Journal of Public Economics 242 (2025) 105275

Contents lists available at ScienceDirect

Journal of Public Economics

journal homepage: www.elsevier.com/locate/jpube

Correlation in state and local tax changes☆

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ARTICLE INFO

JEL classification:
H20
H71
H72
H77

Keywords:
Local tax
State tax
Income tax
Corporate tax
Sales tax
Property tax
Excise tax

ABSTRACT

Empirical research in public economics, including our own, often uses variation in state and local taxes as an empirical laboratory to estimate causal relationships. A key concern is that other taxes might change at the same time. To assess this concern, we develop a dataset of state (1977–2022) and local (2000–2022) tax rates and revenue from personal income, corporate income, property, sales, and excise taxes. This new dataset generates two key results. First, we find that taxes of different types tend to co-move within a jurisdiction: a tax change of one type can more than double the likelihood of a second tax type changing in the same year. Local tax changes also co-move with tax changes enacted by the state they are located in. This positive correlation can upwardly bias elasticity estimates, but only moderately. For example, regressing state economic outcomes on the full set of state tax changes yields elasticities that are about 10%–30% smaller than those obtained from using a single tax type in isolation. Second, we document that the mix of taxes across state and local jurisdictions is very different, and that these differences have become more pronounced over time as jurisdictions have increasingly become reliant on the single tax type — sales, personal or corporate income tax — that was most prominent for them in the earliest part of our sample.

1. Introduction

The United States contains a wide range of tax jurisdictions at all levels of government. While the national government commands the lion's share of attention and tax revenue, state and local jurisdictions also levy taxes of many types. There exists substantial variation in the types of taxes levied both over time and across jurisdictions. Some states, for instance, rely mostly on sales tax revenue, while others depend mostly on revenue from personal income taxes. Local jurisdictions, on the other hand, generally generate most revenue from property tax, but increasing numbers see substantial revenue coming from sales taxes, as well.

Many papers in economics, including some written by the authors, use this variation in state and local tax policies as an empirical laboratory to estimate causal relationships, such as the intertemporal elasticity of consumer spending or the elasticity of labor supply. When presenting such results, a perennial concern is whether other tax or regulatory changes were occurring at the same time.

To answer this question, we assemble and aggregate, to our knowledge, the most complete set of state and local tax rate and revenue data across every major type of tax (personal income, property, corporate income, sales, estate, and excise taxes) going back to 1977 for state level and to 2000 for local level taxes. Using this comprehensive database, we analyze the distribution of state and local taxes over time and across the range of jurisdictions we observe to establish two key results.

First, leveraging the fact that we observe taxes of all types, we examine whether and how the various tax types tend to co-move within a given state or local jurisdiction to answer this common concern of papers that use state or local tax variation to estimate causal relationships. Looking at states, we measure the extent to which taxes of one type are changed concurrently (within the same year) with taxes of another type. We find that when one type of state tax rate changes, the probability of other tax rates changing within that same state approximately doubles. This holds true for all major state tax types—personal income taxes, corporate income taxes, and sales taxes. We find

☆ We wish to thank Danny Yagan (the editor) and two anonymous referees for very helpful comments that substantially improved an earlier version of this paper, Ariza Gusti and Shreya Bhardwaj for superb assistance in collecting and assembling the data, and Thomas Brosy for graciously sharing his property tax data.

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https://doi.org/10.1016/j.jpubeco.2024.105275
Received 29 July 2024; Received in revised form 20 November 2024; Accepted 26 November 2024
Available online 6 January 2025

that most of this effect occurs within the same year, though tax rates of other types are also more likely to be adjusted in the year following the initial tax change.

We show that this positive correlation can upwardly bias elasticity estimates, but only moderately so and not in a statistically significant way in our sample. Regressing state economic outcomes, such as employment or the more comprehensive 'State Coincident Indexes' of the Federal Reserve Bank of Philadelphia, on the full set of state tax changes yields elasticities that are 10%–30% smaller than those obtained from using a single tax type in isolation.

Second, we find that there is substantial variation across both geographies and over time in which types of taxes predominate. Focusing on changes within locations, we document large fluctuations in tax rates. In general, our sample period saw a trend towards greater concentration on sales taxes while reducing both personal and corporate income tax rates across states. Moreover, over this period, both states and local jurisdictions tend to concentrate their revenue sources. That is, a jurisdiction that receives most of its revenue from personal income taxes at the beginning of the sample tends to become even more reliant on this source by the end of the sample in 2022. We demonstrate this tendency to concentrate on a single tax type in terms of tax rates, as well as tax revenue. Tax rates tend to increase more for the tax type that was already dominant in a state in a previous period.

