets are more competitive.

5.3 Labor - Union membership

Third, we hypothesize that union membership increases tax incidence on labor based on the findings of Felix and Hines (2009). Felix and Hines argue that union wages are generally higher than non-union wages because union wages represent unions bargaining successfully for the economic rents of the firm. When taxes rise, union workers suffer more than non-unionized workers because they must forego economic rents in addition to bearing incidence from reduced labor demand. Relying on this argument, Felix and Hines (2009) find that the difference between union wages and non-union wages is nearly equal in high-tax states but dramatically that union workers are paid substantially higher than non-union workers in low-tax states.[20]

We measure union membership using union density. This measure captures the percentage of total workers that are unionized in a given state in a particular year. We expect the coefficient on the interaction between *Increase* and union membership density to be negative.

Results are reported in column (3) of Table 6. We find that the coefficient on the interaction between *Increase* and union membership density is negative and significant at the 5%

[20] Unionized labor may also bear less incidence. Union contracts may prevent firms from shifting taxes to unionized workers and unions may credibly threaten to protest decreases in wages or layoffs.

level. Contrastingly, the coefficient on the interaction between *Decrease* and union membership is insignificant. Our results are consistent with union members bearing more of the costs of tax rate increases but not receiving the benefits of tax decreases.

5.4 Non-state governments - Tax risk

Fourth, we hypothesize that firms willing to take more tax risk will increase tax avoidance following tax rate increases compared to firms unwilling to take tax risk. That is, we expect tax rate increases to affect marginal tax avoidance decisions by reducing expected after-tax profits. At the margin, firms will be more willing to take tax risks to avoid taxes to recoup lost profits from the state tax rate increase. We expect that firms willing to take the most tax risk will avoid the most non-state taxes following a tax increase.

We measure risky tax avoidance using the volatility of GAAP effective tax rates. We expect that firms engaging in risky tax avoidance will experience more volatile effective tax rates compared to firms engaging in less risky tax avoidance (Demere, Lisowsky, Li and Snyder 2016 suggest that GAAP ETR volatility is partially driven by tax risk). We expect that the coefficient on the interaction between the volatility of GAAP ETR and *Increase* is negative.

Our results are reported in column (4) of Table 6. We find that the coefficient on the interaction between *Increase* and GAAP ETR volatility is negative and significant at the 10% level. The coefficient on the interaction between *Decrease* and GAAP ETR volatility is positive and significant at the 5% level. Overall, our results are consistent with the firms willing to engage in the most risky tax avoidance increasing non-state tax avoidance the most following tax rate increases. Similarly, we find that firms taking the highest tax risk increasing non-state tax avoidance the most following a tax rate cut.

5.5 Shareholders - Financial constraints

In our last cross-sectional test, we analyze whether financial constraints enhance corporate income tax incidence on shareholders. We hypothesize that shareholders in financially constrained firms bear less of the costs of corporate income tax rate increases because financially-constrained firms are less reliant on external financing compared to other firms. Thus, corporate tax changes should not alter the investment decisions of financially-constrained firms, resulting in less of a decrease in earnings compared to earnings decreases at unconstrained firms.

We measure financial constraints using Altman's Z score (Altman 1968). We expect that the coefficient on the interaction between Altman's Z score and *Increase* is negative. Such results would be consistent with shareholders at unconstrained firms reciving more of the costs of a tax rate increase.

We report results in column (5) of Table 6. We find that the coefficient on the interaction between *Increase* and Altman Z score is negative and significant at the 5% level. The coefficient on the interaction between *Decrease* and Altman Z score is positive and significant at the 1% level. Our results are consistent with financially unconstrained firms passing on more of the costs (benefits) of a tax rate increase (decrease) to shareholders compared to financially constrained firms.

6. ADDITIONAL TEST: Large tax rate increases and decreases

We also test whether large tax decreases result in incidence. We note that tax decreases seem to have no effect on income statement line items. We suspect that low power explains these null results. Specifically, we note that many of the state tax decreases we use are small in magnitude. Many of our corporate income tax cuts reduce corporate taxes by less than .25%. Consequently, state tax cuts might not have any effect or might have only small effects on firm operations. Contrastingly, state tax rate increases are generally large. To examine whether tax cut

sizes explain our null results, we repeat our analysis but include only large tax decreases (*Big Decrease*) with all state tax rate increases. *Big Decrease* takes a value of 1 if firm *i* is headquarted in a state that decrease corporate taxes by 1% or more in year *t* or in any prior year and 0 otherwise. Thus, *Big Decrease* includes only relatively large tax decreases. Beyond this difference, our specifications are identical to the ones used above. Our coefficient predictions are also identifical.

