The Static, Dynamic, and Distributional Effects of State Business Tax Reforms*

Drew Burd
University of Chicago

Michael Droste
USC

Owen Zidar
Princeton University, NBER

Eric Zwick
University of Chicago Booth, NBER

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This paper estimates the static, dynamic, and distributional effects of state business tax reforms in the United States. We begin by studying the largest state business tax reform on record: in what Kansas Governor Brownback called "a real live experiment," Kansas eliminated state taxes on pass-through business income in 2013, and subsequently repealed this reform in 2017. We use detailed US Treasury data on millions of firms, workers, and business owners to estimate the impact of the Kansas experiment on business activity. Although the reform induced large mechanical transfers to business owners, the Kansas reform's impact on real business activity (including investment, employment, sales, entry/exit, and migration) was surprisingly modest. In the second half of this paper, we generalize our metholdogy to study a broader set of state-level pass-through tax reforms simultaneously. Consistent with our analysis of the Kansas experiment, we find very modest real impacts of these tax reforms on business activity in this broader set of state tax reform episodes. We rationalize our findings through the lens of a model with owner-operated firms, where income effects play a critical role in mediating the response of businesses to tax policy. We conclude that the incidence of these state business tax reforms primarily accrued to business owners and high-income tax payers, with mechanical effects greatly outweighing behavioral responses to tax changes.

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> On taxes, you need to get your overall rates down, and you need to get your social manipulation out of it, in my estimation, to create growth. We'll see how it works. We'll have a real live experiment. —Governor Sam Brownback (2012)

An informed policy debate on state and local business tax policy requires an assessment of the equity and efficiency consequences of business tax cuts. This assessment is important because state and local governments spend substantial resources to attract and retain businesses (Slattery and Zidar, 2020), and because the equity and efficiency trade-offs involved in business taxation are especially salient in public policy debates. Businesses are mobile and can scale up production, so business tax reforms can impact workers by impacting labor demand and consequently employment and wages (Suárez Serrato and Zidar, 2016; Fuest, Peichl and Siegloch, 2018; Risch, 2021). However, the distribution of business income is more unequal than labor income (Smith, Yagan, Zidar and Zwick, 2019), so business tax reforms mechanically increase post-tax inequality. Furthermore, business taxation affects the incentives to invest and hire (Hines, 1996; Zwick and Mahon, 2017; Giroud and Rauh, 2019; Moon, 2021), so business tax policy is closely connected to economic growth.

Figure 1 provides a simple conceptual framework for our analysis by illustrating the static, partial equilibrium incidence of a dividend tax cut. Prior to the tax cut, the surplus in the market for capital services accrues to workers, the government, and to firm owners. A dividend tax cut mechanically reduces the surplus to the government and induces new investment by increasing the post-tax return on capital. This new capital formation generates additional value for workers in the form of a higher wage bill, for the government in the form of tax revenue, and for firm owners in the form of after-tax profits. The magnitudes of the mechanical and growth effects depend on the size of the tax change, the initial distortion, and the elasticities of capital supply and demand.

This paper attempts to estimate the static, dynamic, and distributional impacts of state business tax reforms. We start with an analysis of the largest state-level business tax reform episodes in the 21st century. In what Governor Sam Brownback called "a real live experiment," Kansas eliminated state taxes on income earned from pass-through businesses (for instance, S-corporations and partnerships). In contrast to traditional C-corporations, S-corporations and partnerships are not subject to the U.S. corporate income tax; profits and losses flow directly to their owners and are subject to individual income taxation. Owners of these "pass-though" firms prevail at the top of the U.S. income and wealth distributions, and pass-through businesses have grown enormously as a share of business activity in the United States over the last 40 years (Smith, Yagan, Zidar and Zwick, 2019; Smith, Zidar and Zwick, 2022). The Kansas reform reduced the top marginal tax rate on pass-through income from 6.2% to 0% beginning in the tax year 2013. After four years, the reform was repealed (with the Kansas legislature overriding the Governor's veto) and in 2017 the top marginal tax rate on pass-

through business income rose to 5.8%.

The Kansas "experiment" is an especially interesting environment to study tax policy for several reasons. Most importantly, it was large and salient: the reform reduced the top marginal tax rate on business income from 6.2% to 0%, and was widely covered in national news outlets in 2012. Second, the structure of the tax reform allows for several natural comparison groups for reduced-form empirical analysis. Our preferred empirical design leverages differential exposure to the policy across businesses by comparing the paths of S-corporations to C-corporations in Kansas and in neighboring states. Third, because the reform impacted pass-through businesses, we can "follow the money" to study the impact of the reform on businesses, business owners, and employees over time. This feature allows us to not only estimate growth effects, but also estimate the distributional and mechanical effects of business tax cuts at the individual level.

We then generalize our analysis to pool all state business tax changes of at least one percentage point in the twenty-first century. We focus on eight pass-through business tax changes, and four state corporate tax changes. To quantify and estimate these effects, we assemble US Treasury tax files on the full population of firms, their workers, and their owners from 2000 to 2019. We complement this data with US Treasury corporate sample files—previously used by Yagan (2015) and Zwick and Mahon (2017)—to measure firm-level investment and other balance sheet outcomes. Using these data, we compute the mechanical effects of the Kansas tax reform and other pass-through reforms at the owner and firm-level. For C-corporations, it is difficult to determine who owns the firm if they do not pay dividends so we use firm-level profit information for their owners. Next, we leverage aspects of the tax reforms to compute the treatment effect of the tax reforms, which encompasses both the mechanical impact and any behavioral responses to the tax reforms by mechanical impacts and behavioral responses, on a variety of firm-level and owner-level outcomes.

Our analysis of the Kansas experiment yields three main findings. First, we confirm that the mechanical incidence of the reform across the distribution of taxpayers is highly skewed toward top earners: nearly 70% of the mechanical reduction in government revenue from eliminating state pass-through business taxes goes to "top 1%" Kansas taxpayers whose adjusted gross income (AGI) exceeds $650,000/year, and 90% goes to top 5% Kansas taxpayers whose AGI exceeds $221,000/year. Second, we find extremely modest impacts of the reform on business activity, both on the intensive margin (i.e. pre-tax profits, sales, investment, employment, non-owner labor compensation) and on the extensive margin (entry, exit, cross-state migration). We confirm that the tax cut increases post-tax profits and induces pass-through business owners to shift relatively more of their income from labor income (i.e. W-2 earnings) to business income.

In the second half of this paper, we generalize our analysis of the Kansas experiment to study a broader set of state-level business tax reform episodes simultaneously with a "stacked" research design. We view this as an important extension of the Kansas analysis as a way to

test whether factors specific to the Kansas reform are important for our findings. In both the "real live experiment" of large business tax cuts in Kansas and in the broader set of state-level pass-through tax reforms that we study, the mechanical and distributional effects were much larger than dynamic growth effects.

This paper makes three main contributions to the literature on business taxation. First, we provide the first direct evidence of the effects of state business tax changes on profits, the firm wage distribution, and inequality in the United States. This work complements a growing body of work that uses administrative data to study federal tax changes, such as the American Taxpayer Relief Act of 2012 (Risch, 2021) and the Tax Cuts and Jobs Act of 2017 (Dobridge, Kennedy, Landefeld and Mortenson, 2022). This work also complements recent work estimating the impact of state corporate tax cuts on top income shares (Nallareddy, Rouen and Serrato, 2021). Relative to this work, our paper provides direct empirical evidence of the effects on tax changes on the behavior of firm owners, complementing existing structural work (e.g., Suárez Serrato and Zidar (2016); Suárez Serrato and Zidar (2023)) wherein firm owners bear a substantial share of the incidence of state business tax changes. Moreover, while there is some evidence from other settings about the distributional impacts of business tax cuts along the wage distribution (e.g., Fuest, Peichl and Siegloch (2018)), this paper contributes novel evidence on the effect of state business tax cuts along the wage distribution in the United States.

Second, this paper contributes to the limited evidence we have on the dynamic effects of state business tax changes on investment, entry, and star entrepreneurship. Due to data limitations, state level data on investment and star entry is hard to obtain and study. Our estimates complement work that uses different data from U.S. Census by Giroud and Rauh (2019) to study the impact of state tax reforms on establishment entry and exit, employment, and capital. Bruce, Gurley-Calvez, Norwood et al. (2020) summarizes the literature on taxes and entrepreneurship, which includes findings from Gentry and Hubbard (2000) and Curtis and Decker (2018). Akcigit, Grigsby, Nicholas and Stantcheva (2022) also document related evidence on the effect of state taxes on innovation, and Chirinko and Wilson (2008) estimate the effects of investment incentives.

Third, this paper contributes a literature studying the Kansas tax reform. DeBacker, Heim, Ramnath and Ross (2019) and DeBacker, Goodman, Heim, Ramnath and Ross (2018) study the Kansas tax reform using administrative tax data from 2010 to 2014, finding evidence for income shifting (particularly for taxpayers at the top of the income distribution), but no evidence for real outcomes that include business formation, wage payments, and investment. We build on this work by analyzing both the reform and repeal of the policy, extensive margin outcomes, and by separately studying the mechanical incidence of the reform and its impact across the distribution of taxpayers.

1. Data and Institutional Setting

We begin by briefly reviewing some of the key institutional features of business taxation in the United States. For the purposes of state and federal income taxes, there are four distinct types of business structure: sole proprietorships, partnerships, S corporations, and C corporations.[1] Sole proprietorships, partnerships, and S-corporations are known as *pass-through* businesses: their profits are "passed through" to business owners and subject to (federal and state) income taxes, and not subject to (federal and state) corporate income taxes.

Pass-through businesses have grown substantially as a share of business activity in the United States over the last 40 years, and now represent a majority of private business revenue and sales in the United States (Smith, Yagan, Zidar and Zwick, 2020). S-corporations and partnerships are the dominant form of pass-through business organization for small and medium-sized businesses, with S-corporations in particular growing substantially as a share of business activity over the last four decades. To qualify as an S-corporation, businesses must satisfy certain requirements: they must be domestic; they must have fewer than 100 individual/trust/estate shareholders; and they must have only one class of stock. Moreover, certain types of businesses are *excluded* from organizing as S-corporations: certain insurance companies, businesses which elect to use reserve accounting for bad debt, and Domestic International Sales Corporations (exporters). [2] these requirements preclude virtually all publicly-traded companies, S-corporations do not include some of the largest businesses in the United States. They do include nearly all small and medium-sized businesses.

In contrast to pass-through businesses (S corporations, partnerships, sole proprietorships), C corporations are subject to a federal corporate profits tax in addition to dividend taxes assessed on individual shareholders. C corporations can be either public or private. Unlike S corporations, which are restricted to fewer than 100 shareholders, C corporations do not face restrictions on their ownership structure (e.g. classes of stocks, types and number of shareholders).

Each of these business structures is associated with different sets of Internal Revenue Service (IRS) federal tax forms. The primary business tax return form for partnerships, S-corporations, and C-corporations are Form 1065, Form 1120S, and Form 1120, respectively. These business tax returns describe revenue and expenses for a given business in a given tax year. Sole proprietorships do not fill out a business tax return; business income and expenses are instead enumerated on Schedule C accompanying the owner's individual tax tax return (Form 1040).

Businesses and individuals are generally subject to both federal and state taxes. In most

[1] Limited liability companies (LLCs), an important innovation in business structure, was enabled by a set of state legislation beginning in the 1990s. For tax purposes, LLCs may be organized as any of these business structures; LLCs are not observed or directly relevant for the tax reforms we study.

[2] U.S. Code §1361(b) defines the eligiblity requirements for S-corporations.

states, the structure of individual income taxes and business taxes closely resembles the federal tax code in terms of how taxable income is defined: for instance, pass-through income is a component of adjusted gross income (AGI), the relevant tax base for individual income taxes. A notable exception is in Kansas for the tax years 2013-2017, where pass-through income was exempted state individual income taxes (unlike, for instance, wage income).

1.1 Data Sources and Variable Definitions

Federal tax returns. Our primary source of data is the universe of de-identified US business tax returns spanning the tax years 2000 to 2019. This data comprises the tax returns for all S corporations (form 1120S), C corporations (form 1120), and partnerships (form 1065) who file federal taxes in the United States. We use these business tax returns to construct a business-tax year panel of all tax-filing businesses in the United States over this period.

We also draw on the universe of de-identified U.S. individual tax returns (form 1040) and information returns (form 1099, form W-2) and Schedule K-1s associated with Form 1120S and Form 1065. Schedule K-1s allow us to link businesses with business owners and measure. Forms W-2 and 1099 allow us to associate firms with workers. We use Form 1040 to obtain additional information about business owners who are associated with a Schedule K-1. We use form 4562 to measure business investment.

State tax liabilities. State tax liabilities are not systematically reported in federal tax data. To estimate individuals' state tax liabilities, we use TAXSIM, a program developed and maintained by the NBER which encodes historical state and federal tax schedules allowing for estimation of state and federal tax liabilities using information reported on federal tax returns.[3] Treating business income as the last dollar earned, we use TAXSIM to estimate state tax liability both with and without business income. The difference in these estimated liabilities is an individual's state business tax.[4] To calculate state business tax liability at the firm-level, we sum individual state business tax liabilities across owners. Additional details on measuring state tax liabilities are reported in Appendix B.

Business-level outcomes. Our primary business-level outcomes include profits, after-tax profits, sales , investment, employment, officer compensation, and labor compensation excluding officers. Profits are defined as revenues less cost of goods sold and deductions. Profits after state taxes are defined as profits less business tax liabilities. Investment is defined from

[3]To confirm the accuracy of TAXSIM in our setting, we conduct two validation exercises. First, in Figure A.1 we compare aggregate estimated state tax to publicly-available official tax data and find that the series fit well both in levels and in changes. Second, since federal tax returns report federal tax liabilities, we compare compare estimated vs. realized *federal* taxes. Figure A.12 plots the binscatter of logged estimated vs. realized federal tax for all active pass-through business owners in 2012 and shows that the two series line up well. Additional details on these validation exercises are reported in Appendix B.

[4]For individuals who own multiple businesses, state business tax is allocated to each of their businesses in proportion to the share of total ordinary income received from the business.

Form 4562. Employment is defined as the sum of unique non-owner W-2 employees. We define officer compensation as the item on Form 1120 (line 7) and 1120S (line 12) for C corporations and S corporations, and as guaranteed partner payments for partnerships (Form 1065 line 10). Labor compensation excluding officers is defined by salaries and wages on Form 1120/1120S.

Business owner-level outcomes. We also assemble an individual taxpayer panel of pass-through business owners to study whether state business tax reforms influence entrepreneurial activity. We define a pass-through business owner as an individual taxpayer who receives a Schedule K-1 associated with an active S corporation or partnership with positive ordinary business income (S corps) or guaranteed payments (partnerships). We define entrepreneurial entry as occurring in a given tax year t if a business owner operates a business in year t and did not in year $t-1$. Similarly, we define entrepreneurial exit in year t as owning a business in year t and not $t+1$.

Sample restrictions and variable normalizations. We scale dollar-valued business outcomes (e.g. profits, sales, investment, officer and labor compensation) in our regression specifications by sales in the year prior to the tax reform (e.g. 2012 for the Kansas tax cut, 2016 for the repeal); we also discuss an alternative normalization by pre-period workers. We winsorize these firm-level outcomes at the 0.1^{th} and 99.9^{th} percentiles of their respective distributions within each tax year. Following Yagan (2015); Kline, Petkova, Williams and Zidar (2019); Risch (2021), we restrict our sample to businesses with non-zero revenues and at least 1 non-owner employee.

1.2 Business Taxation in the United States

We begin by briefly reviewing some of the key institutional features of business taxation in the United States. For the purposes of federal taxes, there are four distinct types of business structure in the U.S.: sole proprietorships, partnerships, S corporations, and C corporations.[5] Sole proprietorships, partnerships, and S-corporations are known as pass-through businesses, because their income is not subject to the federal corporate tax. Instead, the net income of these businesses is "passed through" to business owners directly and subject only to individual income taxation (federal and state, where applicable).

Partnerships and S-corporations in particular represent a majority of private business revenue and sales in the United States (Smith, Yagan, Zidar and Zwick, 2020). S corporations in particular have grown enormously as a form of business structure since the 1986 U.S. federal tax reform. To qualify as an S corporation, businesses must satisfy certain requirements: they

[5]Limited liability companies (LLCs), an important innovation in business structure, are enabled by state legislation beginning in the 1990s. Any of these four business structures may be legally classified as LLCs in addition to their structure for tax purposes; however, we cannot observe whether firms are LLCs in our data, and it is not directly relevant for the tax reforms we study.

must be domestic; they must have fewer than 100 individual/trust/estate shareholders, and they must have only one class of stock. Certain business categories (e.g.)

C corporations are distinct from S corporations in that they face a federal corporate tax on profits. This is sometimes described as a "double tax", as dividends C corporations are generally subject to dividend taxes at the individual (shareholder) level. C corporations can be either public or private. Unlike S corporations, which are restricted to fewer than 100 shareholders, C corporations can have any number of owners.

Most states do not distinguish wage income from pass-through business income for the purposes of state income taxes. The Kansas tax reform that we study is a notable exception: during the reform period, all income reported on Form 1040, Schedule C (sole proprietorship income) and Schedule E (partnership and S corporation income)

1.3 The Kansas Tax Reform Episode

The Kansas tax reform was enacted through Kansas Senate Bill Substitute 2117 (SB 2117). SB 2117 was signed into law by Governor Sam Brownback in May of 2012, became law in July of 2012, and took effect in the 2013 tax year. This reform made several important changes to the Kansas tax code. For the purposes of this paper, the most important feature of SB 2117 is that it exempted non-wage pass-through business income from state individual income taxes. In addition, SB 2117 reduced the number of individual income tax brackets from three (with marginal tax rates of 3.5%, 6.25%, and 6.45% percent) to two (marginal tax rates of 3.0% and 4.9%), and increased the standard deduction for most taxpayers considerably.[6]

Governor Brownback successfully campaigned for re-election in 2010 on a platform to lower taxes, and SB 2117 was the signature policy reform of his administration. In a guest editorial published in the Wall Street Journal, Gov. Brownback predicted the reform would lead to a surge of growth in small business activity by reducing the cost of doing business and incentivizing business owners to invest their tax break in their businesses. SB 2117 was effectively repealed by the Kansas legislature in 2017 with the passage of Senate Bill 30 (SB 30). SB 30 eliminated the exemption of non-wage business (pass-through) income, increased the number of individual tax brackets from two to three, and raised the top marginal income tax rate over the following two years (to 5.2% in the 2017 and to 5.7% in 2018).