Relative to the effects seen at a state level, these patterns are also present but are less pronounced at a local level. Rather than a tax change of one type doubling the probabilities for changes in other types, we see increases in probabilities of only 20%–25%. Similarly, we see somewhat elevated probabilities of tax rate changes following state recessions and substantial declines in state-level fiscal transfers. The effects are present both in the same year and the year following the original tax rate change.

While these correlated tax changes across tax types tend to be less frequent at a local level, we also see large increases in the probability of a change in tax rates among local jurisdictions following state level changes in rates. In particular, local tax rates of a given type respond strongly to changes in state level tax rate changes of the same type. For instance, following changes in state-level sales tax rates, the probability that local sales tax rates will change more than doubles. We see similar effects for personal and corporate income tax rate changes, as well. Some of these local rate changes are in the same direction as the state-level change, amplifying the effect, while some are in opposition to the state-level change, diminishing the state change's effect. Local sales taxes are especially prone to exhibit offsetting changes to state-level sales tax changes, corresponding well with the border tax gradient effects documented by Agrawal (2015).

Our paper is related to and builds on several strands in the public economics literature. First, there is growing interest in uncovering basic facts regarding the different avenues utilized by sub-national governments in taxing businesses and individuals, both cross-sectionally and over time (e.g., Gravelle, 2007; Suárez Serrato and Zidar, 2018; Fleck et al., 2021; Robinson and Tazhitdinova, 2022; Derenoncourt, 2023). For example, Suárez Serrato and Zidar (2018) documents facts about the state corporate tax structure (tax rates, base rules, and corporate tax credits). We conduct a similar exercise but consider a wider array of state and local taxes. In subsequent work, Robinson and Tazhitdinova (2022) extends our data and analysis of state taxes to the beginning of the 20th century.

In a similar vein, Gravelle (2007) documents the incidence of the property tax at the state-level and discovers large heterogeneity across households and locations. Second, there is a recent interest in how taxation affects the spatial allocation of businesses and households, generally utilizing state level tax changes as exogenous source of variation (e.g., Becker et al., 2012; Suárez Serrato and Zidar, 2016; Fajgelbaum et al., 2018). With our work, we hope to enable a more comprehensive and local approach to estimating firm and worker location choices which typically depend on the full menu of state and local taxes, not just on one. Finally, we contribute to the empirical literature on fiscal spillovers among neighboring jurisdictions (e.g., Case et al., 1993; Brülhart and Jametti, 2006; Isen, 2014) by also exploring how tax rates co-move within and across states.

The remainder of the paper proceeds as follows. Section 2 discusses the data sources used to build the state and local tax database. Section 3 discusses the correlation in tax changes of various types at both a state and local level, noting some political drivers of these correlations. Section 4 studies the trends in concentration of state and local taxes over time, both in terms of rates and revenue. Section 5 concludes.

Table 1
Summary statistics – State and local tax revenue shares.

Tax type	# Obs.	Mean	1st	10th	25th	50th	75th	90th	99th
Panel A: State tax revenue shares, 1977–2021									
Sales tax	2295	0.31	0.00	0.12	0.24	0.31	0.38	0.50	0.61
Income tax	2295	0.29	0.00	0.00	0.21	0.32	0.40	0.48	0.66
Excise tax	2295	0.10	0.02	0.06	0.08	0.10	0.12	0.15	0.22
Corporate Inc. Tax	2295	0.06	0.00	0.02	0.04	0.06	0.08	0.10	0.25
Property tax	2295	0.03	0.00	0.00	0.00	0.00	0.03	0.09	0.33
Panel B: Local tax revenue shares, 2000–2021									
Property tax	66,378	0.82	0.32	0.56	0.72	0.86	0.98	1.00	1.00
Sales tax	66,378	0.10	0.00	0.00	0.00	0.02	0.16	0.31	0.59
Income tax	66,378	0.02	0.00	0.00	0.00	0.00	0.00	0.05	0.31

Notes: Both panels exclude 'other' taxes such as severance taxes, transfer taxes, inheritance taxes and some license fee revenue. The revenue share from these other taxes is relatively small.