We report our results in Table 7. Our results are nearly identical to our prior results, except we now find that *Decrease* is positively associated with *SG&A*. Specifically, we find that *Big Decrease* has no effect on sales, COGS, non-state taxes or ROA. However, we find that the coefficient on *Decrease* is positive and significant at the 5% level in column (3). Our results are consistent with firms using tax savings to pay employees and suppliers more or to hire more workers. Thus, our results suggest that employees suffer the costs of tax rate increases, but also benefit from tax decreases. Overall, we interpret these results as suggesting that only labor bears symmetric incidence. Other stakeholders seem to only suffer when taxes increase while not benefitting when taxes decrease.

7. CONCLUSION

In this study, we attempt to provide robust evidence on corporate income tax incidence. We hypothesize that consumers, suppliers, employees, non-state governments and shareholders all bear incidence because each stakeholder transacts with firms. We predict that state tax rate increases lead to firms to provide less output to consumers, demand less inputs from suppliers, demand less labor from employees, avoid more non-state taxes and provide less returns to shareholders. Symmetrically, we expect tax rate decreases lead to higher output, higher demand from suppliers and labors, less non-state tax avoidance and higher earnings.

We begin by implementing difference-in-differences regressions to test whether state taxes are associated with equity issuances. Using a sample of state corporate income tax rate increases and decreases, we document that state tax rate increases *reduce* equity issuances but that state tax decreases have no effect. Thus, the supply of capital to firms seems asymmetric between tax rate increases and decreases. This result suggests that prior models of corporate income tax incidence (e.g. Harberger 1962) are only partially correct.

Next, we test whether state tax changes affect investment. Incidence theory generally assumes that corporate income tax changes alter investment because it affects cost of capital and financing decisions. We test whether corporate tax rate changes affect investment by regressing investment meausures on our increase and decrease variables in a difference-in-differences specification. We find that state corporate income tax rate increases reduce investment but that corporate income tax decreases have no effect on incidence. Thus, our results suggest that corporate income taxes and investment are asymmetrically related.

Next, we implement difference-in-differences regressions to test for stakeholder incidence. We use revenues, COGS, SG&A, non-state taxes and net income as dependent variables to measure the welfare of consumers, suppliers, employees, non-state governments and shareholders, respectively. We find that sales, COGS, SG&A and non-state taxes are negatively associated with state tax rate increases. We infer that consumers, suppliers, employees and non-state governments bear some incidence.

Additionally, we incorporate state tax decreases in our same difference-in-differences regressions to determine whether incidence is asymmetric. We find that corporate income state tax decreases are not associated with any income statement line item. Thus, we conclude that none of our identified stakeholders receive the benefits of a state tax cut.

We perform one cross-sectional test for each dependent variable. First, we find that sales fall (rise) more when the firm facing a tax rate increase (decrease) is in an elastic product market compared to when the firm is in an inelastic product market. Second, we find that COGS fall more when the firm facing a tax rate increase has more market power compared to when it doesn't. We find no effects for tax decreases. Third, we find that union membership increases the negative effect of tax rate increases on SG&A, consistent with unionized labor bearing more incidence than non-unionized labor. We find no effects for decreases. We find that tax risk increases the negative effect of tax rate increases on non-state taxes, consistent with firms willing to take more tax risk avoiding more non-state taxes than firms unwilling to take tax risk. Symmetrically, we find that tax risk decreases the positive effect of tax rate increases on non-state taxes. Finally, we find that financially unconstrained firms pass on more of the costs (benefits) of a tax rate increase (decrease) to shareholders relative to constrained firms, consistent with tax changes affecting shareholders of constrained firms less than shareholders of unconstrained firms.