Figure 2 illustrates the impact of the Kansas tax reform on top marginal tax rates and income tax revenue. Panel A documents the top marginal income tax rate on pass-through income in Kansas and neighboring states over time. The top marginal tax rate for pass-through income fell from 6.45% to 0% for the tax years 2013 through 2016. Panel B depicts individual

[6]The standard deduction increased from $4,500 to $5,500 for head of household taxpayers, from $6,000 to $9,000 for married taxpayers filing joint, and from $3,000 to $3,750 for married taxpayers filing separately. The standard deduction remained at $3,000 for single filers.

income tax revenue in Kansas over time from several sources: the Census Survey of State Government Tax Collections (STC), official spending data from the Kansas Department of Revenue, and individual income taxes imputed from Treasury data on individual income tax-filers with the NBER's TAXSIM program. All three sources indicate that Kansas individual income tax revenue fell dramatically for the tax years 2013-2016 while the tax reform initiated by SB 2117 was in effect.

The Kansas reform induced a mechanical decline in tax revenue from individual income taxes, due to strictly lower rates from individual taxpayers. Like nearly all states, Kansas is required to pass a balanced budget. Although individual income tax revenue accounts for about 10% of state general revenue and the Kansas tax reform reduced individual income tax collection dramatically, policymakers engaged in a variety of budget maneuvers to fill this decline in general revenue. For instance, the state of Kansas redirected nearly a billion dollars from dedicated funding (e.g. the state highway fund) to general funding and state agencies over the period 2013-2017. Accounting for these transfers, Kansas was able to avoid more substantial declines in general spending than would have been otherwise necessary to ensure a balanced budget. This will be useful for our analysis, because we can largely assume that the impacts of the reform on most components of governmenting spending were insignificant, simplifying the channels through which the reform might have impacts on business activity in Kansas.

1.4 Pooled State Business Tax Reforms

After studying the Kansas reform and repeal in detail, in the second half of the paper, we broaden our focus by considering the mean impact of business tax reforms across a larger set of state-level pass-through tax reform episodes with a "stacked" empirical design. Using data from Suárez Serrato and Zidar (2016), we identify all state-level pass-through income tax reform episodes between the tax years of 2004 and 2019. We restrict to reforms that are at least 1 percentage point (100 basis points) in magnitude, and exclude any reform episodes where either (A) the reform is spread out across multiple years, or (B) neighboring states also experience reforms in a +/- 3 year window. This procedure yields 8 distinct state pass-through tax reform episodes: Kansas (2013), Kansas (2017), New Jersey (2004), Maryland (2008), Connecticut (2009), Illinois (2011), California (2012), and Minnesota (2013).

We exclude from our list of tax reform episodes states in which tax reforms were implemented in a staggered fashion over multiple years, or in which multiple reforms occur within a +/- 3 year window of each other. A comprehensive list of the state business tax reforms that we identify can be found in Table A.2, Panel A. One interesting observation from these reforms is that 7 of 8 reform episodes are tax *increases*: the Kansas (2013) reform is the sole

pass-through tax cut in our sample.

In order to estimate the effects of business tax cuts on C-corporations, we also identify corporate tax changes greater than 1 percentage point using data from Suárez Serrato and Zidar (2016). We further refine the sample by removing reforms where the corporate tax base changes, the corporate income tax is replaced by a gross receipts tax, or the corporate tax rate gradually changes.[7] Table A.2, Panel B presents our list of identified C-corporation reforms.

1.5 Analysis Samples and Summary Statistics

Our empirical analysis involves several distinct samples assembled from the business and owner panels described in the preceding section. Specifically, our analysis separately studies (1) the 2013 Kansas tax reform; (2) the 2017 repeal of the Kansas tax reform; and (3) a broader set of pass-through business tax reforms, with each of these involving separate analysis samples compiled from this data. We describe these panels more carefully in section 2. and 3..

Table 1 presents summary statistics for each of the panels studied in our empirical analysis. Our Kansas 2013 and Kansas 2017 panels contain 1,273,779 and 1,298,388 firm-year observations representing 6,064,092 and 6,933,766 employees respectively. Our stacked multi-state reform panel contains 13,022,876 firm-year observations representing 65,765,827 employees. Panel A shows that the median firm in our Kansas 2013 panel had 7 employees and generated $0.042 in profits per unit sales. The average state business income tax per worker was roughly $1,500. Panel C shows that the median firm in our stacked analysis sample has 7 employees and paid roughly $0 in state business income tax per dollar revenue, and made $0.027 profits per dollar revenue. Panel D shows that the median firm in our pooled C-corporation sample had the same number of employees, lower profits per worker, and less state business income tax per worker than in any of our pass-through business samples. However, C-corporations in the 99$^{\text{th}}$ percentile of our sample paid $503k per worker in state business income taxes, which is significantly more than the 99$^{\text{th}}$ percentile in any of our S-corporation panels.

2. The Kansas Tax Reform

We begin our analysis of state tax reforms by considering the Kansas tax reform and its subequent repeal. To motivate this analysis, Figure 2 provides some descriptive information on state tax revenues and rates in Kansas and neighboring states over our sample horizon. Panel A of Figure 2 plots the top marginal tax rate for pass-through income in Kansas and

[7]For example, Ohio decreased their corporate income tax by 8.5 percentage points in 2011, but replaced it with a gross receipts tax. Indiana switched from a gross income tax to an adjusted gross income tax in 2003, where adjusted gross income is gross income less expenses. North Carolina decreased their corporate tax rate from 6.9% in 2013 to 3% in 2017, by reducing the tax rate by roughly 1 percentage point annually.

neighboring states over time. In Kansas, the top rate fell from 6.2% to 0% in 2013, and then reverted back in 2017. Neighboring states' tax rates were approximately constant over this period (with a very modest decline in Oklahoma preceding the Kansas reform in 2011). Panel B of Figure 2 shows the sharp drop in Kansas' aggregate income tax revenue in 2013 as a result of the reform. We plot three sources of Kansas individual income tax revenue: two government sources (The Census Bureau's Survey of Tax Collection, and Kansas' Department of Revenue) and our own estimates obtained by imputing state liabilities for each taxpayer based on their federal filings. Our tax liability estimates closely match these government sources. Panel C plots state tax revenues from business activity, which we obtain by imputing state liabilities with and without pass-through income taxes.

2.1 Mechanical Impacts of the Kansas Reform

We start by calculating the *mechanical* impacts of the Kansas 2013 tax reform across the distribution of Kansas taxpayers. As discussed in Section , the Kansas reform weakly reduced tax liabilities for *all* taxpayers: the number of tax brackets was reduced from three to two, the marginal tax rate at all income levels was reduced, and the standard deduction was increased. *A priori*, it is unclear how these provisions interact across the income distribution. Because we observe the universe of Kansas tax-filers and business owners, we can study the mechanical incidence of this reform across the income distribution by characterizing the relative sizes of the mechanical transfer induced by the reform across the income distribution.

We start this analysis by considering the universe of individual taxpayers filing in Kansas in the tax year 2012, the year prior to the Kansas tax reform. We bin (partition) taxpayers into quantiles based on their 2012 adjusted gross income. Next, we use TAXSIM to estimate each taxpayer's state tax liabilities under both the (realized) pre-reform 2012 Kansas tax schedule and the (counterfactual) post-reform 2013 Kansas tax schedule. We then construct the change in tax liability for each taxpayer across these two tax regimes: this can be thought of as the mechanical transfer from the government to each taxpayer induced by the reform *absent any behavioral responses.*

Figure 3 reports how the mechanical transfer induced by the reform is allocated across income groups in Kansas. Panel A depicts how the mechanical transfer induced by the entire Kansas tax reform - including the pass-through business income exemption, the increase in the standard deduction, and the change to the number of tax brackets and marginal tax rates - is split across the income distribution. Although the program weakly reduced tax liabilities for everyone, the mechanical impact is quite regressive: the bottom 60% of Kansas taxpayers receive under 10% of this transfer, or approximately 200 million 2020 dollars. In contrast, more than half of the total mechanical transfers accrued to the top 5% of the income distribution,

with even greater concentration at the extreme tail: the top 0.1% of Kansas taxpayers received over 15% of the mechanical transfer. In other words, the net impact of the Kansas reform heavily benefited the wealthiest Kansas taxpayers.

Since we are primarily interested in the incidence of one particular element of this tax reform - the elimination of pass-through business income from Kansas state income taxes - we also consider a second exercise (Panel B) in which we assess the mechanical transfer induced solely by the pass-through business tax exemption. As before, we start by taking the universe of 2012 Kansas tax filers, and we compute their tax liabilities under the (realized) 2012 tax schedule. Next, we compute tax liabilities under an alternative tax schedule with the same rates and deductions as 2012, but with pass-through business income exempted. We then aggregate the difference in individual state tax liabilities by income bins.

Of course, this exercise does not capture the equilibrium incidence of the reform when businesses or individuals change their behavior in response to the tax reform. For instance, if labor demand increases as a consequence of the reform (either due to existing businesses scaling up production, or through the entry of new businesses), workers may benefit from increased employment and labor compensation. We now turn to estimating the size of these behavioral responses directly.

2.2 Causal Impacts of the Kansas Reform

We start with a simple dynamic difference-in-differences design that compares pass-through businesses in Kansas against pass-through businesses in neighboring states. This design can be expressed as:

$$Y_{it} = \alpha_i + \eta_{sc} + \gamma_{ndct} + \sum_{k=-B,\neq -1}^{B} \beta_k D_{it}^k + \varepsilon_{it} \tag{1}$$

where Y_{it} is an outcome for firm i in tax year t, D_{it}^k is indicator for firm i operating in Kansas k tax years after the reform, and α_i, η_{sc}, and γ_{ndct} represent firm, state-corporate form, and NAICS2-firm size decile-corporate form-tax year fixed effects, respectively. We choose a window of $B = 3$ tax years before and after the reform (inclusive), dropping tax years outside this window. We cluster standard errors by firm.

The coefficients $\{\beta_k\}_{k\geq 0}$ capture the dynamic causal impacts of the tax reform on the firm-level outcome Y_{it}. The key identification assumption for this design is a standard parallel trends assumption: conditional on the fixed effects, firm outcomes in Kansas and neighboring states would have evolved similarly absent the policy change. We normalize β_{-1} to 0, so that the causal effects are interpreted as being relative to the year prior to the reform. We estimate the reform (2013) and repeal (2017) by estimating 1 using two different samples; this allows

us to avoid assuming symmetric impacts of repeal and reform.

We estimate the regression specification 1 on an analysis sample comprising all active S-coprorations and partnerships in Kansas and the neighboring states of Oklahoma, Missouri, and Nebraska in a three-year window on either side of the tax cut (2011-2017) and the repeal (2014-2018). We exclude the neighboring state of Colorado as a control due to readily apparent violations of parallel trends in the pre-period. Our baseline estimates of 1 for the Kansas 2013 tax cut and its subsequent repeal are plotted in Figure 4. Panels A through H document how firm profits, after-tax profits, labor compensation, officer compensation, investment, sales, entry, and exit change around the reform. A few results emerge. First, after-state-tax profits clearly increase following pass-through tax cuts. This increase was mechanical, i.e., it is driven by taxes because pre-tax profits show small effects in Panel A. Panel C and D plot point estimates for labor compensation and officer pay that suggest they might decline slightly, but the confidence intervals are fairly wide and usually can not reject a zero effect. Similar patterns apply for investment and sales in Panel E and F, respectively.

A causal interpretation of the estimated coefficients $\hat{\beta}_k$ requires a standard parallel trends assumption: conditional on the controls, pass-throughs in Kansas and in neighboring states would have exhibited similar trends in outcomes absent the reform. This is a potentially strong assumption with several plausible threats to identification. One large story is that treated firms were exposed to common shocks. One natural placebo test is to estimate our difference-in-differences specification on the sample of C-corporations in Kansas and neighboring states rather than pass-throughs (S-corps and partnerships). Since C-corporations were not exposed to the reform and because neither Kansas nor neighboring states adjusted their state corporate tax over this period, we might expect to find null results here. Figure 9 plots dynamic event studies showing estimated coefficients (both for the 2013 reform and the 2017 repeal, as before) for this specification. Encouragingly, these placebo regressions indicate null results, supporting the hypothesis that our treatment is not confounded with other shocks impacting Kansas firm outcomes. We interpret this placebo test as suggesting that our baseline difference-in-difference results are not driven by a confound that differentially impacts firms in Kansas relative to our control states.

We also consider an alternative and complementary empirical approach that makes use of the fact that the Kansas reform (and repeal) differentially impacts pass-through businesses and C corporations. More precisely, we consider a triple-differences specification that compares the difference between pass-through business and C corporation outcomes in Kansas against the difference in pass-through business and C corporation outcomes in neighboring states over

time. This specification can be written as:

$$Y_{it} = \alpha_i + \eta_{sc} + \gamma_{ndct} + \sum_{k=-B,\neq -1}^{B} \theta_k D_{it}^k \times T_{it} + e_{it} \tag{2}$$

where Y_{it} is an outcome for firm i in tax year t, the fixed effects α_i, η_{sc}, γ_{ncdt} are defined as in the difference-in-differencees specification (1), and T_{it} is an indicator for firm i being a pass-through business (S-corp or partnership) in tax year t.

Identification of the causal impact of the Kansas reform on business outcomes requires that the difference in pass-through and C-corp outcomes in Kansas would have exhibited parallel trends relative to the difference in pass-through and C-corp outcomes in neighboring states absent the Kansas reform or repeal. This can be seen as a partial relaxation of the identifying assumption in our baseline difference-in-differences design, in the sense that estimates from this triple-differences specification ought to be robust to time-varying, state-specific factors that might otherwise induce bias in our baseline design. Intuitively, state-specific time-varying shocks will be "differenced out" in this design by the comparison of pass-throughs to C corporations in the same state. An important limitation of this triple-differences design is that we cannot estimate tax-related outcomes (e.g. post-state tax business profits), because dividend income reported by individual taxpayers (shareholders) cannot generally be assigned to individual businesses from individual tax returns.

We report these triple-difference estimates in Figure 4 and in Table 2.

We report a variety of extensions and sensitivity analyses for these specifications in the appendix. Figure A.2 shows our Kansas dynamic difference-in-differences estimates under an alternative normalization of dollar-valued outcomes, using pre-period workers rather than pre-period sales. These results are qualitatively similar to our preferred normalization in Figure 4. Figures A.5 and A.6 report our dynamic difference-in-difference estimates for the Kansas reform separately for S-corporations and partnerships. Notably, officer compensation is somewhat more responsive to the tax reform for partnerships than for S-corporations: officer compensation falls by about 1 percent of pre-reform sales on average for partnerships, and only 0.1 percent of pre-reform sales for S-corporations. Both the S-corporation subsample and the partnership subsample exhibit weak responses in real economic activity (e.g. sales, investment) or labor demand (e.g. labor compensation).

3. Evidence From Other State Business Tax Reforms

Next, we turn to studying the impacts of business tax reform episodes in other states. While we view our analysis of the Kansas experiment as important in its own right, it is not obvious

to what extent the lessons learned from this reform episode might generalize to other states. For instance, one possible explanation for the null effects on business activity that we find is that the reform may have been expected to be repealed before changes in business activity could benefit from the new tax regime. In a similar vein, one interpretation of our null findings on the extensive margin might be that Kansas is relatively difficult for entrepreneurs in the other state to move business activity to (e.g. due to geographic distance and a smaller local labor market from which to recruit employees than in metropolitan areas elsewhere in the country). We cannot directly test these stories in the context of the Kansas experiment; however, generalizing our analysis to a broader set of (smaller) reforms in other states may shed light on some of these important questions. To accomplish this objective, we generalize the difference-in-difference and triple-difference designs we explored in our analysis of the Kansas reform to a setting with multiple tax reforms occurring in different states and at different times. The *stacked difference-in-differences design* with staggered treatments that we develop is a natural generalization of our Kansas analysis to this environment, and parsimoniously nests our Kansas analysis as a special case.

3.1 Stacked Design for Multiple Reforms

The analysis sample for this design comprises a set of subsamples of our business-year panel that are appended ("stacked") to form a long business-year-event panel. For each reform episode, we consider a subpanel comprising all businesses filing in the treated (reform) state and in neighboring (control) states for all tax years in a three-year window around the reform, excluding neighboring states that experience a tax reform in a three-year window on each side of these reforms. After doing this for each of the reform episodes in our panel, we "stack" these panels by collecting them into a single sample (vertically concatenating the individual panels). An observation in the stacked panel is associated with a firm i in a tax year t for event e.

Our stacked difference-in-differences design can be written as:

$$Y_{eit} = \alpha_{ei} + \eta_{esc} + \gamma_{endct} + \sum_{k=-B,\neq -1}^{B} \delta_k (M_e \times D_{eit}^k) + u_{eit} \tag{3}$$

where Y_{eit} represent a firm-level outcome for firm i in year t and reform event e, M_e denotes treatment intensity (the change in the top marginal business net-of-tax rate in the reform state), and D_{eit}^k is a dynamic treatment indicator that is equal to 1 if firm i is operating in a treated (reform) state k years after year t and 0 otherwise. The fixed effects α_{ei}, η_{es}, and γ_{et} represent the same fixed effects from our Kansas analysis (firm, state-corp form, NAICS2-firm size decile-corp form-year), additionally interacted with event. We continue to use a three-year window (inclusive) before and after each tax reform event, and we impose $\hat{\delta}_{-1} = 0$.