2. Data

We utilize sources such as NBER TaxSim, Tax Foundation, CCH CorpSystem, state and local level tax authority websites (typically the department of revenue or equivalent body), as well as data from other research. For each state and local tax type, we collect annual data going back in time as far possible. Local jurisdictions include everything from city and county governments to overlapping taxing geographies defined by local school boundaries, water and fire districts, or even specially constructed business tax districts. For instance, sales taxes are widely applied not only at state but also at local levels, with the number of unique taxing jurisdictions standing at over 10,000 today.

This diverse set of sources allows us to generate and make available to other researchers, to our knowledge, the most complete set of state and local tax rates that has been assembled. We link this data to a government financial database that allows us to track revenue for counties and states for each individual type of tax and revenue source. Additionally, we collect data on state and local economic conditions such as employment and recession indicators. We also obtain data on state and local political voting data and both legislative and executive electoral outcomes. We track the party of the state governor and state legislative houses as well as their partisanship as measured by Shor and McCarty (2011).

We aggregate local tax rates to the county level as this represents a stable and well-defined geographic mapping that is non-overlapping and corresponds well to other available measures of governmental oversight and economic activity. While counties themselves are non-overlapping, some of the tax jurisdictions that we study (e.g., a fire district or even a city) may partially reside within multiple counties.

Table 1 provides summary statistics of tax revenue shares at the state level (mostly from 1977–2022) and at the local level (mostly from 2000–2022). At the state level, the average shares for the different taxes are ranked as follows: sales (average share of 31%), personal income (29%), excise (10%), corporate income (6%), and property (3%). The remaining tax revenue comes from other sources which are diverse and typically make up only a small share of total revenue, such as severance taxes, transfer taxes, inheritance taxes, or license fee revenue.

Table 2
Summary statistics – State and local tax rates.

Tax type	# Obs.	Mean	1st	10th	25th	50th	75th	90th	99th
Panel A: State taxes, 1978–2022									
Sales tax	2200	4.6	0.0	2.0	4.0	5.0	6.0	6.5	7.3
Income tax: Median rate	2200	3.8	0.0	0.0	3.0	4.0	5.2	6.5	8.0
Income tax: Top rate	2200	5.7	0.0	0.0	3.8	6.0	7.9	9.9	14.0
Corporate income tax	2200	6.6	0.0	2.3	5.5	7.0	8.7	9.5	12.0
Property tax	2200	0.13	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Panel B: State taxes – Non-zero rates									
Sales tax	1978	5.1	2.9	4.0	4.0	5.0	6.0	6.5	7.3
Income tax: Median rate	1800	4.7	2.0	3.1	3.6	4.6	5.5	6.6	8.0
Income tax: Top rate	1800	7.0	2.4	4.4	5.0	6.7	8.5	10.0	14.0
Corporate income tax	1992	7.3	2.4	5.0	6.0	7.3	8.8	9.8	12.0
Property tax	189	0.03	0.00	0.00	0.01	0.01	0.03	0.12	0.14
Panel C: Local taxes, 2003–2022									
Sales tax	39,400	1.5	0.0	0.0	0.0	1.3	2.3	3.6	5.3
Property tax	39,400	1.49	0.1	0.5	0.9	1.3	2.0	2.7	4.0
Income tax: Mean rate	39,400	0.2	0.0	0.0	0.0	0.0	0.0	0.7	2.8
Panel D: Local taxes – Non-zero rates									
Sales tax	28,325	2.1	0.1	0.7	1.0	1.9	2.9	4.0	5.4
Property tax	39,400	1.49	0.1	0.5	0.9	1.3	2.0	2.7	4.0
Income tax: Mean rate	4702	1.5	0.2	0.6	0.9	1.3	2.0	2.6	3.2

Table 2 shows corresponding summary statistics for statutory tax rates at the state and local level. Unlike the states, counties are predominantly financed by property tax revenue: the average share of revenue for counties from property taxes is 82%, from sales taxes 10%, and from personal income taxes 2%. Because many jurisdictions do not impose some types of taxes, there are many zeros in our data. We therefore provide summary statistics for both the entire sample (panels A and C) and conditioning on jurisdictions with positive rates (panels B and D).