In an additional test, we examine whether tax cuts have little effect on various stakeholders because they are too small. We omit tax decreases of less than 1% and perform the same tests as before. We find that large tax decreases are associated with increases in *SG&A* but are unassociated with other income statement items. Our results are consistent with tax decreases benefitting workers and employees.

Our study makes several contributions. First, we improve on identification in prior incidence studies by using several difference-in-differences specifications to examine incidence. Second, we test the assumptions that corporate income taxes are negatively associated with equity issuances and investment, as is consistent with the assumption in corporate income tax

incidence models that corporate income taxes reduce the supply of capital to firms (Auerbach 2006). Third, we demonstrate that incidence itself is asymmetric: while consumers, suppliers and non-state governments all suffer from corporate income tax rate increases, these same stakeholders do not benefit from tax decreases. Our study should prove useful to policymakers and those interested in predicting the consequences of the Tax Cuts and Jobs Act of 2017.

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Appendix A: Variable Definitions

Dependent Variables	
Sales	Sales (net) (SALES) scaled by beginning total assets (AT)
COGS	Cost of goods sold (COGS) scaled by beginning total assets (AT)
SG&A	Sales, general and administrative expense (XSGA) scaled by beginning total assets (AT)
Non-state Taxes	Total income tax expense (TXT) minus state income tax expense (TXS) scaled by beginning total assets (AT)
Net Income	Net income (NI) scaled by beginning total assets (AT)
Equity Issuances	Sale of common stock and preferred stock (SSTK) scaled by beginning total assets (AT)
Net Equity Issuances	Sale of common stock and preferred stock (SSTK) minus purchase of common stock and preferred stock (PRSTKC) scaled by beginning total assets (AT)
Capex	Capital expenditures (CAPX) scaled by beginning total assets (AT)
R&D Expense	Research and development expense (XRD) in year t scaled by total assets in year t-1. We set missing values to zero
Independent Variables	
Increase	Takes a value of 1 if the given firm is headquartered in a state that experienced a state corporate income tax rate increase in the current year or a prior year in the sample
Decrease	Takes a value of 1 if the given firm is headquartered in a state that experienced a state corporate income tax decrease in the current year or a prior year in the sample
Controls	
ln(Assets)	The natural logarithm of assets (AT)
Book-to-Market	Natural log of book-to-market at fiscal year-end
Comdiv	Common stock dividends (DVC) scaled by beginning total assets (AT)
CETR3	3-year cumulative cash effective tax rate calculated as the 3-year sum of cash taxes paid (TXPD) scaled by the 3-year sum of pre-tax income (PI) less special items (SPI) and multiplied by -1.
Foreign Income	Foreign pre-tax income (PIFO) scaled by beginning total assets (AT).
Intangibles	Intangibles (INTAN) scaled by beginning total assets (AT)
Leverage	Long term debt (DLTT) scaled by beginning total assets (AT)
NOL	Equals 1 if the firm reports a positive NOL carryforward (TLCF) and 0 itherwise

PPE(Net)	Net property, plant and equipment (PPENT) scaled by beginning total assets (AT)
TA	Total accruals, Income before extraorindary items (IB) minus cash flows from operating activities (OANCF) scaled by beginning total assets (AT)
GSP Growth	Economic growth rate for each state extracted from the FRED Economic Data website
Unemployment	Unemployment rate for each state extracted from the FRED Economic Data website
Cross-sectional variables	
Elasticity	Coded to 1 if firm *i*'s SIC2 industry is agriculture/mining, transportation or manufacturing and 0 if firm *i*'s SIC2 industry is retail or services.
IndAdjPM	Industry adjusted profit margin is defined as a firm's profit margin minus the mean profit margin by industry (SIC2) in a given fiscal year. Profit margin is calculated as pretax income (PI – SPI) divided by sales (SALE)
UnionMembership	An indicator that take a value of 1 if a firm faces union membership above the median union membership by industry (SIC2) in a given calendar year. Union membership is defined as percentage of nonagricultural wage and salary employees who are union members in a state in a given year. we obtain the data from http://www.unionstat.com.
TaxRisk	Standard deviation of GAAP effective tax rates (TXT/(PI-SPI)) over the past five years (t-4 to t)
FinConst	We calculate *Altman-Z Score* as follows: $Altman\text{-}Z = \{3.3*PI + 1*SALE + 1.4*RE + (ACT - LCT)\}/lagAT$ Where *PI* is pre-tax income, *SALE* is sales, *RE* is retained earnings, *ACT* is current assets, *LCT* is current liabilities, and *lagAT* is lagged total assets (at).