The estimated coefficients $\hat{\delta}_k$ characterize the mean impact of a 1 percentage point increase in the top marginal business tax rate on a firm outcome Y_{it} k years after a given state reform. Relative to our baseline specification for a single reform, our stacked specification requires a parallel trends assumption *for each reform*. Importantly, this stacked dynamic difference-in-differences design yields estimates that are robust to treatment effect heterogeneity with two-way fixed effects in this environment, a property that has been the subject of much discussion in recent empirical research; see de Chaisemartin and D'Haultfoeuille (2022) for a survey.

As with our analysis of the Kansas reform, we consider specifications with a variety of firm-level outcomes: pre-tax and post-tax profits, sales, investment, labor compensation, officer compensation, and employment. Our baseline triple-difference estimates for the impact of a 1 percentage point cut in the state pass-through tax rate for firm-level outcomes are depicted by Figure 8. Relative to our analysis of the Kansas reform (where the treatment was binary, reflecting discrete exposure to the reform based on a firm's location, the tax year, and whether the firm is a pass-through), we normalize the treatment here to reflect a 1 percentage point cut in the pass-through tax rate.

4. A Model of Pass-Through Business Taxation

The evidence from our empirical analysis indicates that the response of firm activity to pass-through tax reforms is modest. We present a model that allows us to associate our reduced-form estimands with structural objects and disentangle competing explanations for the empirically modest impacts of pass-through tax reforms on investment. The model we develop departs from a neoclassical "q-theoretic" benchmark model of taxes and firm behavior in two respects. First, we assume that firm decisions are undertaken by a utility-maximizing representative business owner. Second, we assume that business owners provide a productive input to the firm, *entrepreneurial labor*, in addition to capital and (non-owner) labor. In this environment, the impact of tax policy on firm behavior is mediated by the presence of income effects on business owners. This model nests a standard, neoclassical model of firm behavior as a special case. We unpack this channel by first studying this income effect in a static model environment where we can analytically characterize the income effect. Next, we generalize this model to a dynamic environment in which we can map our reduced-form empirical estimates to structural parameters.

4.1 Income Effects with Owner-Operated Firms

We start by describing a simple, static model of firm behavior in the presence of taxes. Firms produce output using capital, employee labor, and entrepreurial (owner) labor with a constant

returns to scale production function. Firms sell output and purchase capital and labor on competitive markets, taking their respective prices as given. Each firm is owned by a single owner. The owner chooses their consumption, labor supply, and other firm inputs in order to maximize their utility, subject to a budget constraint. They receive (post-tax) income from the firm they operate and possess virtual (endowment) income R. The business owner's utility maximization problem can be written as:

$$\max_{C,N,K} U(C,N) \qquad \text{s.t.} \quad C = (1-\tau)pF(K,N) - p_K K + R$$

where R represents unearned (endowment, or virtual) income, and where we have normalized the price of the consumption good to 1. We assume that the utility function U is twice differentiable, concave increasing in C and N, and additively separable between consumption and labor. We assume the production function F satisfies the Inada conditions for all three factors of production K and N.

The business owner's optimal choices (C^*, N^*, K^*) are characterized by the system:

$$\begin{aligned} -U_C(C^*)/U_N(N^*) &= p_C/F_N(K^*,N^*)(1-\tau) \\ F_K(K^*,N^*) &= p_K \\ p_C C^* &= (1-\tau)\big[F(K^*,N^*) - p_K K^*\big] + R \end{aligned}$$

The business owner's optimality conditions for employee labor and capital are standard, equating the marginal products with their marginal costs. This implies that the capital-labor ratio K/L will be constant and equal to their relative prices: it is independent of the tax on business profits because the linear profits tax has the same impact on marginal costs and marginal products.

The business owner's behavior deviates from that of a profit-maximizing firm due to the presence of entrepreneurial labor as a factor of production and diminishing marginal utility from consumption. In the limiting case where $F_N \to 0$ for all N (entrepreneurial labor irrelevant for firm production) or where $U_{CC} \to 0$, the firm owner behaves as if they are profit-maximizing.

In order to analytically characterize the impact of the tax rate τ on the owner's labor supply N, we place functional form assumptions on U and F. We will assume that F is (decreasing returns to scale) Cobb-Douglas, $F(K,N) = K^{\alpha_K} N^{\alpha_N}$ with $\alpha_K + \alpha_N < 1$. Moreover, we will assume that utility $U(C,N)$ is additively separable in C and N with CRRA consumption subutility and log leisure subutility, i.e. $U(C,N) = C^{1-1/\sigma}/(1-1/\sigma) + \beta \ln(1-N)$ (where without loss of generality we've normalized the household's time endowment to 1). Note that this utility function is quasilinear in the limit as $\sigma \to \infty$, and Cobb-Douglas as $\sigma \to 1$.

Define the income effect on labor supply as $\eta = \partial N/\partial R$. Implicitly differentiating the

optimality conditions with respect to virtual income R and solving for η:

$$\eta = \frac{U_{CC}F_N(1-\tau)}{p_C\Big[pU_{NN} - U_{CC}\big(\frac{1-\tau}{p}\big)F_N\big(1+(\frac{F_{KN}}{F_{KK}})(1-\tau)(1-p_K)\big) - U_C F_{NK}\big(\frac{F_{KN}}{F_{KK}}\big)(1-\tau)\Big]}$$

Importantly, the numerator of this expression shows that the income effect is nonzero if and only if utility is not quasilinear in consumption and the marginal product of owner labor supply is positive.

4.2 A Dynamic Model of Owner-Operated Firms

We now extend the static model of the preceding section into a dynamic environment. Time is continuous and infinite-horizon, indexed by $t \in [0, \infty)$. The economy is populated by a large number of identical firms whose behavior is described by a representative business owner and firm.

The business owner chooses paths for consumption, savings, labor supply, investment, and (non-owner) employment to maximize their lifetime utility, subject to a sequence of budget constraints and the law of motion for capital. Their utility maximization problem (dated from $t = 0$) can be written:

$$\max_{\{C_t, S_t, N_t, L_t, I_t, K_t\}_{t=0}^{\infty}} \quad \int_0^{\infty} e^{-\rho t} U(C_t, N_t) dt \tag{4}$$

$$\text{s.t.} \quad \dot{K}_t = I_t - \delta K_t$$

$$\dot{S}_t = rS_t + (1-\tau)\Big(AF(K_t, L_t, N_t) - W_t L_t - \Phi(I_t, K_t)\Big) - (1-\Gamma_t)P_K I_t$$

$$\Gamma_t = z + (1-\tau)\left[B + (1-B)\int_t^{\infty} e^{\rho h} E_{t+h|t} dh\right]$$

where the initial capital stock K_0 and the initial liquid asset position S_0 is given. The household earns a constant exogenous rate of return r on liquid assets, and receives post-tax profits from the firm they operate. The endogenous object Γ_t summarizes the taxation of capital through all three (exogenous) tax instruments in the model: τ (tax rate on profits), z (investment tax credit), and B (bonus depreciation). The object $E_{t+h|t}$ characterizes an exogenous depreciation schedule, and denotes the amount of expensable depreciation at date $t+h$ per dollar of capital expenses incurred at date t.

Let μ_t and λ_t denote the costates (multipliers) associated with the owner's budget constraint and the law of motion for capital, respectively. The optimality conditions for the owner's utility

maximization problem can be expressed:

$$\begin{aligned} U_C &= \mu_t \\ -U_C/U_N &= (1-\tau)AF_N \\ AF_L &= W \\ \lambda_t/\mu_t &= (1-\tau)\Phi_I + (1-\Gamma_t)P_K \\ \dot{\mu}_t &= \big(\rho - r\big)\mu_t \\ \dot{\lambda}_t &= (\rho+\delta)\lambda_t - (1-\tau)\big[AF_K - \Phi_K\big] \end{aligned}$$

The first and second equations are standard optimality conditions for consumption and leisure, with the second equation equating the marginal rate of substitution between consumption and leisure with the post-tax return on entrepreneurial labor. The third and fourth equations characterize demand for non-owner inputs (labor and capital investment). The fifth and sixth equations are costate equations characterizing the time evolution of the costates. Importantly, observe that equation (4), the "user cost" optimality condition for investment, scales the shadow value of investment λ_t by the marginal utility of consumption μ_t. Together with transversality conditions for both states[8], this system plus the sequence of household budget constraints and the law of motion for capital fully characterizes the equlibrium behavior of the business owner.

Before proceeding to characterizing the steady state and transition dynamics of this model, it is convenient to parameterize the production function F, the period utility function U, and the adjustment cost function Φ. For each of these functions, we follow the literature with standard functional form assumptions. In particular, we assume a Cobb-Douglas production function $F(K,L) = K^\alpha L^{1-\alpha}$, a quadratic adjustment cost function $\Phi(I_t, K_t) = \frac{\phi}{2}\big(I_t/K_t - \delta\big)^2 K_t$, and a utility function U that is additively separable between consumption and leisure, with a constant intertemporal elasticity of substitution and logarithmic utility from leisure: $U(C_t, N_t) = C_t^{1-\sigma}/(1-\sigma) + \ln(1-N_t)$.

Now we turn to characterizing the steady state of this model. As a matter of notation, we let X^* denote the steady state of an endogenous variable X_t. In the steady state, investment exactly offsets gross depreciation: $\dot{K}_t = 0 \implies I^* = \delta K^*$. Our choice of adjustment cost function implies that adjustment costs are not paid in the steady state and are additionally minimized at the steady state, or $\Phi(I^*, K^*) = \Phi_I(I^*, K^*) = \Phi_K(I^*, K^*) = 0$. This implies that the marginal product of capital is equated with the user cost R in the steady state, $AF_K/\mu^* = (\rho+\delta)P_K\Gamma^* \equiv R^*$.

The dynamics of this model are characterized by paths for the two state variables (K_t, S_t)

[8] XX

and the costates (λ_t, μ_t):

$$\dot{\mu}_t = \big(\rho - r\big)\mu_t \tag{5}$$

$$\dot{\lambda}_t = (\rho - \delta)\lambda_t - (1-\tau)\big[G(K_t) - \Phi_K(I_t, K_t)\big] \tag{6}$$

$$\dot{K}_t = \frac{1}{\phi}\left(\frac{\lambda_t/\mu_t - (1-\Gamma_t)P_K}{(1-\tau)}\right)K_t \tag{7}$$

$$\dot{S}_t = rS_t - \mu_t^{-1/\sigma} + (1-\tau)G(K_t) - (1-\Gamma_t)P_K\Big(\delta + \frac{\lambda_t/\mu_t - (1-\Gamma_t)P_K}{(1-\tau)\phi}\Big)K_t \tag{8}$$

given initial conditions for capital and savings (K_0, B_0).

We now turn to establishing a relationship between our reduced-form coefficients and the dynamic transition path for capital. Our solution strategy closely follows Chodorow-Reich (2025), which in turn follows from Auerbach (1989). We start by linearizing the system characterized by equations (5)-(8) around the steady state. The linearized system can be expressed as:

$$\begin{pmatrix} \dot{\lambda}_t \\ \dot{K}_t \\ \dot{\mu}_t \\ \dot{S}_t \end{pmatrix} = \begin{pmatrix} \rho & -(1-\tau)G''(K^*) & \frac{\delta\lambda^*}{\mu^*} & 0 \\ \frac{K^*}{\phi(1-\tau)\mu^*} & 0 & -\frac{K\lambda^*}{\phi(1-\tau)\mu^2} & 0 \\ 0 & 0 & \rho - r & 0 \\ -\frac{(1-\Gamma)P_K K^*}{(1-\tau)\phi\mu^*} & (1-\tau)G'(K^*) - (1-\Gamma)P_K\delta & \frac{C^*}{\sigma\mu^*} + \frac{(1-\Gamma)P_K K^*\lambda^*}{(1-\tau)\phi\mu^*} & \rho \end{pmatrix} \begin{pmatrix} \lambda_t - \lambda^* \\ K_t - K^* \\ \mu_t - \mu^* \\ S_t - S^* \end{pmatrix}$$

where we define $G(K_t) = \max_{N_t, L_t} A_t F(K_t, L_t, N_t) - WL_t$ by "concentrating out" the business owner's optimal choice of employee and owner labor in production. Assuming the riskless return $r > 0$ and $\delta < 1$, there is one stable eigenvalue associated with this system, which we denote as $\chi = \frac{\rho - \sqrt{\rho^2 - G''(K^*)\frac{K^*}{\phi\mu^*(1-\tau)}}}{2} < 0$.

Letting $\tilde{x}_t \equiv \ln X_t - \ln X^*$ denote log deviations of a variable X from steady state, we can express the loglinearized dynamics of this economy as:

$$\tilde{\lambda}_t = \phi(1-\tau)\tilde{k}_0\chi e^{\chi t}$$
$$\tilde{k}_t = \tilde{k}_0 e^{\chi t}$$

5. Conclusion

This paper estimates the static, dynamic, and distributional effects of state business tax reform episodes. We use U.S. business and individual tax returns to estimate the impact of state business tax reform episodes on business and entrepreneurial activity. We begin with the case of Kansas, which implemented a historically large tax cut on pass-through businesses in 2013, which was subsequently repealed in 2017. We first study the mechanical incidence

of the reform, documenting that the exemption of pass-through income from state income taxation represented a large transfer to high-income households. Next, we study the impacts of the reform (and its subsequent repeal) on business and entrepreneurial outcomes. We find extremely modest impacts of the reform (and repeal) on business activity (for instance, sales, labor compensation, and investment) and business formation/exit.

In the second half of this paper, we generalize our analysis of the Kansas reform to study a broader set of pass-through business tax reforms in other states. In broad terms, our pooled analysis of state-level business tax reforms supports the findings from our Kansas analysis. Taken together, we identify five consistent findings from this analysis. First, consistent with prior work, we find no evidence the Kansas tax cut induced meaningful growth in wage bills, sales, entry, pre-tax profits, or investment. Second, the mechanical effects were much larger than the dynamic growth effects, implying a substantial reduction in revenues and increase in after-tax income inequality. Third, the behavioral responses we do observe indicate that combining the mechanical, static, and dynamic responses leads to an even more unequal distribution of benefits from the reform. Fourth, we find similar estimates when broadening our scope to a pooled analysis of six additional pass-through tax reforms, which also enable us to estimate limited long-term responses. Finally, we find evidence of heterogeneous effects for C-corporate reforms relative to pass-through reforms, suggesting a larger burden that falls more on the top decile of workers.

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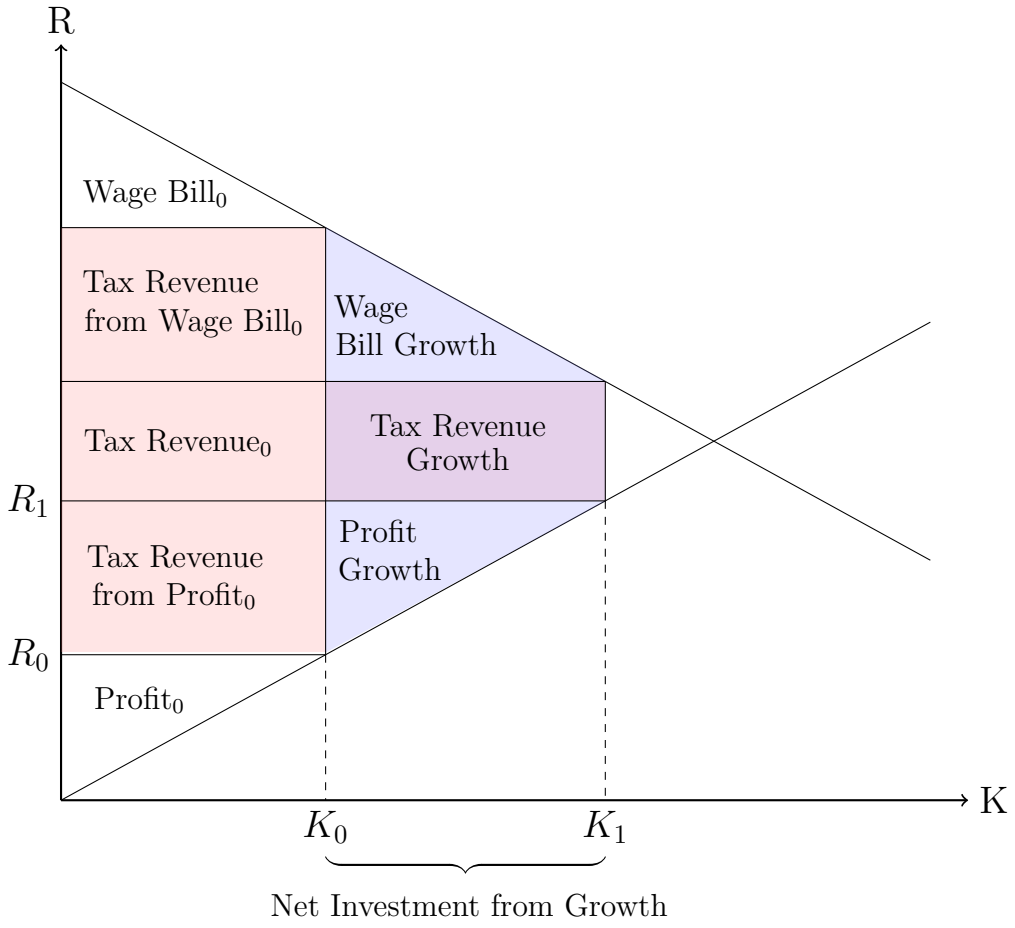
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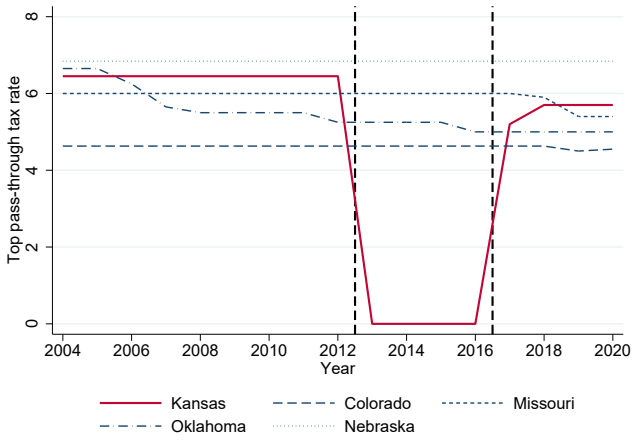
Figure 1. Conceptual Framework of a Dividend Tax Cut



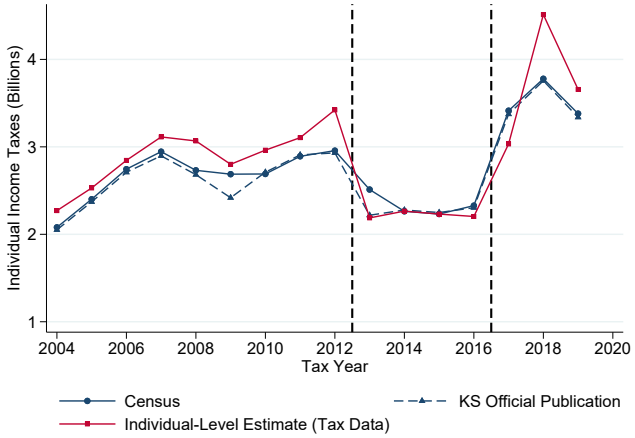
Notes: This figure outlines the conceptual framework for assessing the incidence of a dividend tax cut.