Fig. 1 illustrates variation in average state- and county-level tax rates in various types of taxes. Of note is the fact that there is generally little correlation in tax rates across tax types within a given state. Many states tend to concentrate tax collection in certain tax types rather than smoothing across all tax types. For instance, Texas has no income taxes but high sales tax rates. In contrast, Oregon has high personal income taxes but no sales tax. Other states possess high or low tax rates across all types. For instance, California has relatively high sales taxes, personal income taxes, and corporate income taxes at the state level, while Alaska has no or only low state tax rates across the board largely due to income from severance taxes on the extraction of oil and natural gas resources (Kueng, 2018), reflected in our dataset as unusually large excise tax revenue. Across all states, the correlation between sales tax rates and average personal income tax rates within states — the two most common types of state-level taxes — is less than 0.05.

The right panel of Fig. 1 maps out average local tax rates by county across the three primary local tax types: sales taxes, personal income taxes, and, most importantly, property taxes. We see wide ranges in applicable tax rates in each type, with property taxes being the most prevalent and personal income taxes being levied in comparatively few local jurisdictions.

2.1. Property taxes

Property tax rates turn out to be the most difficult taxes to collect data on. The primary source of data for our annual statutory property tax rates (millage rates) are comprehensive hand-collected county-level records. We transcribed and aggregated this data from annual reports provided by a state agency on a state-by-state basis (typically the department of revenue or an equivalent state-level body).

While property tax rates are on average under 3% of state tax revenue, they contribute on average over 80% to total county level tax revenue (Table 1). Property tax rates are typically set annually, and taxes change frequently as property is reassessed. The mean local (state) property tax rate in our sample is 1.5% (0.1%) and the median is 1.3% (0%); see Table 2.

2.1.1. State property taxes (2000–2022)

The majority of states collect no state-level property taxes. We collect state property tax rates for all states that report obtaining at least 1 percent of their total tax revenue from property taxes, which includes 5 states in 2000, 8 states in 2001, and 9 states (AL, AZ, GA, KY, MD, MI, MT, NV, WA) for 2002–2022.

2.1.2. Local property taxes (2003–2022)

At the local level, we collect rates for all counties outside of Alaska, Kentucky, and Oklahoma for the years 2003–2015 and for counties in California, Colorado, Florida, Illinois, Maine, Nebraska, New York, Ohio, Utah for the years 2016–2022. The level of aggregation in the data varies by state but most report millage rates by overlapping taxing districts (county, school, city, state, special infrastructure districts) and by property class when applicable (e.g., residential, commercial, industrial). We then merge our dataset with the one developed in Brosy (2021) in states where our methodology overlaps, which allows us to further extend the time series for 11 states. In total, we obtain millage rates for 44,000 county-by-year observations.

We use the value-weighted average total residential county-level tax rates reported in these annual reports for 26 states (method 1). For the remaining 24 states that only report rates by taxing districts within the county, we compute the total local millage rate as the median total rate that an urban residential property owner inside a given county would face as (method 2):[1]

$$rate_{it} = countywide_{it} + median(schools)_{it} + median(cities)_{it},$$

where i denotes county and t denotes the year.

Aggregate property values per taxing district were not readily available in the documents we examined for all states. Thus, we cannot compute value weighted averages for our full sample. To understand what sort of bias we face by using medians of rates for method 2 states, we gather the necessary data and compute rates using *both methods* for one large state, Texas, between 2000–2016. In total, we have data for all 254 counties in Texas and 32 different classes of jurisdictions (schools, cities, county, fire districts) for approximately 5000 rates and taxable values per year. The median number of jurisdictions in a county

[1] Method 1 applies to the following states: AK, AZ, AR, CA, CO, FL, HI, ID, IL, KS, LA, ME, MS, MT, NE, NV, NM, NY, ND, OH, OK, OR, UT, VA, WA, and WY. Method 2 applies to: AL, CT, GA, IN, IA, KY, MD, MO, NC, PA, SC, TX, WI, DE, IN, MA, MN, NH, NJ, RI, SD, TN, VT, and WV.