Table 1. Descriptive Statistics

VARIABLES	N	Mean	Median	SD	Min	25th	75th	Max
Sales t	89693	1.373	1.175	1.003	0.000	0.697	1.770	5.483
COGS t	89693	0.905	0.697	0.832	0.000	0.330	1.193	4.556
SG&A t	89693	0.387	0.306	0.326	0.016	0.155	0.519	1.805
Non-state Taxes t	89693	0.020	0.011	0.038	-0.092	0.000	0.037	0.161
Net Income t	89693	-0.025	0.031	0.236	-1.252	-0.052	0.085	0.398
Increase	89693	0.309	0.000	0.462	0.000	0.000	1.000	1.000
Decrease	89693	0.423	0.000	0.494	0.000	0.000	1.000	1.000
ln(Assets) t-1	89693	4.864	4.800	2.200	0.065	3.276	6.385	10.205
Leverage t-1	89627	0.250	0.187	0.277	0.000	0.022	0.373	1.568
PPE(Net) t-1	89693	0.324	0.232	0.306	0.002	0.104	0.442	1.666
ForeignIncome t-1	89693	0.008	0.000	0.027	-0.063	0.000	0.000	0.145
TA t	89693	-0.068	-0.056	0.141	-0.679	-0.114	-0.006	0.357
GSP Growth t	89693	0.027	0.026	0.027	-0.103	0.011	0.043	0.222
Unemployment t	89693	0.060	0.057	0.019	0.022	0.047	0.069	0.139
Net Equity Issue t	89546	0.068	0.000	0.280	-0.186	0.000	0.013	1.965
Equity Issuances t	88149	0.083	0.004	0.281	0.000	0.000	0.021	2.001
Capex t	88925	0.071	0.041	0.093	0.000	0.019	0.083	0.574
R&D t	89693	0.048	0.000	0.090	0.000	0.000	0.058	0.504
Book-to-Market t	85752	0.726	0.522	0.722	0.032	0.293	0.888	4.554
Comdiv t	89693	0.008	0.000	0.020	0.000	0.000	0.005	0.131
CETR3 t	52294	-0.277	-0.278	0.168	-1.000	-0.368	-0.161	0.000
Intangibles t	80484	0.150	0.047	0.231	0.000	0.000	0.209	1.271
NOL t	89693	0.310	0.000	0.996	0.000	0.000	0.084	6.886

Note: Our sample period spans 1989 to 2012. All variables are trimmed at the 1st and 99th percentiles to mitigate the effect of outliers. All variables are defined in Appendix A.

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Table 2. Pearson's (below) and Spearman's (above) Corrlation Matrices