Figure 2. Kansas Income Tax Revenue and Top Pass-through Tax Rates

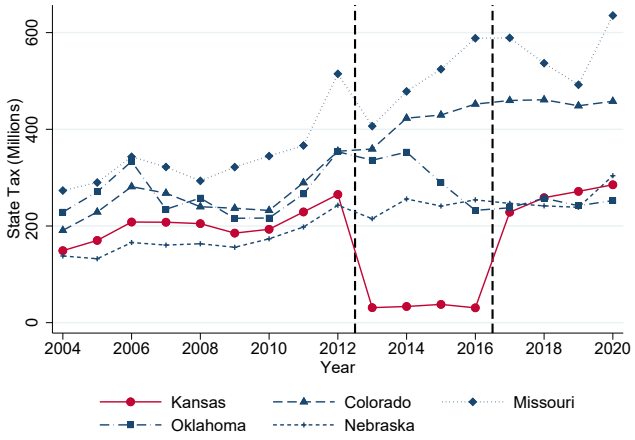
A. Top Marginal Rate for Pass-Through Income



B. Kansas Individual Income Tax Revenue



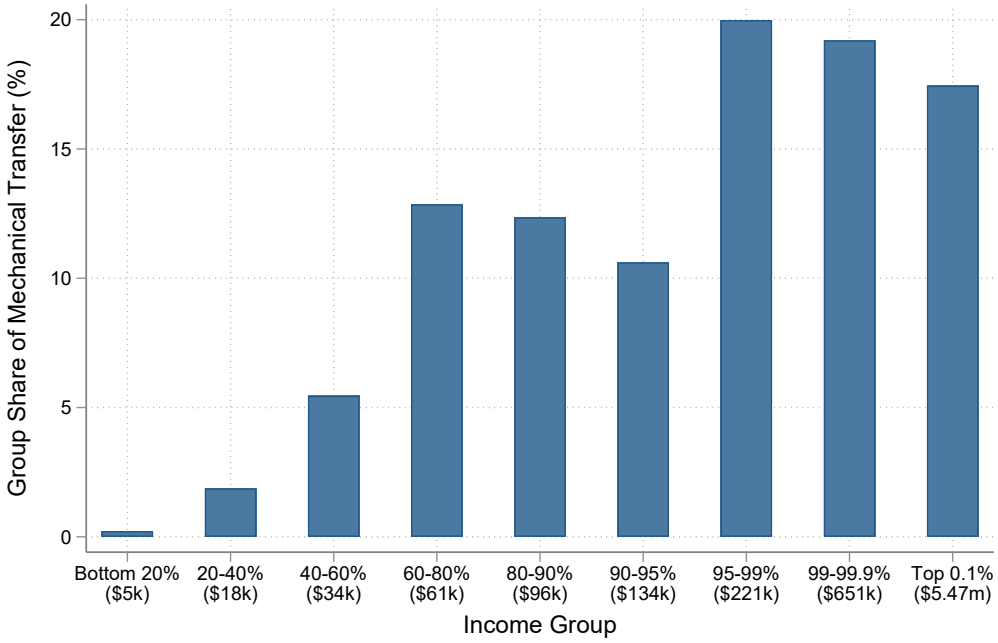
C. Individual Income Tax Revenue from Business Income



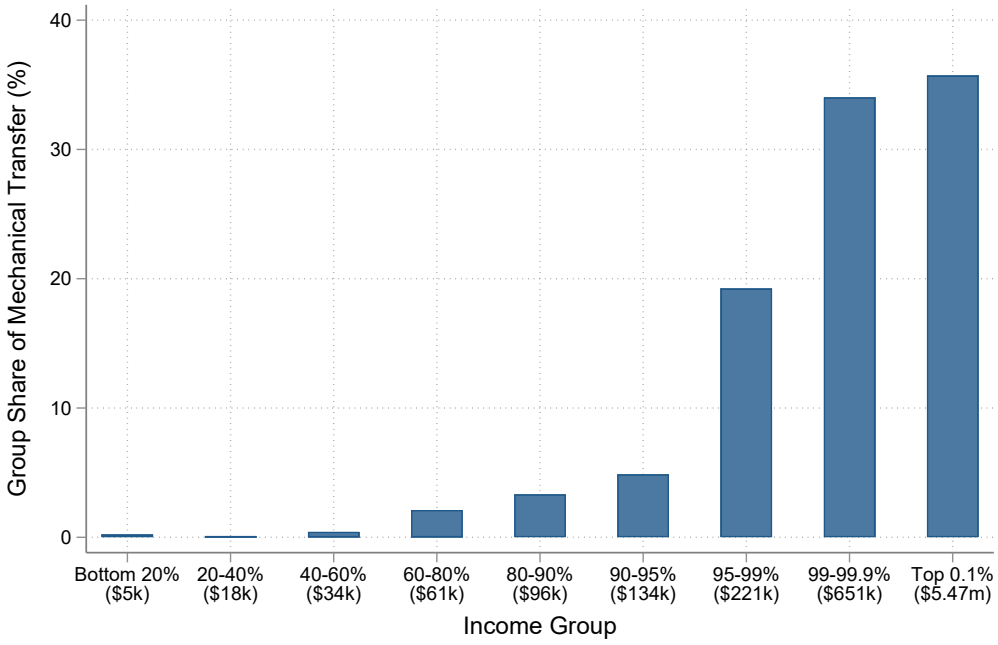
Notes: Panel A plots the top pass-through tax rate in Kansas and neighboring states over time. Panel B plots three different estimates of Kansas income tax revenue over time. Panel C plots the aggregate business tax revenue in Kansas and neighboring states. The dashed vertical lines denote the tax reform and its subsequent repeal.

Figure 3. Mechanical Incidence of the Kansas Tax Reform

A. Full Reform

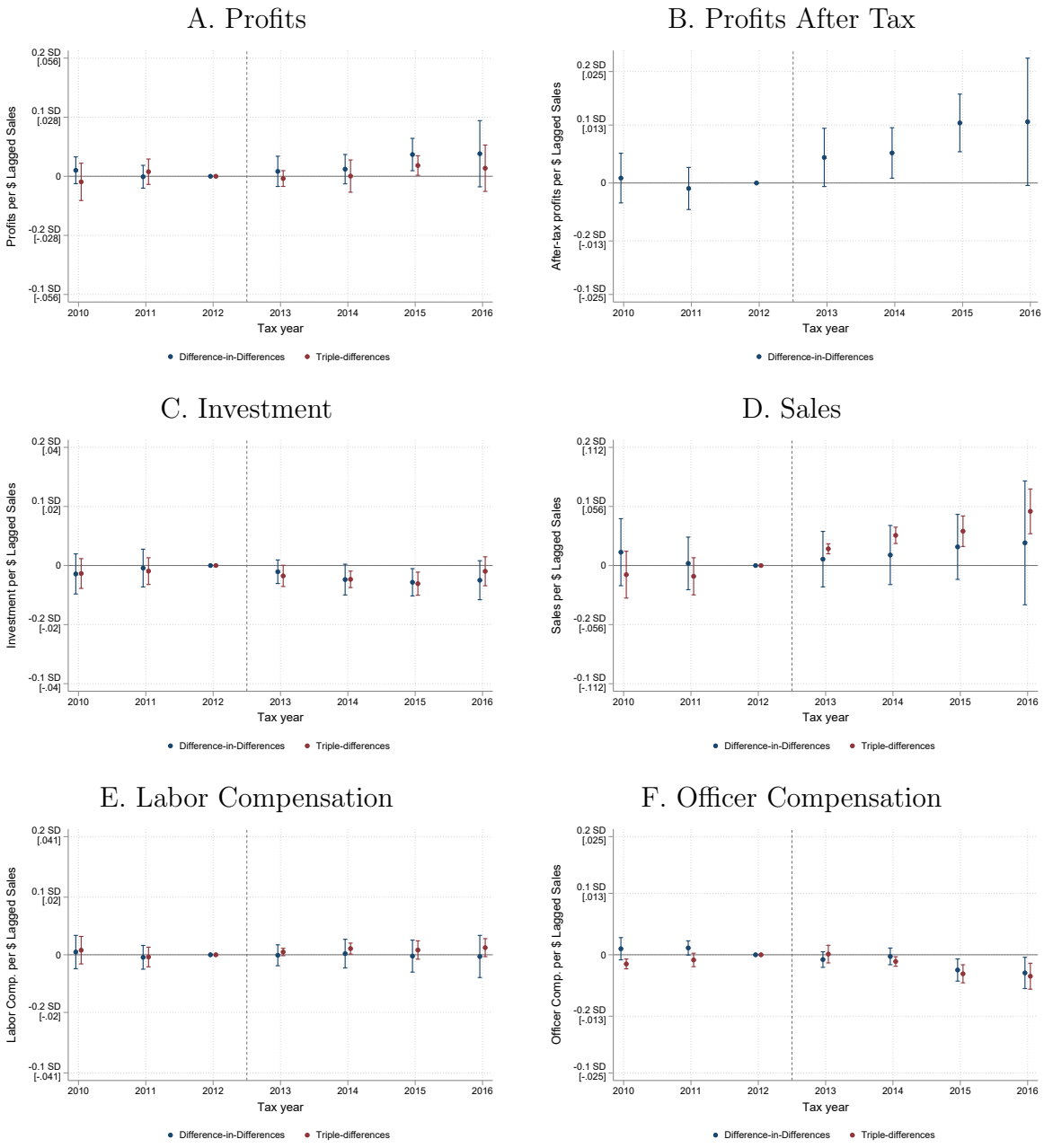


B. Pass-Through Income Tax Cut Only



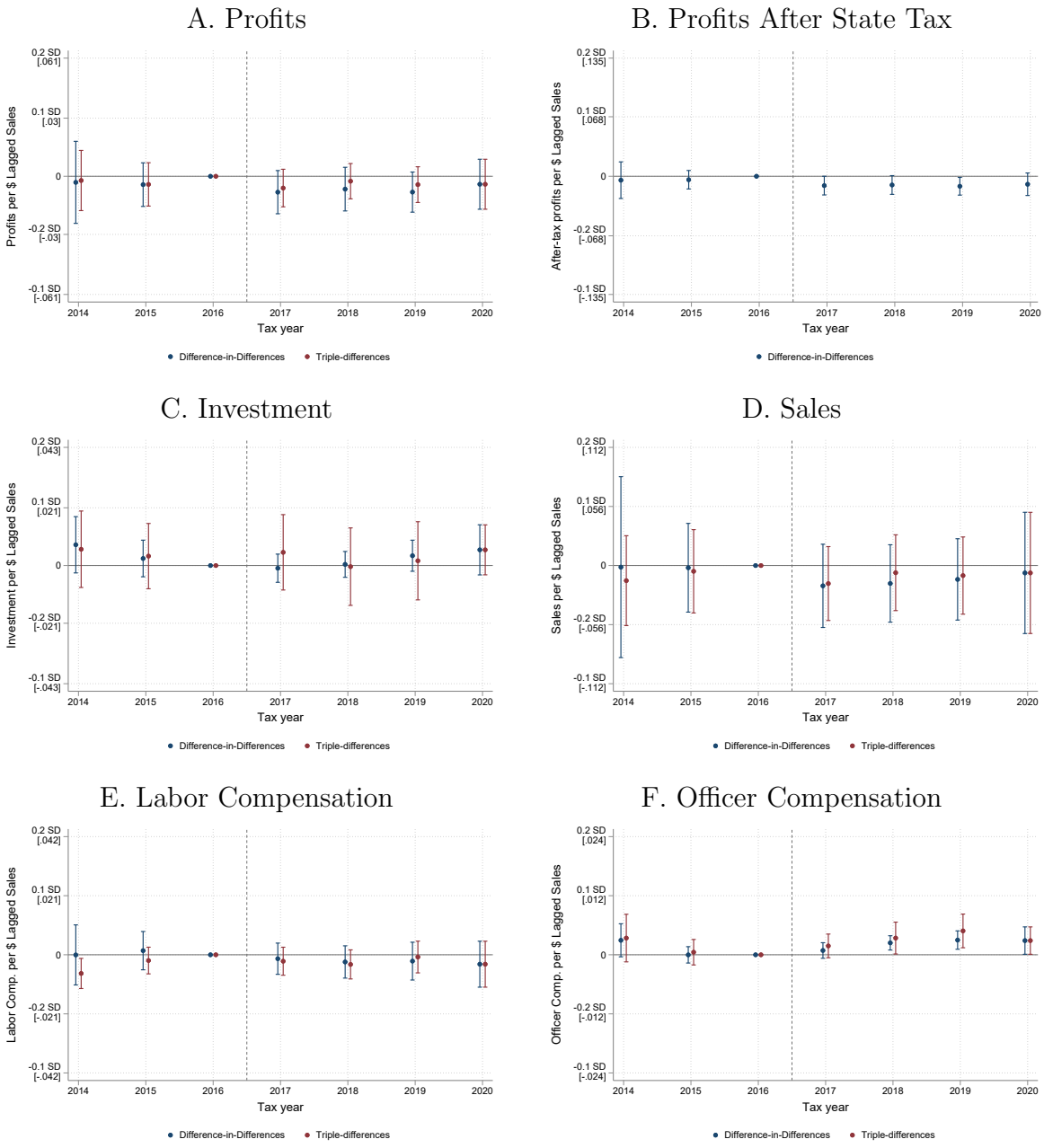
Notes: This figure characterizes the *mechanical* impacts of the Kansas 2013 tax reform across the distribution of Kansas taxpayers. Panel A documents relative size of the mechanical transfer to income groups from the full reform. Panel B documents the mechanical transfers from the pass-through business income exemption only. Taxpayers are binned into income groups (x-axis) based on their rank in the 2012 pre-tax distribution of adjusted gross income. Numbers in parenthesis indicate the mean adjusted gross income within each income bucket. See Section 2.1 for more information on this exercise.

Figure 4. Impacts of the Kansas 2013 Reform on Business Outcomes



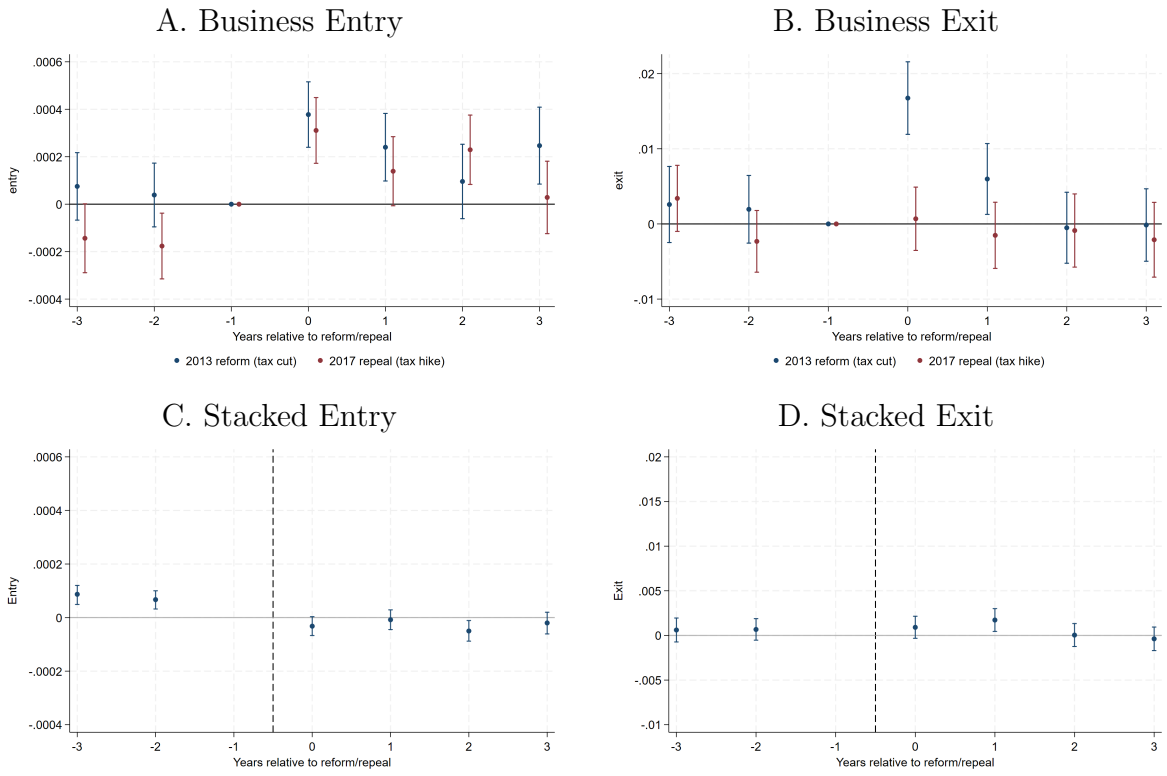
Notes: These graphs depict our baseline dynamic difference-in-differences and triple-differences estimates for the Kansas 2013 tax reform. Each panel contains coefficient plots corresponding to equations 1 and 2. See Section 2.2 for more details.