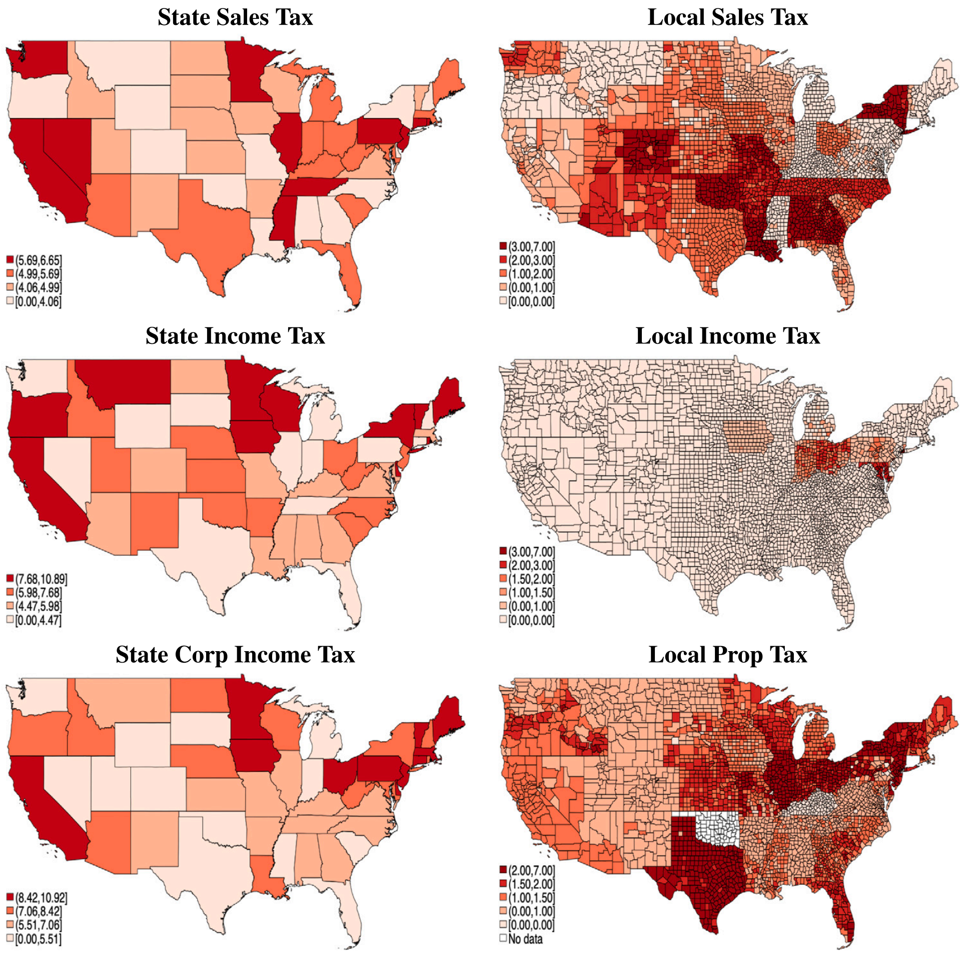


Fig. 1. Average major tax rates by state (1977–2022) and county (2000–2022). *Notes:* Maps show average tax rates of the stated types across the entirety of the sample for a given state or county. Alaska and Hawaii are represented in the data but not in the maps to save space. 'State Income Tax' refers to an average state personal income tax rate, calculated as (lowest bracket rate + highest bracket rate)/2. 'Local Income Tax' represents the mean local income tax rate in the county. The corporate income tax shown is the maximum rate due to the fact that most corporate rates have very low baselines and very few brackets.

is 10. We compute both the absolute and level difference between the two methods as:

$$AbsError_{it} = \frac{|\text{median}_{it} - \text{average}_{it}|}{0.5(\text{median}_{it} + \text{average}_{it})},$$

$$LevelError_{it} = \frac{\text{median}_{it} - \text{average}_{it}}{0.5(\text{median} + \text{average}_{it})}.$$

The mean of the level errors is only 0.2% in our sample, which gives us confidence that we are not systematically biasing our sample by combining rates computed by two distinct methods in our analysis. The mean of the absolute error is 7.1% and has a correlation coefficient of 0.98 with the level error. Hence, the measurement error introduced by using different methods is likely modest, overall.

The rates we collect are applied to assessed property values which are the product of estimated market value and an assessment ratio that varies by state. Thus, in order to compare the levels of millage rates across states, we collect state-level assessment ratios and transform our rates into effective rates per dollar of house value. We then manually checked a sample of data for a range of state-year observations and it did not appear that these ratios varied over our sample period.

To illustrate, consider the case of Autauga County, AL in 2003. State records show a total county-wide millage of 10.5 dollars per \$1000 of assessed value (mills).[2] The county also encompasses two school districts (District 1 and 2, both levy 7 mils), and three municipalities (Prattville, Billingsley, Millbrook with levies of 7, 7, and 5, respectively). The assessment ratio is 10%. Thus, the property tax rate for Autauga County in our database shows up as: $10\% \times \frac{10.5(\text{County})+7(\text{Median District})+7(\text{Median Municipality})}{1000} = 0.245\%$.