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) Increase	1	**0.34**	**-0.03**	**-0.02**	**-0.01**	**0.01**	**0.01**	**0.12**	**-0.03**	**-0.08**	**0.07**	0.00	**-0.15**	**0.10**
(2) Decrease	**0.34**	1	**-0.08**	**-0.10**	**0.06**	**-0.04**	**-0.04**	**0.06**	**-0.11**	**-0.14**	**0.04**	**-0.03**	**-0.04**	**-0.01**
(3) Sales t	**-0.03**	**-0.06**	1	**0.92**	**0.43**	**0.30**	**0.36**	**-0.07**	**0.02**	**-0.02**	-0.01	**0.17**	**0.04**	**-0.06**
(4) COGS t	**-0.02**	**-0.07**	**0.94**	1	**0.19**	**0.20**	**0.25**	**-0.01**	**0.12**	**0.05**	**-0.02**	**0.16**	**0.03**	**-0.06**
(5) SG&A t	**-0.02**	**0.05**	**0.39**	**0.17**	1	**0.02**	**-0.05**	**-0.42**	**-0.30**	**-0.34**	**-0.09**	0.00	**0.02**	**-0.03**
(6) Non-state Taxes t	-0.01	**-0.03**	**0.24**	**0.14**	**0.04**	1	**0.69**	**0.24**	**-0.08**	**0.07**	**0.19**	**0.17**	**0.02**	**-0.05**
(7) Net Income t	**0.02**	**-0.05**	**0.27**	**0.18**	**-0.32**	**0.39**	1	**0.23**	**-0.05**	**0.09**	**0.19**	**0.37**	**0.02**	**-0.04**
(8) ln(Assets) t-1	**0.12**	**0.06**	**-0.08**	**-0.03**	**-0.42**	**0.14**	**0.30**	1	**0.24**	**0.20**	**0.34**	0.00	**-0.10**	**0.05**
(9) Leverage t-1	**-0.04**	**-0.09**	**-0.03**	**0.02**	**-0.21**	**-0.11**	**0.01**	**0.17**	1	**0.38**	**0.02**	**-0.02**	**0.01**	**-0.04**
(10) PPE(Net) t-1	**-0.09**	**-0.11**	**-0.12**	**-0.07**	**-0.26**	0.00	**0.04**	**0.13**	**0.42**	1	**0.01**	**-0.14**	**0.09**	**-0.08**
(11) ForeignIncome t-1	**0.05**	**0.04**	**-0.03**	**-0.06**	**-0.07**	**0.16**	**0.15**	**0.28**	**-0.03**	**-0.02**	1	**0.05**	**-0.07**	**0.05**
(12) TA t-1	**0.01**	**-0.03**	**0.17**	**0.16**	**-0.11**	**0.14**	**0.53**	**0.05**	**-0.01**	**-0.12**	**0.04**	1	**0.02**	**-0.04**
(13) GSP growth t-1	**-0.15**	**-0.03**	**0.04**	**0.03**	**0.03**	**0.03**	**0.01**	**-0.10**	**0.02**	**0.08**	**-0.06**	**0.03**	1	**-0.22**
(14) Unemployment t-1	**0.15**	**0.02**	**-0.07**	**-0.06**	**-0.03**	**-0.06**	**-0.01**	**0.07**	**-0.07**	**-0.08**	**0.06**	**-0.03**	**-0.25**	1

Note: This table presents the Pearson's (below) and Spearman's (above) correlation matrices among dependent variables, *Sales*, *COGS*, *SG&A*, *Non-state Taxes*, *Net Income* and Controls. All control variables are defined in Appendix A. We bold all correlations that are statistically significant at 0.10 level or better (two-tailed)

Table 3. The effect of state tax changes on firms' equity issuance decisions

VARIABLES	Predicted	(1) *Net Equity Issuances*	(2) *Equity Issuances*
Increase	-	-0.021***	-0.012***
		(-3.95)	(-2.64)
Decrease	+	-0.001	-0.000
		(-0.32)	(-0.12)
ln(Assets)	+	0.005*	0.006**
		(1.43)	(2.01)
Book-to-Market t	-	-0.012***	-0.014***
		(-3.33)	(-4.34)
Comdiv t	+	0.314***	0.296***
		(11.38)	(10.77)
SG&A t	+	0.468***	0.505***
		(2.63)	(2.76)
Earnings t	-/+	0.105***	0.162***
		(4.44)	(7.01)
CETR3 t	+	0.012*	0.006
		(1.53)	(0.76)
Leverage t	-	-0.084***	-0.076***
		(-4.26)	(-3.73)
Intangibles t	+	0.154***	0.133***
		(8.14)	(6.57)
PPE(Net) t	+	0.156***	0.142***
		(8.24)	(7.24)
Foreign Income t	-	-0.269***	-0.165***
		(-5.84)	(-3.38)
NOL t	+	-0.005	-0.007
		(-0.48)	(-0.83)
GSP Growth t	+	0.111***	0.057**
		(3.78)	(2.49)
Unemployment t	-/+	-0.008	0.048
		(-0.08)	(0.51)
Observations		44,300	44,300
Adj. R2		0.361	0.358
Year FE		Yes	Yes
Firm FE		Yes	Yes
State FE		Yes	Yes
SE clustered by year		Yes	Yes
SE clustered by firm		Yes	Yes

Notes: This table presents the results of a difference-in-difference regression using state tax rate increases as a plausibly exogenous treatment. In column (1), we use share issuances minus share repurchases scaled by lagged assets as our dependent variable. In column (2), we use share issuances scaled by lagged assets as our dependent variable. Our control variables are defined in Appendix A. In both specifications, we use firm, state and year-level fixed effects. Fixed effects are omitted for parsimony. Standard errors are robust to heteroscedasticity and clustered at the firm and year level, following the suggestions in Petersen (2009).We perform one-sided t-tests on each coefficient. t-statistics are in parentheses. ***, ** and * denote significance at the 1%, 5%, and 10% level, respectively.