Figure 5: Impacts of the Kansas 2017 Repeal on Business Outcomes



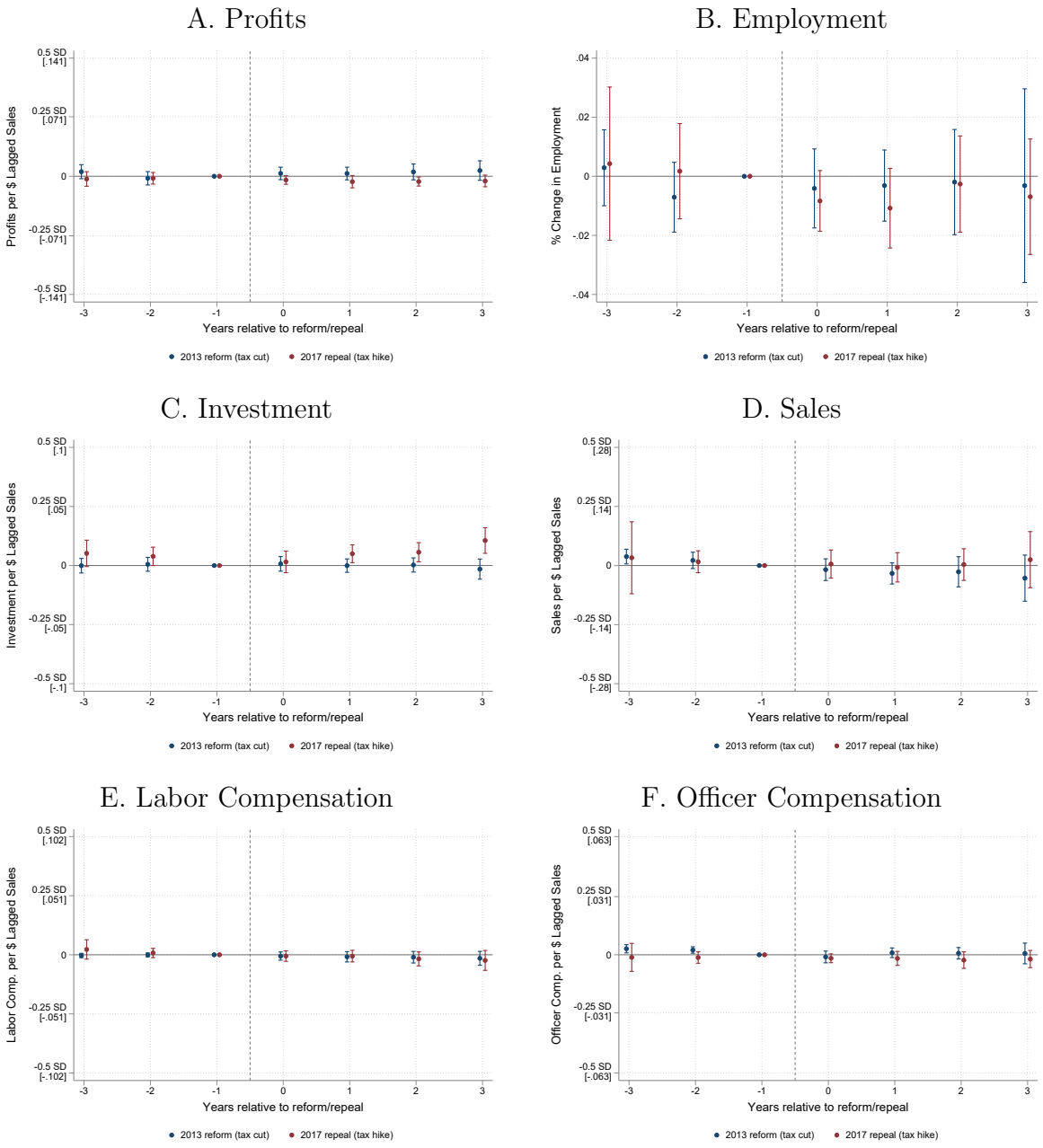
Notes: These graphs depict our baseline dynamic difference-in-differences and triple-differences estimates for the 2017 repeal of the Kansas tax reform episode. Each panel contains coefficient plots corresponding to equations 1 and 2. See Section 2.2 for more details.

Figure 6: Impacts of the Kansas Reform on Extensive Margin Outcomes



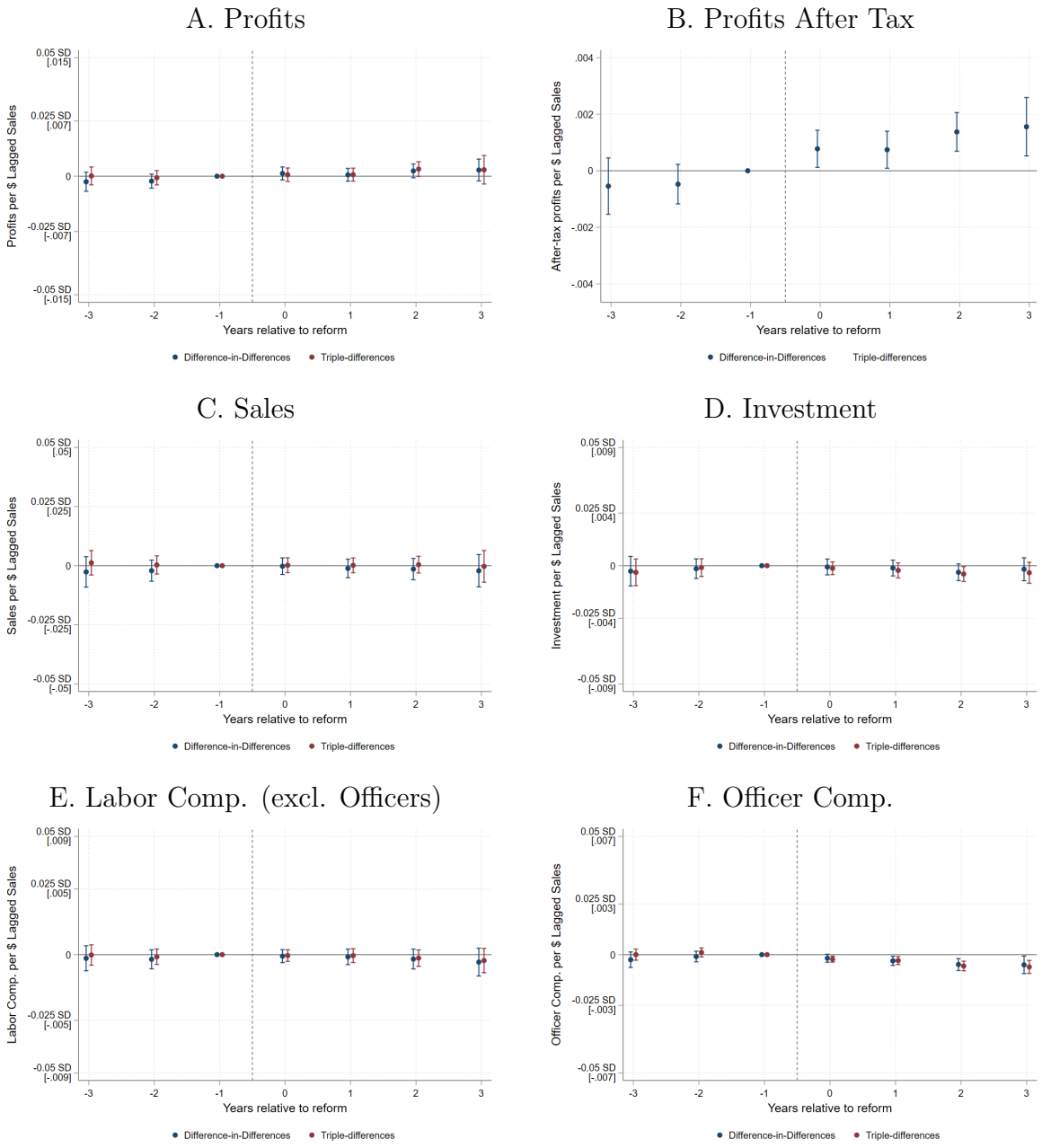
Notes: These graphs depict our baseline dynamic difference-in-differences estimates for the Kansas 2013 tax reform and 2017 repeal on entrepreneurial activity. Panel A documents the impact of the reform and repeal on entrepreneurial entry, defined as an outcome in which a business owner starts a new business activity. Panel B documents the impact of the reform and repeal on entrepreneurial exit, defined analogously. See Section 2.2 for more details.

Figure 7: Placebo Impacts of the Kansas Reform on C-Corporations



Notes: These graphs depict our baseline dynamic difference-in-differences estimates for the Kansas reform (2013) and repeal (2017), estimated on the sample of C-corporations in Kansas and the neighboring states of Oklahoma, Nebraska, and Missouri. See Section 2.2 for more details.

Figure 8: Impact of 1pp. Pass-Through Tax Cut (Stacked Reforms)



Notes: These graphs depict our stacked triple-differences estimates for our stacked dynamic difference-in-differences specification. Each panel corresponds estimates obtained on a given firm-level outcome. See Section 3 for more details. **XX NOTE: These CI's are based on state-year clustered SEs (not firm).**

Table 1. Business Summary Statistics

Outcome	Mean	SD	p1	p25	p50	p75	p99
A. Kansas (2013) reform							
Profits ($K)	132	523	-1154	-3	34	128	3254
Sales ($K)	3122	8380	59	354	803	2049	57831
Investment ($K)	136	361	0	4	31	100	2464
State business taxes ($K)	5	15	0	0	0	3	97
Profits after tax ($K)	126	509	-1154	-4	33	124	3154
Officer comp. ($K)	108	215	0	0	43	109	1372
Non-officer labor comp. ($K)	388	939	0	35	108	306	6320
Number of Employees	35	1201	1	3	8	20	349
B. Kansas (2017) repeal							
Profits ($K)	128	516	-1212	-5	35	134	3140
Sales ($K)	3093	8268	59	360	810	2046	57138
Investment ($K)	137	367	0	5	32	101	2511
State business taxes ($K)	5	15	0	0	0	4	98
Profits after tax ($K)	122	501	-1213	-5	34	129	3037
Officer comp. ($K)	101	193	0	0	43	105	1237
Non-officer labor comp. ($K)	407	972	0	38	116	328	6545
Number of Employees	38	1498	1	3	8	21	373
C. Pooled state pass-through income tax reforms							
Profits ($K)	110	490	-1247	-6	24	104	2999
Sales ($K)	3264	8571	67	371	834	2183	58766
Investment ($K)	130	366	0	4	29	92	2539
State business taxes ($K)	5	16	0	0	0	2	109
Profits after tax ($K)	104	474	-1248	-6	24	101	2884
Officer comp. ($K)	135	268	0	0	51	134	1707
Non-officer labor comp. ($K)	421	1040	0	35	111	325	7005
Number of Employees	34	887	1	3	8	20	346

Notes: This table presents summary statistics describing businesses in the three primary analysis samples we study. Panel A corresponds to our analysis sample for the 2013 Kansas tax reform, and presents statistics describing the cross-sectional distribution of business outcomes in the tax year 2012 (the year prior to the reform). Panel B describes the cross-sectional distribution of business outcomes in the tax year 2016 in our Kansas sample (the year prior to the repeal of the Kansas tax reform). Panel C presents summary statistics in our pooled "stacked" sample of firms in the year prior to their corresponding reform episode. See Section 2 for additional information on the analysis samples and variable definitions.

Table 2. Impact of Kansas 2013 Reform on Business Outcomes

Outcome	Profits	Profits After Tax	Sales	Investment	Officer comp.	Non-officer labor comp.	Log Employment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. Difference-in-Differences							
Treated x Post	0.006	0.008	0.009	-0.003	-0.003	-0.000	0.008
	(0.003)	(0.002)	(0.015)	(0.002)	(0.001)	(0.003)	(0.009)
% Impact	11.1%	25.9%	0.9%	-3.4%	-3.3%	-0.1%	0.4%
Observations	598,970	598,970	598,970	349,917	598,970	598,970	598,970
B. Triple-Differences							
Treated x Post	0.002	-	0.037	-0.003	-0.001	0.002	0.010
	(0.003)	-	(0.009)	(0.002)	(0.001)	(0.002)	(0.005)
% Impact	3.9%	-	3.7%	-2.9%	-1.5%	0.9%	0.5%
Observations	824,645	-	824,645	492,540	824,645	824,645	824,645

Notes: This table presents static difference-in-difference and triple-difference estimates of the Kansas 2013 tax reform. See Section 2 for data and sample definitions. Dollar-valued outcomes (all except column 8) are normalized by sales in the year prior to the policy change (2012). The percent impact of the reform and repeal are obtained by scaling the estimated difference-in-difference coefficients by pre-period mean values of the outcome. See Section 2 for more details.

Table 3. Impact of Kansas 2017 Repeal on Business Outcomes

Outcome	Profits	Profits After Tax	Sales	Investment	Officer comp.	Non-officer labor comp.	Log Employment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. Difference-in-Differences							
Treated x Post	-0.005	-0.007	-0.013	-0.001	0.001	-0.003	-0.003
	(0.004)	(0.003)	(0.019)	(0.003)	(0.001)	(0.003)	(0.010)
% Impact	-10.0%	-26.5%	-1.3%	-1.3%	1.6%	-1.5%	-0.2%
Observations	639,109	639,109	639,109	423,526	639,109	639,109	639,109
B. Triple-Differences							
Treated x Post	-0.001	-	-0.008	-0.006	0.003	0.002	0.006
	(0.003)	-	(0.009)	(0.003)	(0.002)	(0.002)	(0.005)
% Impact	-1.7%	-	-0.8%	-6.4%	3.1%	0.9%	0.3%
Observations	824,573	-	824,573	563,656	824,573	824,573	824,573

Notes: This table presents static difference-in-difference and triple-difference estimates of the Kansas 2017 tax repeal. See Section 2 for data and sample definitions. Dollar-valued outcomes (all except column 8) are normalized by sales in the year prior to the policy change (2016). The percent impact of the reform and repeal are obtained by scaling the estimated difference-in-difference coefficients by pre-period mean values of the outcome. See Section 2 for more details.

Table 4. Impact of Pooled State Pass-through Reforms on Business Outcomes

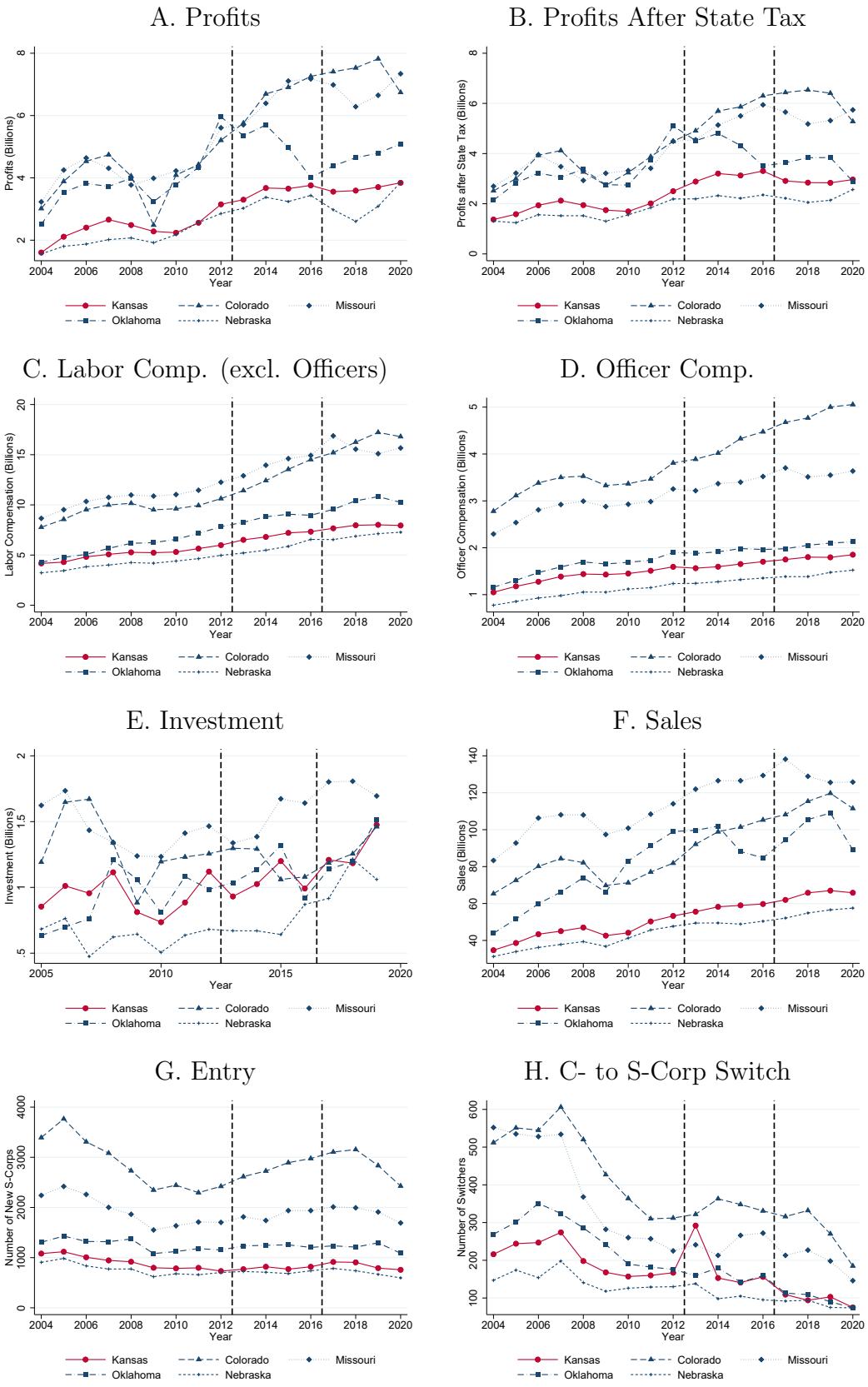
Outcome	Profits	Profits after tax	Sales	Investment	Officer comp.	Non-officer labor comp.	Log employment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. Difference-in-Differences							
(-$\Delta\tau$) × Treated × Post	-0.002	-0.003	-0.002	-0.001	0.000	-0.000	-0.003
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.004)
% Impact (1 p.p. increase)	-9.0%	-12.8%	-0.2%	-1.5%	0.0%	-0.0%	-0.3%
Observations	7,816,757	7,816,757	7,816,757	3,249,564	7,816,757	7,816,757	7,816,757
B. Triple-Differences							
Treated x Post	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
% Impact (1 p.p. increase)	-	-	-	-	-	-	-
Observations	-	-	-	-	-	-	-

Notes: This table presents the static difference-in-difference estimates on our pooled sample of state pass-through business income tax reform episodes using the stacked difference-in-differences estimator developed in Section 3.1. The percent impact of the reform and repeal are obtained by scaling the estimated difference-in-difference coefficients by pre-period mean values of the outcome. See Section 3.1 for more details.