2.2. Personal income taxes

2.2.1. State income taxes (1977–2022)

We collect state income tax rates from the NBER TAXSIM simulation model for the years 1977–2021 and hand-collect them from state publications for 2022. The NBER TAXSIM model maps inputs about household characteristics to yield marginal and average tax rates for a given taxpayer. We utilize the model solely to learn about statutory state-level income tax rates and their associated income thresholds. For the purposes of this paper, we focus on two dimensions of these state level taxes: the maximum marginal personal income tax rate and the median marginal rate paid by taxpayers in each state. We checked the consistency of these rates by comparing our data with that from Suárez Serrato and Zidar (2018) and manually corrected any discrepancies.

The average state-level (median) personal income tax rate among states that impose such a tax is 4.7% with a median of 4.6%. The average top statutory rate is 7.0%, with a median of 6.7%.

2.2.2. Local income taxes (2000–2022)

We hand-collect information on local personal income tax rates from state, county, and city government reports in Delaware, Indiana,

[2] 'millage', derived from the Latin word millesimum, means thousandth, with 1 mill being equal to 1/1000th of a dollar.

Iowa, Maryland, Michigan, Missouri, New Jersey, New York, Ohio, and Pennsylvania.[3] These rates are levied by cities, counties, and school districts. In general, local income taxes are relatively rare, with fewer than 20% of all counties having any local income tax levied within their jurisdiction. Our data from these six states captures between 370 and 394 counties per year between 2000–2020, and 100 counties in 2021–2022.

The aggregation procedure follows that utilized for property millage rates. For overlapping local tax districts, we compute the personal local income tax rate as the median rate faced by workers within all taxing districts inside a county.

Additionally, Iowa school districts and Yonkers, NY levy a personal income tax rate as a surtax on the state income tax bill. We report both the statutory surtax rates as well as the statutory rate multiplied by the maximum marginal income tax rate at the state level. As a final check, we compare our data with that of two reports from the Tax Foundation and our data match theirs perfectly where they overlap.[4]

The average local income tax rate in our sample of counties (outside of surtax counties) that have a local income tax is 1.5% (Table 2, panel D) with a median of 1.3%.

2.3. Sales taxes

For data on sales tax rates, we combine the CCH CorpSystem sales tax service, which we previously used in Baker et al. (2018, 2021), with Tax Foundation data, sales tax rates reported in Suárez Serrato and Zidar (2018), and data scraped from the online Sales Tax Deduction Calculator provided by the IRS.

2.3.1. State sales taxes (1975–2022)

At the state level, we use data from Suárez Serrato and Zidar (2018) for the years 1975–1998, from CCH for the years 1999–2015, and from the Tax Foundation for the years 2016–2022. The median sales tax rate across our common sample period is 5.0% with an average tax rate of 4.6%.

2.3.2. Local sales taxes (2003–2022)

At the local level, the CCH source allows us to construct a national database of ZIP code level sales tax rates at a monthly frequency from 2003–2015. The data contains comprehensive information on all sales taxes imposed in a given ZIP code. These include sales taxes that originate from many different geographic and administrative levels: states, counties, cities, and special tax districts like school or fire or water districts. Moreover, there is sufficiently detailed information to disentangle the combined sales tax in a ZIP code from the sum of all local taxes. These two figures may differ due to statutory maximum sales taxes imposed at a state level (e.g., the state sales tax rate is 6% and local sales tax rates add up to 2%, but the state also mandates a maximum combined state and local sales tax rate of 7%). In addition, occasionally the tax rate of one jurisdiction overrides the sales tax rate of a different jurisdiction. For the years 2016–2022, we use the Sales Tax Deduction Calculator to compile zip-code level local sales tax rates.[5]

In the United States, on average, a household is subject to about 6 separate overlapping local tax jurisdictions. For local sales taxes, we handle the aggregation of data to a county-level using 2010 zip-code population weights. That is, the county-level estimates are a weighted average of all local sales taxes across zip-codes that lie within that county.

The median local sales tax rate across our common sample period is 1.3% with an average tax rate of 1.5%. Since many locations do not impose any sales tax, the tax rate is substantially higher among local jurisdictions with non-zero rates: 2.1% on average with a median of 1.9%.