Table 4. The effect of state tax changes on firms' Investment

VARIABLES	Predicted	(1) *Capex*	(2) *R&D expense*
Increase	-	-0.004**	-0.006***
		(-1.92)	(-3.47)
Decrease	+	0.001	-0.001
		(0.85)	(-0.92)
ln(Assets)	+	-0.003***	-0.000
		(-2.97)	(-0.29)
Book-to-Market t	-	-0.009***	-0.000
		(-6.38)	(-0.18)
Comdiv t	+	0.023***	0.077***
		(5.76)	(17.89)
SG&A t	+	-0.077***	-0.004
		(-3.53)	(-0.37)
Earnings t	-/+	0.065***	-0.009**
		(13.01)	(-2.20)
CETR3 t	+	-0.000	0.002*
		(-0.04)	(1.64)
Leverage t	-	-0.014***	-0.002*
		(-3.78)	(-1.45)
Intangibles t	+	-0.007**	-0.000
		(-1.98)	(-0.09)
PPE(Net) t	+	0.295***	0.003*
		(32.55)	(1.61)
Foreign Income t	-	-0.026**	0.010
		(-2.39)	(0.96)
NOL t	+	-0.012***	0.002
		(-4.08)	(0.93)
GSP Growth t	+	0.022*	-0.004
		(1.38)	(-0.69)
Unemployment t	-/+	-0.152***	-0.008
		(-3.54)	(-0.42)
Observations		44,300	44,300
Adj. R2		0.751	0.887
Year FE		Yes	Yes
Firm FE		Yes	Yes
State FE		Yes	Yes
SE clustered by year		Yes	Yes
SE clustered by firm		Yes	Yes

Notes: This table presents the results of a difference-in-difference regression using state tax rate increases as a plausibly exogenous treatment. In column (1), we use capital expenditure as a proxy for firms' investment. In column (2), we use R&D expense as a proxy for firms' investment. Our control variables are defined in Appendix A. In both specifications, we use firm, state and year-level fixed effects. Fixed effects are omitted for parsimony. Standard errors are robust to heteroscedasticity and clustered at the firm and year level, following the suggestions in Petersen (2009).We perform one-sided t-tests on each coefficient. t-statistics are in parentheses. ***, ** and * denote significance at the 1%, 5%, and 10% level, respectively.

Table 5. State tax rate increases and decreases

Dependent Variable	(1) *Sales*	(2) *COGS*	(3) *SG&A*	(4) *Non-state Taxes*	(4) *Net Income*
Increase	-0.060***	-0.030**	-0.021***	-0.004***	0.001
	(-2.85)	(-1.90)	(-2.74)	(-3.19)	(0.28)
Decrease	-0.018	-0.009	-0.001	-0.000	-0.001
	(-1.20)	(-0.81)	(-0.16)	(-0.45)	(-0.53)
ln(Assets) t-1	-0.315***	-0.187***	-0.143***	-0.004***	0.011***
	(-17.42)	(-16.42)	(-20.10)	(-6.47)	(5.12)
Leverage t-1	-0.149***	-0.101***	-0.020***	-0.014***	-0.019***
	(-6.54)	(-6.30)	(-3.05)	(-11.38)	(-3.41)
PPE(Net) t-1	0.068***	0.008	0.024**	0.008***	-0.001
	(3.01)	(0.54)	(2.24)	(6.57)	(-0.07)
Foreign Income t-1	1.220***	0.541***	0.269***	0.099***	0.360***
	(9.91)	(5.76)	(6.36)	(8.71)	(13.91)
TA t	0.465***	0.221***	-0.128***	0.021***	0.700***
	(10.76)	(7.34)	(-5.45)	(4.62)	(30.18)
GSP Growth t	0.134	0.101	-0.061*	0.013	0.014
	(0.95)	(0.89)	(-1.58)	(1.25)	(0.47)
Unemployment t	-1.237**	-1.019***	-0.327***	-0.072***	-0.093
	(-2.43)	(-2.67)	(-2.54)	(-3.10)	(-0.98)
Observations	89,693	89,693	89,693	89,693	89,693
Adjusted R-squared	0.756	0.799	0.786	0.332	0.685
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes
SE clustered by year	Yes	Yes	Yes	Yes	Yes
SE clustered by firm	Yes	Yes	Yes	Yes	Yes