Appendix For Online Publication

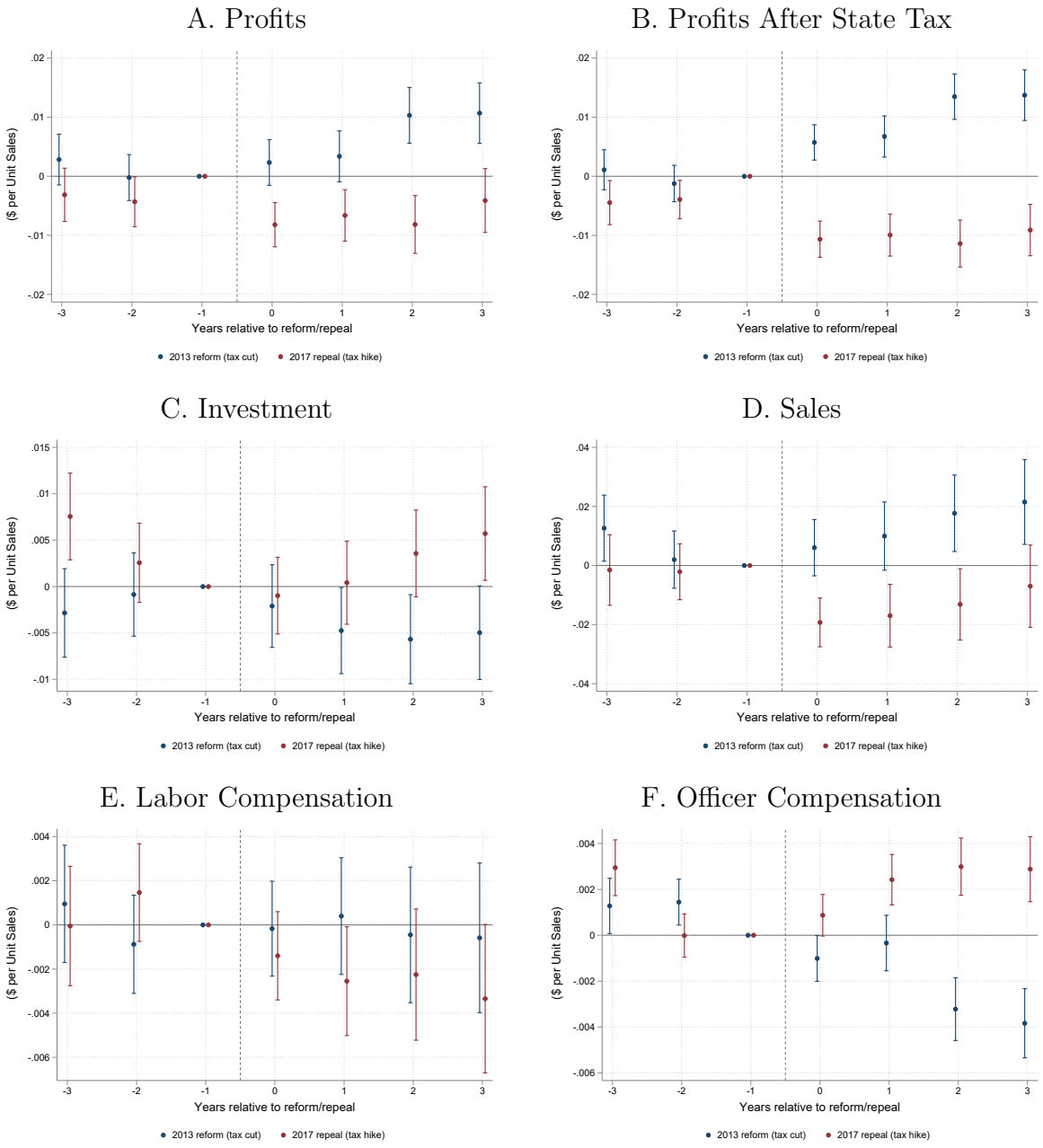
A Appendix Figures and Tables

Figure A1. Time Series of Business Outcomes by State



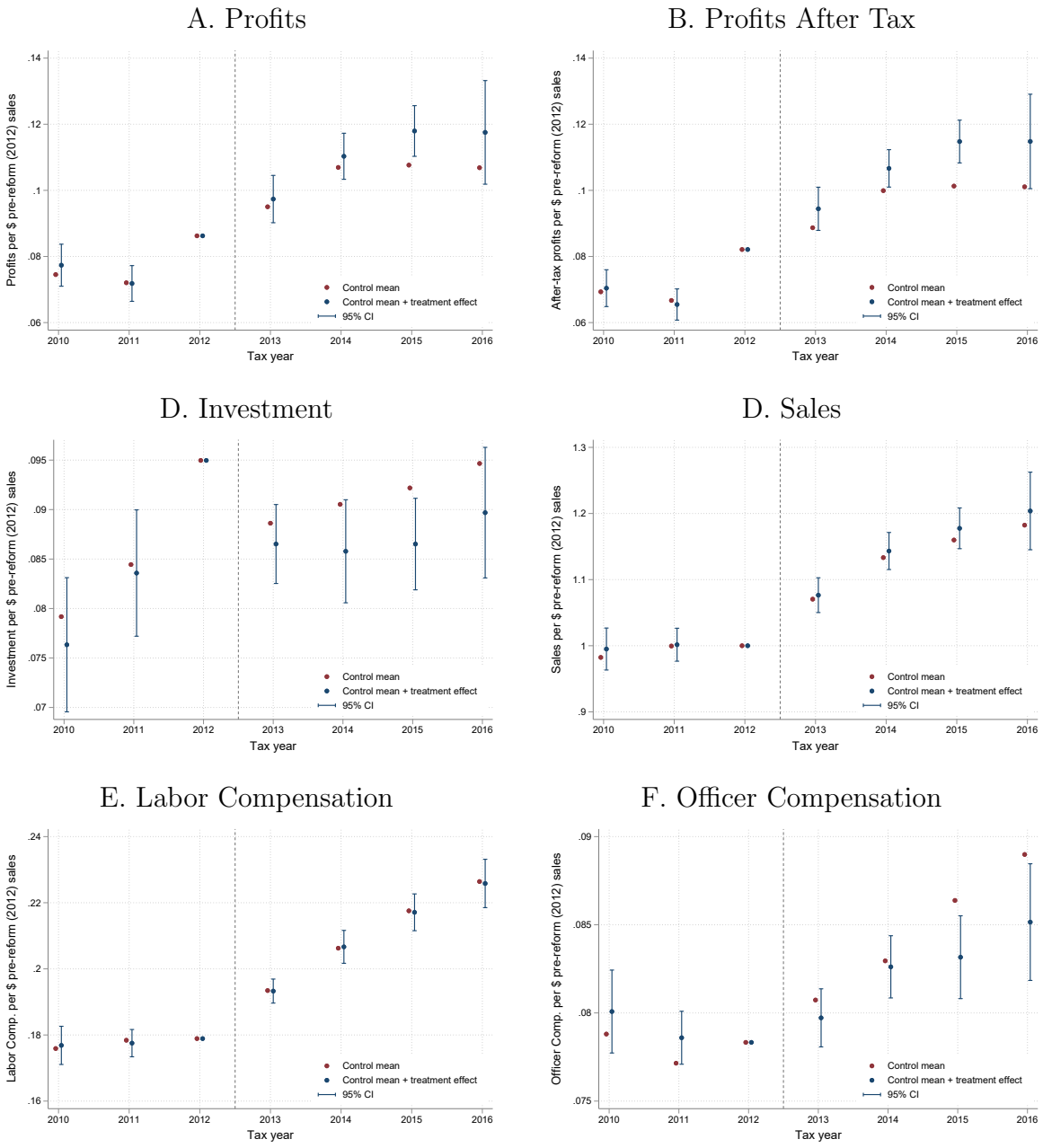
Notes: This figure plots state-level aggregate time series analogs of our primary business outcomes over the tax years 2005 to 2019 in Kansas and in neighboring states (Colorado, Oklahoma, Missouri, Nebraska)

Figure A2. Impact of the Kansas Reform: Per-Worker Outcome Scaling



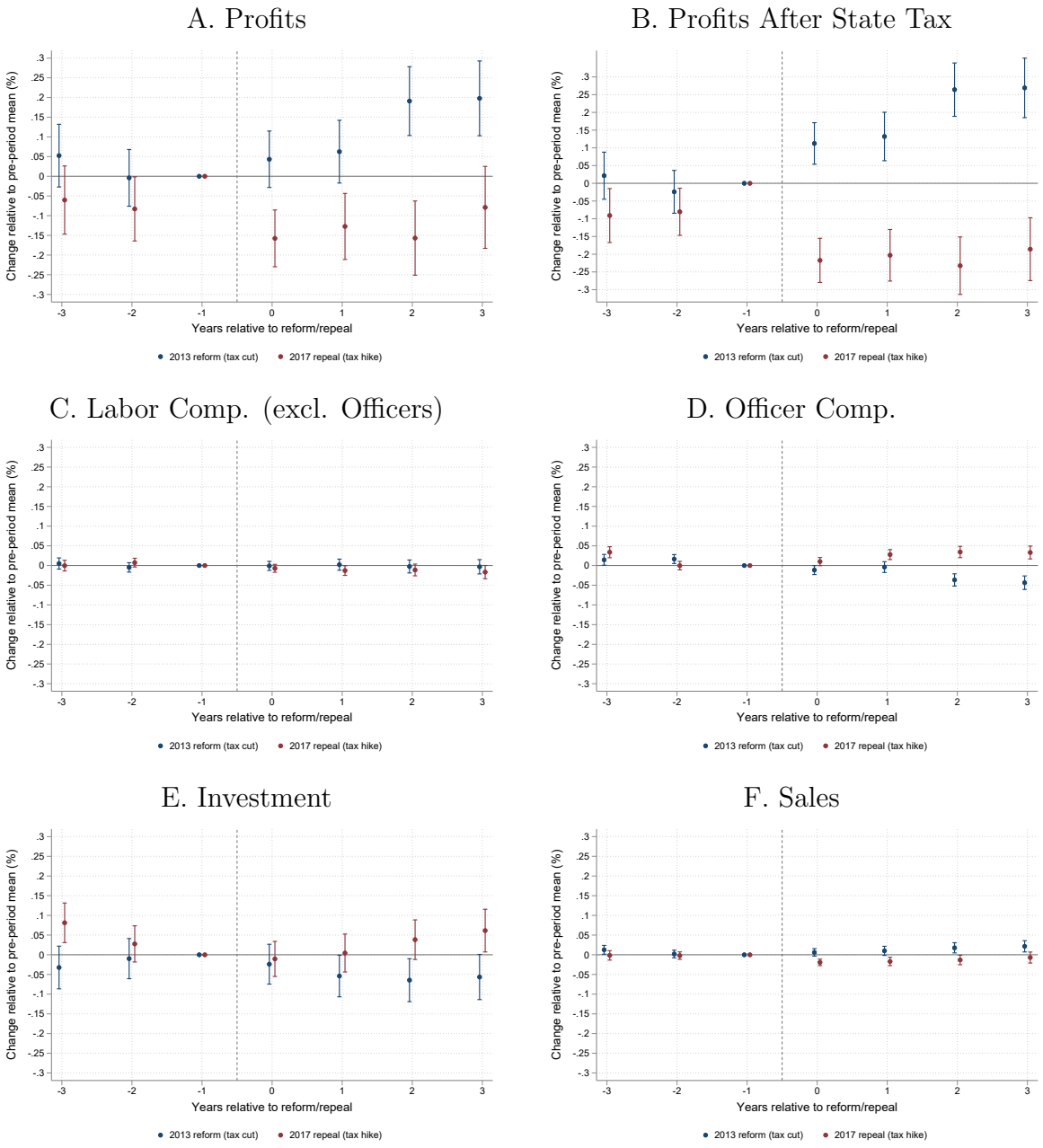
Notes: These graphs depict our baseline dynamic difference-in-differences estimates for the Kansas 2013 tax reform and 2017 repeal, scaling dollar-valued outcomes by pre-period employment. Each panel contains the difference-in-difference coefficient plots following equation 1 for the two Kansas reforms for a given firm-level outcome. See Section 2.2 for more details.

Figure A3. Impact of the Kansas Reform: Control and Treatment Means



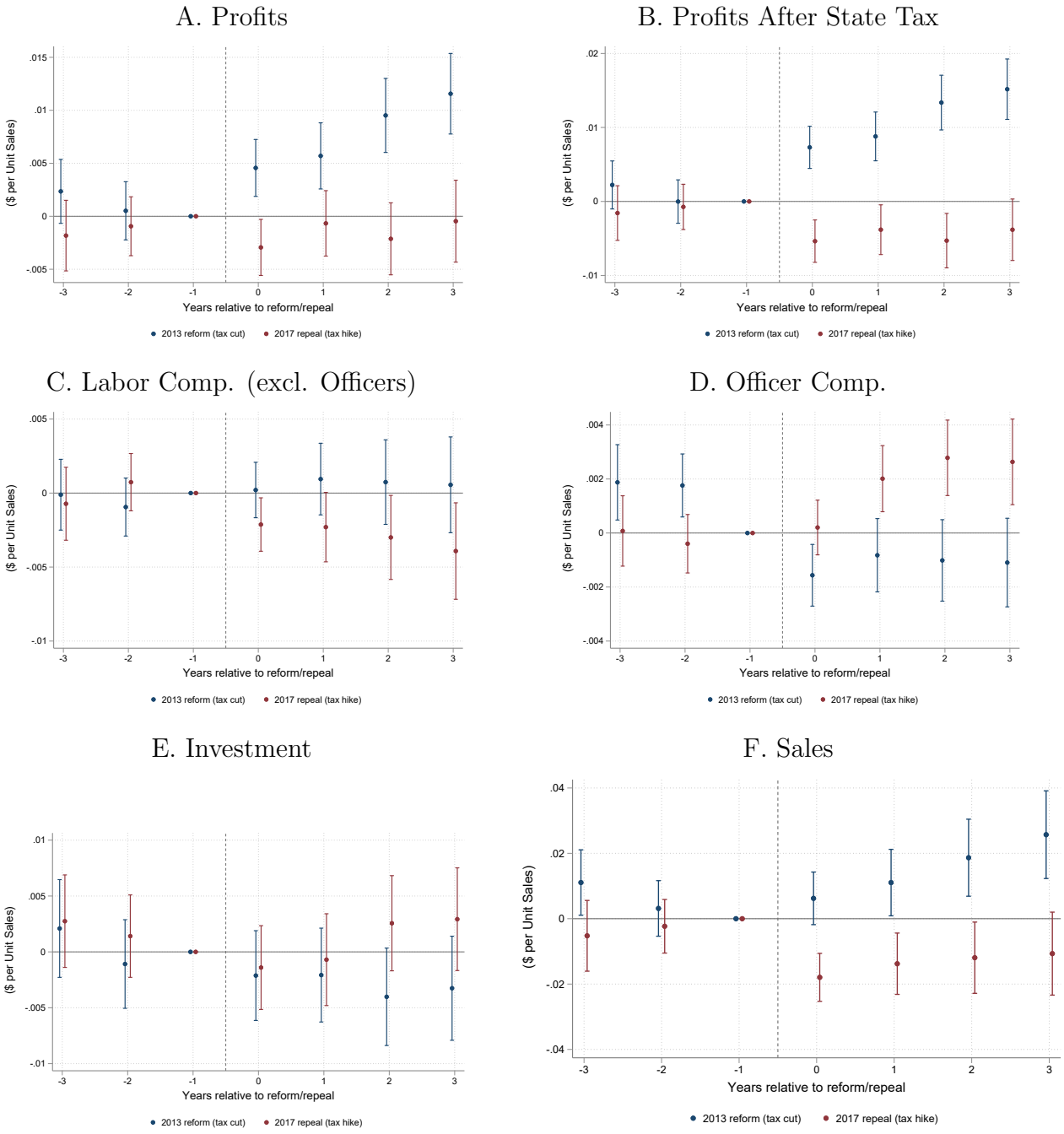
Notes: These graphs depict our baseline dynamic difference-in-differences estimates for the Kansas 2013 tax reform. Each panel describes a regression on a given business outcome. Within each panel, we plot mean outcomes for control firms and mean outcomes for treated firms (control means plus treatment effects). See Section 2.2 for more details.