2.4. Corporate income taxes (1978–2022, states only)

We obtain annual state level corporate income tax rates from the Tax Foundation for the years 2002–2022 (Tax Foundation, 2023) and from Suárez Serrato and Zidar (2018) for the years 1978–2001. Specifically, we gather information on the maximum and minimum income tax rates and bracket levels for bank and non-bank corporations as well as the number of tax brackets. All states except for Nevada, South Dakota, Washington, and Wyoming levied a corporate income tax in our sample period. We do not include local corporate income taxes because, to the best of our knowledge, only local jurisdictions in Ohio and a handful of other cities impose them, and they tend to contribute only a small share to those jurisdictions' tax revenue.

The maximum corporate tax rate has a mean of 6.6% (median of 7.0%) across states over the entire sample periods, a minimum of 1.9% among states with positive rates (Michigan), and a maximum of 12.25% (Pennsylvania). Over 90% of the states have four or fewer tax brackets. For the few cases where our data differs from Suárez Serrato and Zidar (2018), we manually check state annual reports and report the rate disclosed there.

2.5. Excise taxes (1982–2022, states only)

Excise taxes are taxes levied on a relatively small number of specific goods and activities by states and the federal government, but not by local jurisdictions, and they are typically included in posted prices for goods. Some of the most common excise taxes imposed by states are included in our data: good-specific taxes on beer, wine, liquor, cigarettes, and gasoline. All states impose excise taxes of some type, though the amounts and coverage of these taxes varies widely across states and over time, as well.

Excise taxes differ from other good-specific taxes like VATs or sales taxes in that they are not simple ad valorem taxes. That is, excise taxes are often levied on a volumetric or count basis. For instance, gasoline or wine is generally taxed by the gallon, regardless of the price of gasoline being charged by the retailer. Similarly, per-pack taxes on cigarettes are seen in all states. Ad valorem sales taxes (both state and local) are then imposed on top of these excise taxes.

We obtain excise tax data primarily from the Tax Foundation (Tax Foundation, 2018), which assembles the relevant statistics from organizations like the Distilled Spirits Council, the American Petroleum Institute, Bloomberg, and states' own budget documents. We supplement this data with some additional years of data hand-collected from state tax websites. In total, we have data for all states and Washington D.C. on gasoline taxes (2000–2022), alcohol (beer, wine, spirits) taxes (1982–2022), and cigarette taxes (2000–2017). Since many excise taxes are not simple ad valorem taxes and because the tax base is very heterogeneous across states, we do not report excise tax rates in Table 2.

2.6. State and local budgets (1977–2021)

Annual data on state and local government expenditure and taxation come from the Government Finance Database, a publicly available source which has standardized the Census of Governments from 1977 (for states) and 1967 (for local governments) onwards (Pierson et al., 2015). The data include detailed breakdowns of annual expenditures,

[3] We were unable to obtain county-level income tax rates for Kentucky and Alabama, the only other states in which local governments systematically levied an earned income tax rate. We also omit from our dataset isolated localities in West Virginia, Colorado, and various transportation districts in Oregon. We further omit the local intangible (capital) income tax imposed in Kansas counties.

[4] See, for example, Tax Foundation reports such as Bishop-Henchman (2008), Bishop-Henchman and Sapia (2011), and Walczak (2019).

[5] The calculator can be found at https://apps.irs.gov/app/stdc/.

taxes, debt, and assets by type and function (e.g., education, transportation, correction) for states, counties, municipalities, townships, special districts, and school districts. For years ending in 2 or 7, the Census Bureau collects data from the universe of taxing districts but restricts the sample to just the largest sub-state districts in intervening years.

We extract data on revenue collected from sales, excise (alcohol, gasoline, tobacco), corporate net income, personal income, and property taxes as well as total intergovernmental transfers (grants from federal or state to local governments). We aggregate data on county governments, school districts, municipalities, special districts, and townships to the county level. On average, we capture the near universe of sub-state taxing districts in years ending in a 2 or 7 (e.g., 2002, 2017) starting with the year 1977. Between 2000–2021 we report aggregated local budgets for at least 2948 counties at the annual level.

Table A.1 describes the changes in state and local revenue from different tax types following changes in those tax rates. Panel A estimates the relationship as an elasticity at the state-level—deriving the logged change in tax revenue as linked to the logged change in tax rates. Unsurprisingly, we find that increases in tax rates of any type drive tax revenue of that type upwards and vice versa. For instance, a doubling of the mean personal income tax rate leads to an increase in personal income tax revenue of approximately 51%. Panel B mirrors this exercise from Panel A using county-level tax data. In contrast to local sales and income tax revenue, property tax revenue is on average not sensitive to local rate changes. This is driven by the fact that property tax rates tend to adjust based on revenue requirements of a local jurisdiction, rather than revenue responding directly to rates. That is, property tax rates are often set on an annual basis by working backwards from local revenue needs and current property assessments. If local properties become more valuable but local budgets are unchanged, rates will generally fall to compensate and yield a null relationship between rates and revenue, on average.