Notes: This table presents baseline firm-level difference-in-difference estimates using state tax rate increases as plausibly exogenous treatments. We use five dependent variables from firms' income statements to measure incidence on various stakeholders. *Sales* is constructed as sales divided by lagged assets. *COGS* is constructed as the cost of goods sold divided by lagged assets. *SG&A* is constructed as sales, general and administrative expenses divided by lagged assets. *Non-state Taxes* is total tax expense minus federal tax expense scaled by lagged assets. *Net Income* is net income scaled by lagged assets. In each specification, we use various state-level measured at *t* and firm-level controls measured at *t-1*. All control variables are defined in Appendix A. We use firm fixed effects to remove fixed within-firm variation over time, state fixed effects to remove state-wide shocks and year fixed effects to remove annual, economy-wide shocks. Fixed effects are omitted for parsimony. Standard errors are robust to heteroscedasticity and clustered at the firm and year level, following the suggestions in Petersen (2009). One-sided t-tests are performed on our *Increase and Decrease* variables, except when *Sales* is the dependent variable. t-statistics are in parentheses. ***, ** and * denote significance at the 1%, 5%, and 10% level, respectively.

Table 6. Cross-sectional tests

Dependent Variable	(1) *Sales*	(2) *COGS*	(3) *SG&A*	(4) *Non-state Taxes*	(4) *Net Income*
Increase	-0.0246	-0.025*	-0.012*	-0.003**	0.007
	(0.0341)	(-1.62)	(-1.70)	(-1.88)	(1.20)
*Increase*XsecVar*	-0.0650**	-0.001***	-0.015**	-0.010*	-0.003**
	(0.0370)	(-2.67)	(-2.18)	(-1.32)	(-1.83)
Decrease	-0.0853***	-0.012	-0.004	-0.002*	-0.004
	(0.0249)	(-1.12)	(-0.72)	(-1.48)	(-1.17)
Decrease XsecVar*	0.0783***	0.000	0.005	0.017**	0.002***
	(0.0281)	(1.06)	(0.94)	(2.41)	(2.81)
XsecVar	-0.221***	0.001***	0.007*	-0.017***	0.003**
	(0.0565)	(3.38)	(1.61)	(-2.53)	(1.99)
ln(Assets) t-1	-0.353***	-0.211***	-0.143***	-0.010***	0.006**
	(0.0186)	(-18.30)	(-20.10)	(-9.89)	(2.31)
Leverage t-1	-0.137***	-0.100***	-0.019***	-0.018***	-0.013**
	(0.0231)	(-6.54)	(-3.03)	(-12.14)	(-2.04)
PPE(Net) t-1	0.0702**	0.001	0.023**	0.015***	-0.007
	(0.0289)	(0.04)	(2.24)	(10.16)	(-0.68)
Foreign Income t-1	1.152***	0.568***	0.269***	0.097***	0.349***
	(0.127)	(6.06)	(6.35)	(7.65)	(10.45)
TA t	0.499***	0.240***	-0.128***	0.049***	0.686***
	(0.0437)	(8.08)	(-5.45)	(12.08)	(29.92)
GSP Growth t	0.0147	0.095	-0.064*	0.015	0.017
	(0.143)	(0.83)	(-1.65)	(1.20)	(0.56)
Unemployment t	-1.329**	-1.033***	-0.300**	-0.097***	-0.071
	(0.561)	(-2.63)	(-2.35)	(-3.89)	(-0.64)
Observations	73,772	87,867	89,693	67,725	86,638
Adjusted R-squared	0.798	0.804	0.786	0.365	0.697
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes
SE clustered by year	Yes	Yes	Yes	Yes	Yes
SE clustered by firm	Yes	Yes	Yes	Yes	Yes