Figure A4. Impact of the Kansas Reform: Pre-Period Mean Scaling



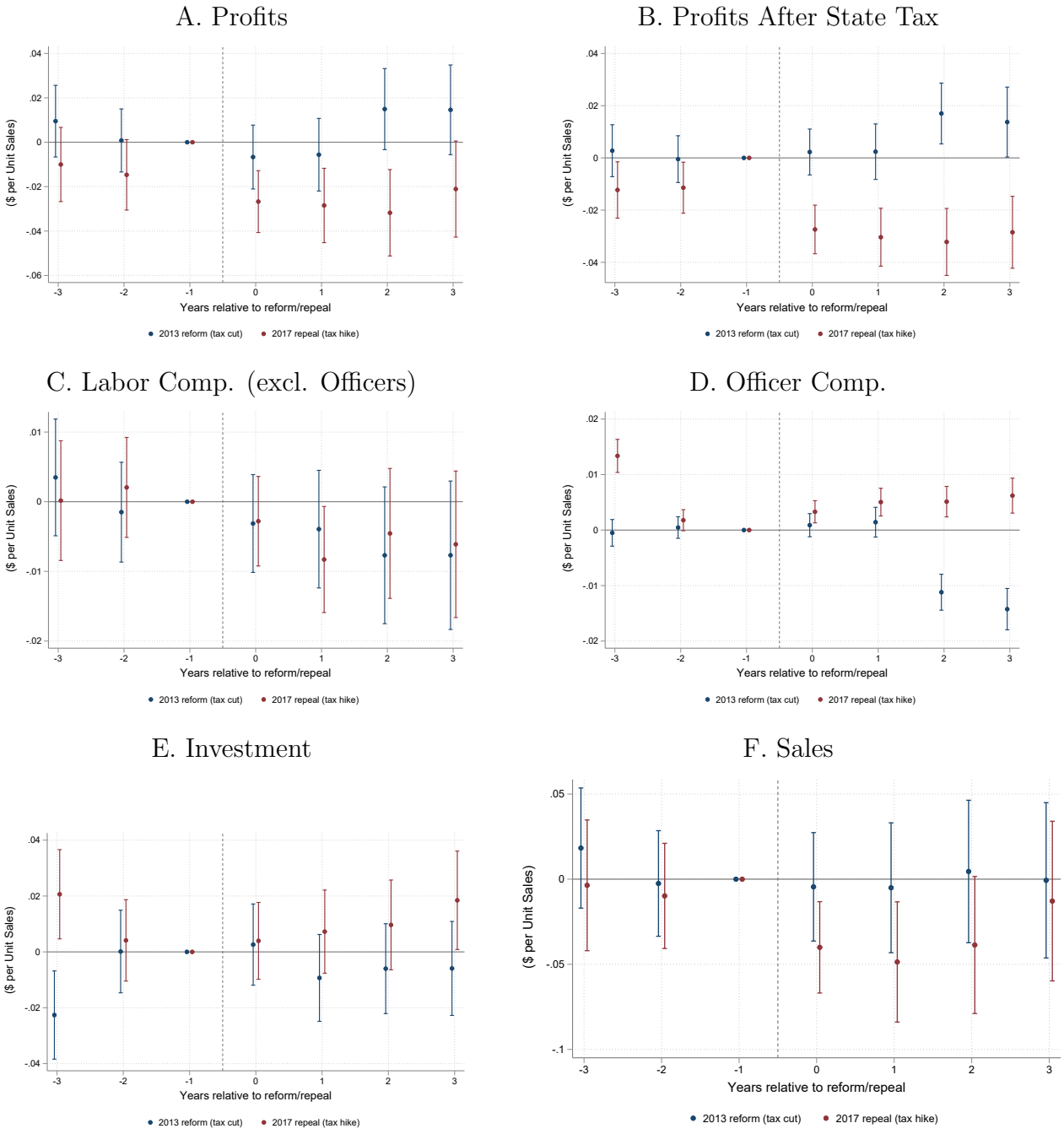
Notes: These graphs depict our baseline dynamic difference-in-differences estimates for the Kansas 2013 tax reform and 2017 repeal. Outcomes are scaled by pre-period sales, and coefficients are normalized by pre-period means (e.g. Appendix Table A2). Each panel contains the difference-in-difference coefficient plots following equation 1 for the two Kansas reforms for a given firm-level outcome. See Section 2.2 for more details.

Figure A5. Impact of the Kansas Reform on S-Corporations (Diff-in-Diff)



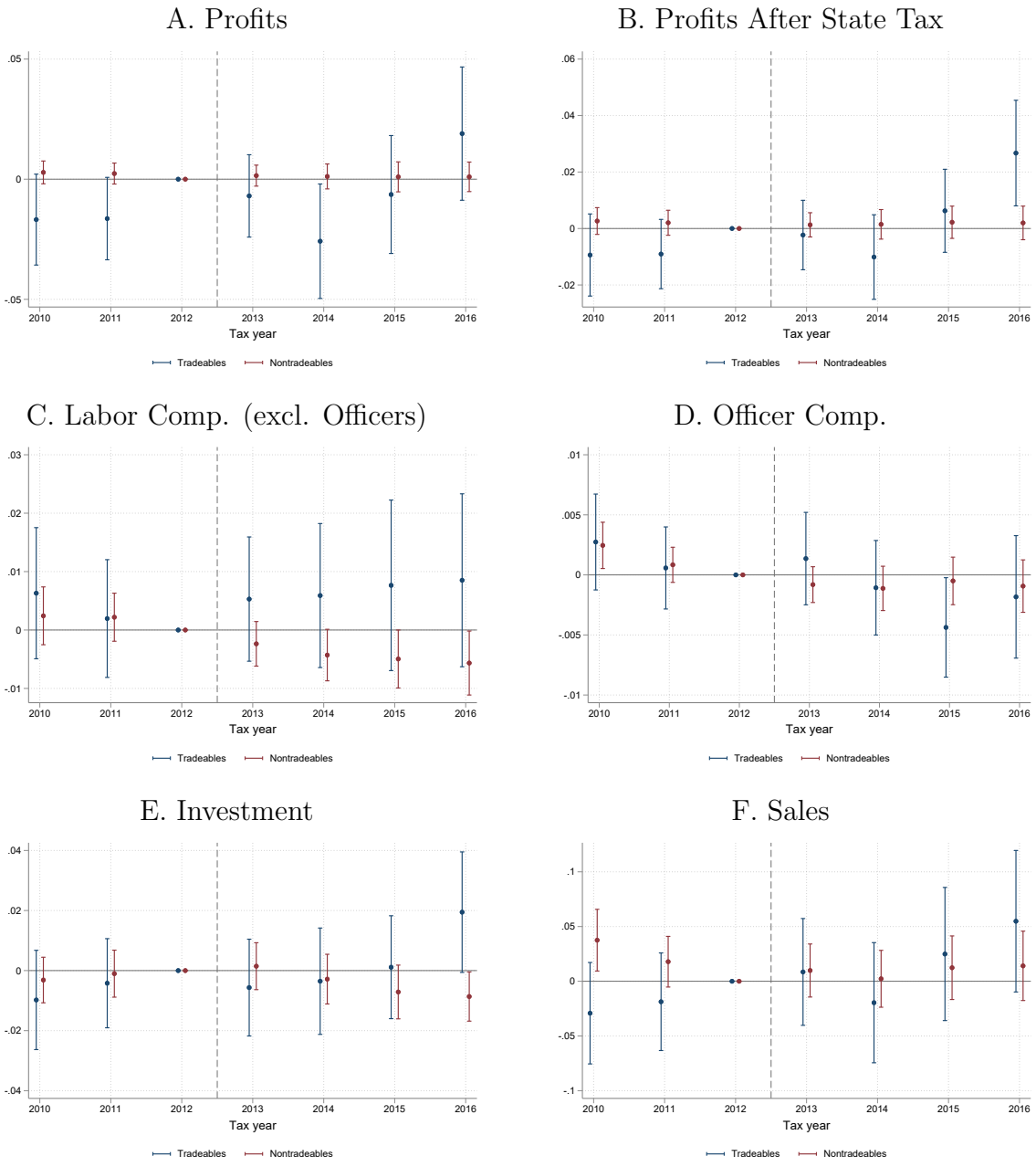
Notes: These graphs depict our baseline dynamic difference-in-differences estimates for the Kansas 2013 tax reform and 2017 repeal for the subsample of S-corporations; that is, excluding partnerships from the sample. Each panel contains the difference-in-difference coefficient plots following equation 1 for the two Kansas reforms for a given firm-level outcome. See Section 2.2 for more details.

Figure A6. Impact of the Kansas Reform on Partnerships (Diff-in-Diff)



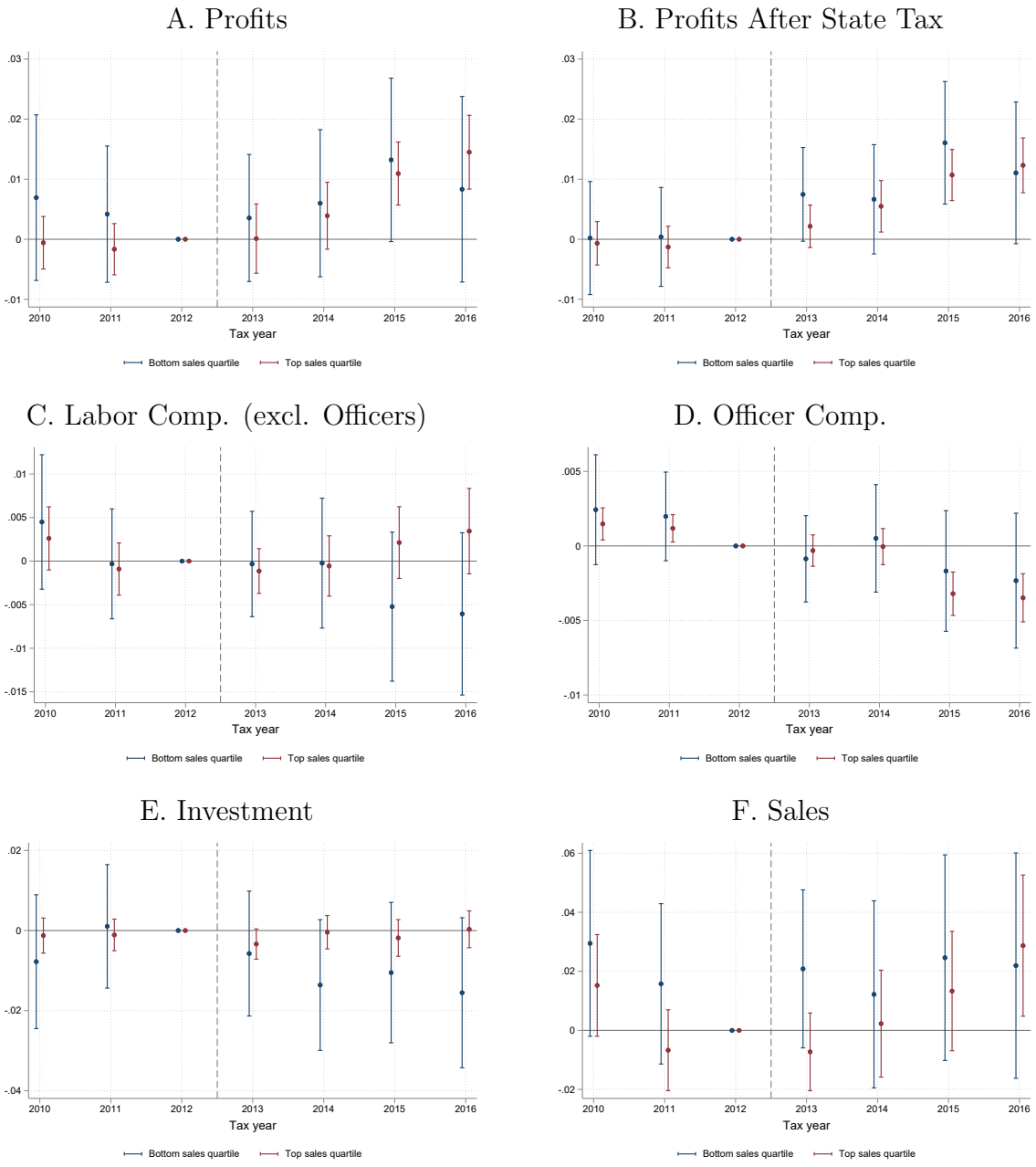
Notes: These graphs depict our baseline dynamic difference-in-differences estimates for the Kansas 2013 tax reform and 2017 repeal for the subsample of partnerships; that is, excluding S-corporations from the sample. Each panel contains the difference-in-difference coefficient plots following equation 1 for the two Kansas reforms for a given firm-level outcome. See Section 2.2 for more details.

Figure A8. Impacts of the Kansas (2013) Reform: Tradeables and Nontradeables



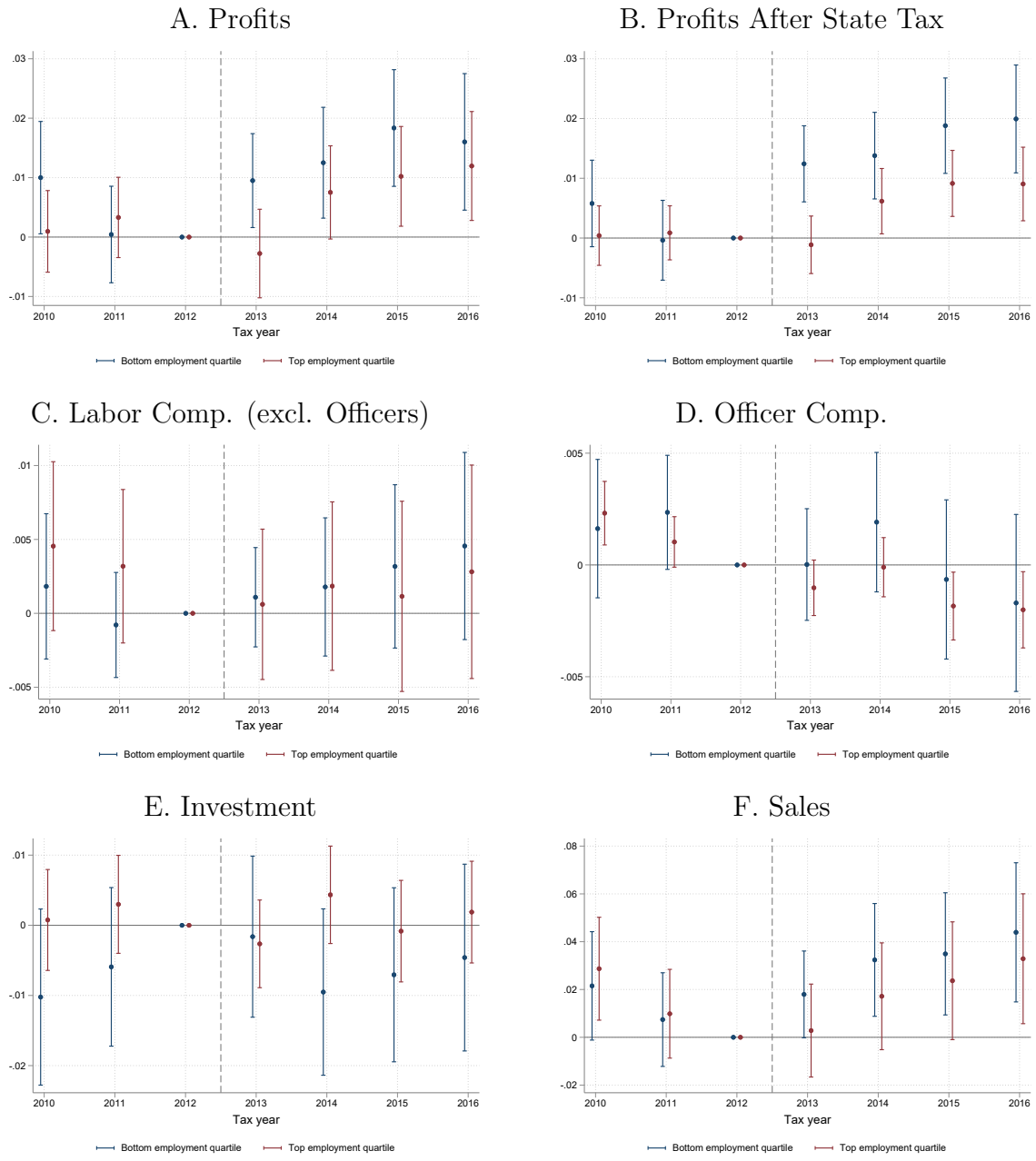
Notes: These graphs depict our baseline dynamic difference-in-differences estimates for the Kansas 2013 reform separately for tradeable and nontradeable goods-producing sectors.

Figure A9. Impacts of the Kansas (2013) Reform: Heterogeneity by Sales



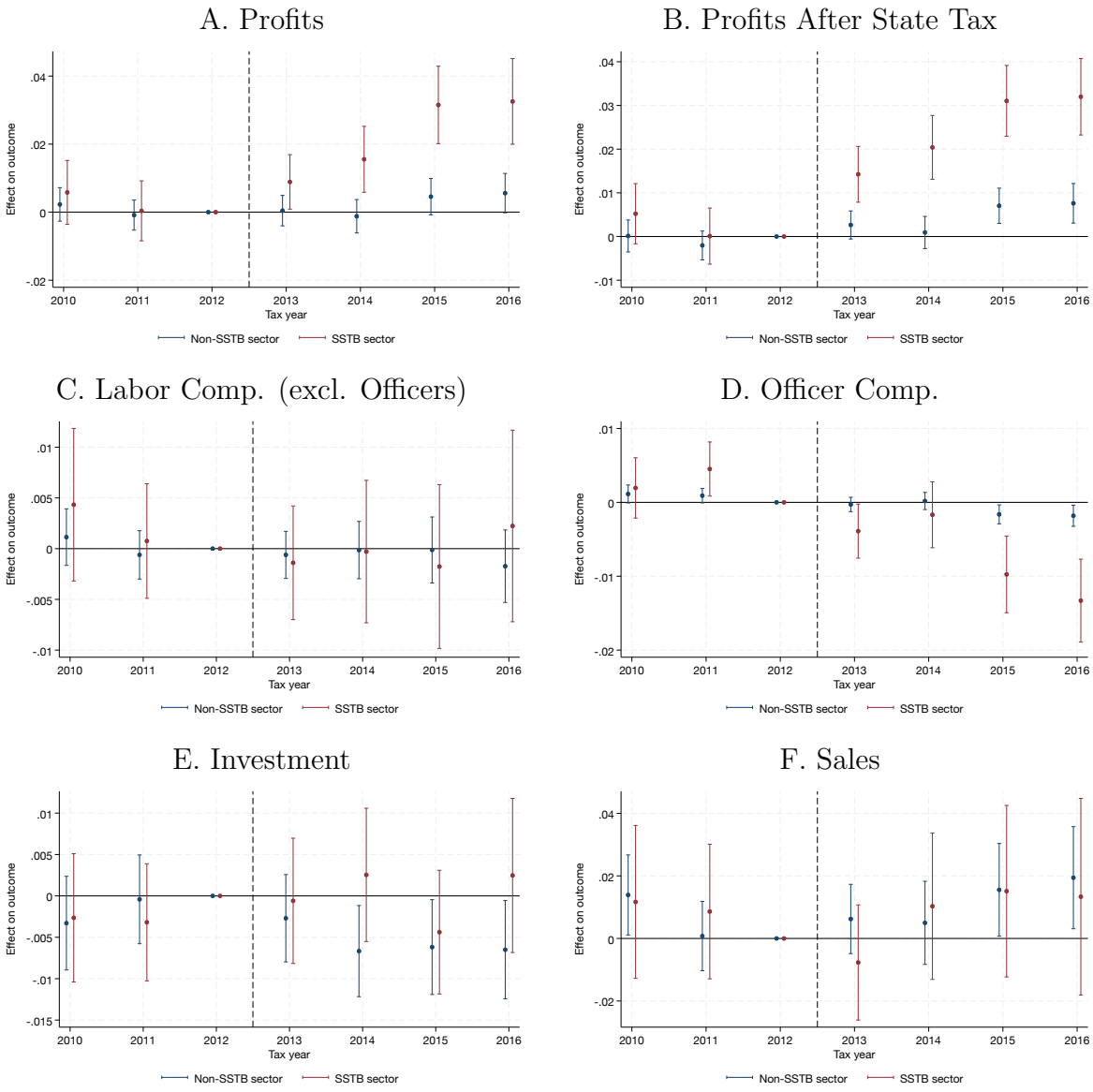
Notes: These graphs depict our baseline dynamic difference-in-differences estimates for the Kansas 2013 reform for top-quartile and bottom-quartile sales firms. Firm sales quartiles are computed using 2012 (year prior to reform) sales.

Figure A10. Impacts of the Kansas (2013) Reform: Heterogeneity by Employment



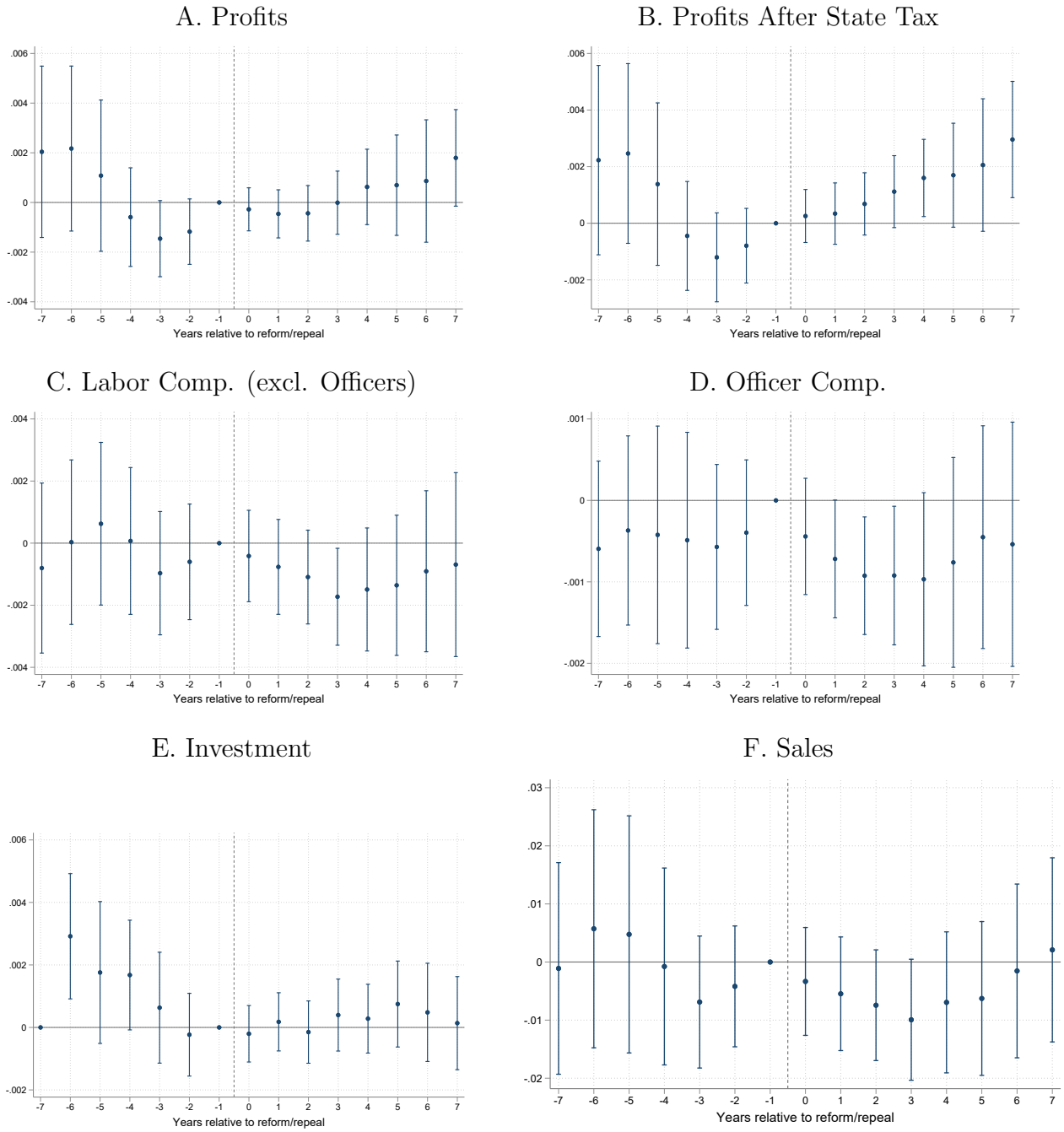
Notes: These graphs depict our baseline dynamic difference-in-differences estimates for the Kansas 2013 reform for top-quartile and bottom-quartile sales firms. Firm sales quartiles are computed using 2012 (year prior to reform) sales.

Figure A10. Impacts of the Kansas (2013) Reform: Heterogeneity by SSTB Sector



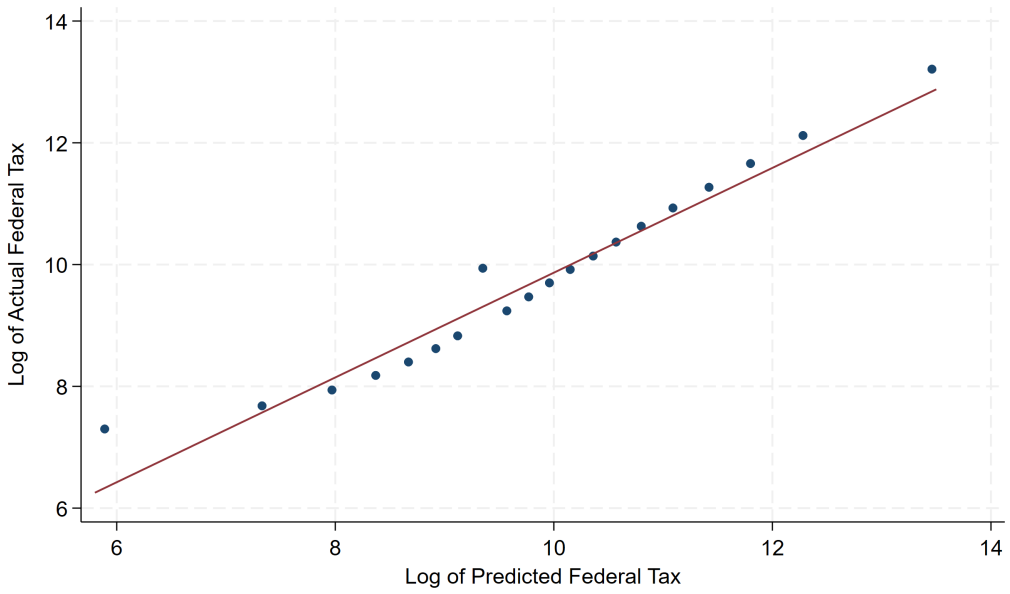
Notes: These graphs depict our baseline dynamic difference-in-differences estimates for the Kansas 2013 split by industries likely to represent specified services trades or businesses (SSTBs), using the classification provided by Goodman et al. (2021).

Figure A12. Stacked Difference-in-Difference Estimates: Long-Horizon



Notes: These graphs depict our stacked difference-in-differences estimates with over a longer horizon pre- and post-reform (+/- 7 tax years).

Figure A13. Actual vs. Predicted Logged Federal Tax



Notes: This figure is a binned scatterplot documenting the relationship between observed federal income tax liabilities (y-axis) and TAXSIM-imputed federal tax liabilities (x-axis) for all business owners in the Kansas (2013) analysis sample.

Table A1. Business Outcome Definitions and Sources

Outcome	Outcome Definition	Line Item on Federal Tax Return		
		Partnerships (Form 1065)	S Corporations (Form 1120-S)	C Corporations (Form 1120)
Profits	Ordinary business income/loss (pass-through); taxable income (C-corps)	1065, line 23	1120S, Line 22	1120, line 23
Profits after tax	Profits less state taxes*	N/A: See Data Appendix Section XX		
Tax on business income	State and federal tax liabilities attributable to business income	N/A: See Data Appendix Section XX		
Sales	Gross receipts or sales less returns	1065, line 1C	1120S, line 1C	1120, line 1C
Employment	Count of persons receiving positive W-2 earnings	Sum of unique W-2 recipients with positive earnings		
Labor Compensation	Labor compensation excluding officers	1065, line 9	1120S, line 8	1120, line 13
Officer Compensation	Officer compensation or guaranteed payments to partners	1065, line 10	1120S, line 7	1120, line 12
Investment	Cumulated from Form 4562	Derived from Form 4562		

Notes: This table describes the primary business outcomes that we examine in our quasi-experimental research designs. T
the text; the second column provides a short description of this outcome in the sense that it is defined on business tax returns
where line from each corporate return corresponding to this variable, which can vary depending on whether a given business is

Table A2. Event Studies in Pooled Reforms

State	Year	Magnitude (p.p.)	Neighboring Control States
A. Pass-through Business Income Tax Reforms			
New Jersey	2004	2.6	xx
Maryland	2008	1.5	xx
Connecticut	2009	1.5	xx
Illinois	2011	2.0	xx
California	2012	3.0	xx
Minnesota	2013	2.8	xx
Kansas	2013	-6.2	xx
Kansas	2017	5.2	xx
B. Corporate Income Tax Reforms			
Vermont	2007	-1.25	xx
Kentucky	2008	-1.25	xx
Maryland	2008	1.3	xx
Connecticut	2012	1.5	xx

Notes: This table describes the state tax reform episodes that are included in the analysis for our stacked difference-in-differences design in Section 3.

Table A3. Business Summary Statistics (sales-normalized outcomes)

Outcome	Mean	SD	p1	p25	p50	p75	p99
A. Kansas (2013) reform							
Profits / sales	0.054	0.282	-0.864	-0.005	0.039	0.127	0.832
Investment / sales	0.088	0.199	0.000	0.004	0.024	0.087	1.133
State business taxes / sales	0.003	0.007	0.000	0.000	0.000	0.004	0.037
Profits after tax / sales	0.051	0.247	-0.911	-0.005	0.038	0.123	0.832
Officer comp. / sales	0.088	0.125	0.000	0.000	0.043	0.121	0.608
Non-officer labor comp. / sales	0.187	0.204	0.000	0.048	0.137	0.264	0.943
B. Kansas (2017) repeal							
Profits / sales	0.052	0.304	-0.995	-0.007	0.041	0.135	0.860
Investment / sales	0.093	0.214	0.000	0.004	0.026	0.090	1.209
State business taxes / sales	0.004	0.007	0.000	0.000	0.000	0.004	0.039
Profits after tax / sales	0.049	0.270	-1.046	-0.007	0.040	0.130	0.852
Officer comp. / sales	0.087	0.122	0.000	0.000	0.043	0.119	0.590
Non-officer labor comp. / sales	0.200	0.210	0.000	0.057	0.150	0.279	0.998
C. Pooled state pass-through income tax reforms							
Profits / sales	0.037	0.303	-0.904	-0.008	0.028	0.100	0.706
Investment / sales	0.077	0.174	0.000	0.003	0.021	0.077	0.917
State business taxes / sales	0.003	0.007	0.000	0.000	0.000	0.002	0.035
Profits after tax / sales	0.035	0.242	-0.953	-0.008	0.027	0.097	0.705
Officer comp. / sales	0.103	0.147	0.000	0.000	0.051	0.138	0.690
Non-officer labor comp. / sales	0.192	0.223	0.000	0.049	0.136	0.266	1.021

Notes: This table presents additional summary statistics for the samples of businesses used in our empirical analysis, analogous to Table 1. Business are outcomes normalized by *pre-period* (i.e., 2012 for the Kansas 2013 reform sample in Panel A) sales, the outcomes that we use for our empirical design. Panel A presents summary statistics for the cross-section of Kansas businesses in the tax year 2012 (year prior to reform). Panel B presents summary statistics for the cross-section of Kansas businesses in the tax year 2016 (year prior to repeal). Panel C presents summary statistics in our pooled "stacked" sample of firms in the year prior to the reform. See Section 2 for additional information on the analysis samples and variable definitions.

B Data Appendix

This appendix describes our data, analysis samples, and outcomes in additional detail.

B.1 State Tax Liabilities with TAXSIM

We use TAXSIM35, developed and maintained at the NBER, to estimate state individual income tax liabilities from the information we observe on business owners' federal tax returns. The purpose of TAXSIM is to allow researchers to determine federal and state individual income tax liabilities from income information commonly found in survey data. We use an "offline" implementation of TAXSIM35 to impute state tax liabilities from information present on federal tax returns.[9]

We start by assembling a person-tax year panel comprising all individual federal income tax filers in our sample. For each taxpayer-year, we assemble their adjusted gross income (Form 1040, line 11), W-2 (labor) income (Form 1040, line 1a), capital gains (Form 1040, line 7), and total Schedule E (business) income (Form 1040 Schedule E, line 41). We also collect information on each taxpayer's filing status, state of residence, age, age of spouse, and number of dependents. We feed this information directly into TAXSIM, which expects these variables to be named in a certain way. Specifically, we assign Schedule C and E income to 'otherprop', capital gains to 'stcg' and 'ltcg', labor income to 'pwages', and other income to 'nonprop'.

TAXSIM takes this information and the history of state tax schedules and returns a panel comprising federal and state individual income tax liabilities for each taxpayer-year. We can assess the quality of this imputation (as an estimate of unobserved state tax liabilities) in two ways. First, we can compare how the time series of state individual income tax revenue (derived by aggregating individual tax liabilities within state of residence and tax year) compares against publicly-available information on state individual income tax revenue. (imputed by TAXSIM from this data) compares against publicly available information on tax returns. This is documented in Figure 2, Panel B, which compares individual income tax revenue in Kansas from public sources (e.g. the Kansas Department of Revenue) against the sum of individual state income tax liabilities in Kansas over time. The two series fit remarkably well in levels and in changes, displaying essentially the same behavior before, during, and after the Kansas experiment. Second, we can compare TAXSIM's *federal* income tax liability against each taxpayer's actual (realized) federal income tax liabilities, which we observe directly. (XX awaiting figure outside)

With these individual (business-owner) level state tax liabilities in hand, we next aggregate them at the business level in order to define a business-level "post-tax profits" outcome by subtracting this measure of business-level tax liabilities. For each business owner, we compute their state tax liabilities *with* and *without* pass-through business income, and interpret the difference in tax liabilities as the marginal tax liability on pass-through income. For business owners who operate more than one business, we divide this liability in proportion to their share of ordinary business income associated with each business, and sum the total liabilities attributed to each business across business owners.

[9]We thank Daniel Feenberg at NBER for technical assistance on the offline implementation of TAXSIM.

B.2 Business-Level Outcomes

This section describes additional information on how business-level outcomes are defined in our data.

Investment. We use Form 4562, the federal tax form bsuinesses use to claim deductions for the depreciation and amortization of assets, to measure *gross* investment in tangible assets.

Form 4562 is a federal tax form used by businesses to claim tax deductions for the depreciation and amortization of assets. We define (gross) investment as the cost of a firm's newly-purchased assets in a given tax year. We measure this on Form 4562 by summing the basis for depreciation on assets placed in service in a given year, Section 179 expenses, and bonus depreciation. Form 4562, Part III, Section B, column (c) (lines 19a-19i, 20a-20d) reports the basis for depreciation on assets placed into service in a given tax year subject to the Modified Accelerated Cost Recovery System (MACRS), the standard depreciation system governing business expensing for federal tax purposes in the U.S. Section 179 expense deductions allow businesses to deduct the *full* value of an asset in the year of purchase rather than depreciating the asset over time; assets expensed under Section 179 are thus not subject to MACRS. Lastly, we include bonus depreciation, since bonus depreciation reduces the basis for assets reported under MACRS.

Investment is observed for any business in our sample that e-files Form 4562. Our coverage for this outcome increases over tax years. In the tax year 2010, approximately 30% of businesses in our "Kansas" sample have non-missing investment; by 2020, this increases to 70%.