Notes: This table presents cross-sectional tests using a different cross-sectional variable for each dependent variable. *XsecVar* represents the different cross-sectional variables. First, we use elasticity in the *Sales* test. Second, we use industry-adjusted profit margins in the *COGS* test. Third, we use union membership in the *SG&A* test. Fourth, we use a volatility of GAAP effective tax rates over the past five in the *Non-state Taxes* test. We use Altman-Z scores in the *Net Income* test. All control variables are defined in Appendix A. We use firm, state and year fixed effects. Fixed effects are omitted for parsimony. Standard errors are robust to heteroscedasticity and clustered at the firm and year level, following the suggestions in Petersen (2009). One-sided t-tests are performed on our interaction terms, *Increase* and *Decrease*, except when *Sales* is the dependent variable. t-statistics are in parentheses. ***, ** and * denote significance at the 1%, 5%, and 10% level, respectively.

Table 7. Additional test: State tax rate increases and big decreases

Dependent Variable	(1) *Sales*	(2) *COGS*	(3) *SG&A*	(4) *Non-state Taxes*	(4) *Net Income*
Increase	-0.063***	-0.031**	-0.021***	-0.004***	0.001
	(-2.93)	(-2.00)	(-2.74)	(-3.23)	(0.25)
Big Decrease	-0.008	-0.014	0.014**	-0.002	0.002
	(-0.29)	(-0.69)	(1.73)	(-0.96)	(0.39)
ln(Assets) t-1	-0.315***	-0.187***	-0.143***	-0.004***	0.011***
	(-17.47)	(-16.43)	(-20.18)	(-6.41)	(5.10)
Leverage t-1	-0.149***	-0.101***	-0.019***	-0.014***	-0.019***
	(-6.54)	(-6.30)	(-3.02)	(-11.37)	(-3.41)
PPE(Net) t-1	0.068***	0.008	0.024**	0.008***	-0.001
	(3.01)	(0.54)	(2.25)	(6.57)	(-0.07)
Foreign Income t-1	1.219***	0.541***	0.269***	0.099***	0.360***
	(9.91)	(5.76)	(6.35)	(8.70)	(13.90)
TA t	0.465***	0.222***	-0.128***	0.021***	0.700***
	(10.76)	(7.35)	(-5.45)	(4.62)	(30.18)
GSP Growth t	0.113	0.091	-0.062*	0.013	0.013
	(0.80)	(0.80)	(-1.63)	(1.26)	(0.42)
Unemployment t	-1.139**	-1.004***	-0.275**	-0.074***	-0.078
	(-2.29)	(-2.68)	(-2.14)	(-3.35)	(-0.87)
Observations	89,693	89,693	89,693	89,693	89,693
Adjusted R-squared	0.756	0.799	0.786	0.332	0.685
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes
SE clustered by year	Yes	Yes	Yes	Yes	Yes
SE clustered by firm	Yes	Yes	Yes	Yes	Yes

Notes: This table presents baseline firm-level difference-in-difference estimates using state tax rate increases as plausibly exogenous treatments. We use five dependent variables from firms' income statements to measure incidence on various stakeholders. *Sales* is constructed as sales divided by lagged assets. *COGS* is constructed as the cost of goods sold divided by lagged assets. *SG&A* is constructed as sales, general and administrative expenses divided by lagged assets. *Non-state Taxes* is total tax expense minus federal tax expense scaled by lagged assets. *Net Income* is net income scaled by lagged assets. In each specification, we use various state-level measured at *t* and firm-level controls measured at *t-1*. All control variables are defined in Appendix A. We use firm fixed effects to remove fixed within-firm variation over time, state fixed effects to remove state-wide shocks and year fixed effects to remove annual, economy-wide shocks. Fixed effects are omitted for parsimony. Standard errors are robust to heteroscedasticity and clustered at the firm and year level, following the suggestions in Petersen (2009). One-sided t-tests are performed on our *Increase and Decrease* variables, except when *Sales* is the dependent variable. t-statistics are in parentheses. ***, ** and * denote significance at the 1%, 5%, and 10% level, respectively.