3. Correlation of tax changes across tax types

3.1. Concurrent tax changes

We build this database combining state and local taxes across a number of important tax types primarily to enable a better understanding of how taxes of different types interact with one another and how they may move in concert. Much research has analyzed responses of households and firms to changes in the state and local tax rates that they face. However, most of this research focuses on a single tax type (e.g., responses of consumers to sales tax changes or responses of firms to changes in corporate tax rates). If tax rate changes of one type occur in conjunction with those of another type, focusing only on a single tax type may produce misleading estimates of economic impacts.

We start by analyzing state tax changes before turning to local taxes and their interactions with state taxes. Table 3 gives a summary of the relationship between tax rate changes of different types within a state. Each row shows the fraction of states that saw changes in the listed type of taxes when subject to the condition in columns (1) to (3). Panel A shows state tax changes occurring in the same year. Row 1 shows that unconditionally, 15% of states change income taxes each year during our sample period, 7% change sales taxes, and 9% change corporate income taxes.

Rows 2 to 4 show, for each of the three major state taxes, the correlation of concurrent tax changes across tax types. For instance, when there is a sales tax change in a state (row 3, column 1), 23% of states also see a change in personal income taxes in that year. In other words, a state is about 60% more likely to legislate a change in its personal income tax rate when there is a concurrent change in the state's sales tax rate (23% vs. 15%). Following a corporate tax rate change, we see that the probability of a personal income tax rate change is more than twice as high as in a random year (34% vs. 15%). For sales tax rates and corporate income tax rates, we find similar patterns. Following a change in one of the other major state tax rates, the probability of a sales or corporate income tax rate change increases by 50%–100%.

Table 3
Concurrent tax changes – State level.

	Fraction of taxes that changed:		
	Income tax (1)	Sales tax (2)	Corp. Inc. Tax (3)
Panel A: Fraction of states changing taxes in same year			
Unconditional fraction of tax changes	0.15	0.07	0.09
Concurrent with income tax change	1.00	0.11	0.19
Concurrent with sales tax change	0.23	1.00	0.16
Concurrent with corporate tax change	0.34	0.13	1.00
Panel B: Fraction of states changing taxes in same or next year			
Unconditional fraction of tax changes	0.24	0.13	0.15
Concurrent with income tax change	1.00	0.18	0.30
Concurrent with sales tax change	0.34	1.00	0.22
Concurrent with corporate tax change	0.41	0.18	1.00
Panel C: Budget pressure			
State recession	0.17	0.09	0.09
Federal budgetary shock	0.15	0.08	0.10

Notes: Each row shows the fraction of states that saw changes in the listed type of taxes when subject to the condition in the left-most column. That is, unconditionally, 15% of states changed income taxes in a given year (row 1). When there is a sales tax change in a state in a given year (row 3), 23% of states see an increase in income taxes in that year. Panel B reports the fraction of states changing taxes in *either* year t or year $t+1$ when a tax of a different type changes in year t. Panel C looks at years in which there is a decline in nominal federal transfers of more than 5% or if there is a decline in business activity in the state as measured by the Philadelphia Fed Coincident Index.

Panel B looks not just at the same year but at the fraction of states changing taxes in *either* year t or year $t+1$ when a tax of a different type changes in year t. Necessarily, baseline levels of concurrent tax changes are weakly higher with a more expansive definition of 'concurrent'. We again see substantial increases in the probability of one tax type changing following another tax type's change, with magnitudes ranging from 50%–100% higher likelihood of a tax change relative to the baseline of the unconditional probability of a tax change during this expanded window.

Table 4 further clarifies these relationships through the lens of panel fixed-effects regressions. Panel A examines the impact that personal income tax rate changes have on the likelihood of a tax rate change for non-personal income taxes (corporate income or sales taxes) in a given state and year. Column (1) includes year fixed effects and columns (2) and (3) add state fixed effects, as well. Panel A indicates that a non-income tax rate change is approximately 10 percentage points more likely to occur in a year with an income tax rate change than in a year with no income tax rate change. Column (3) restricts the income tax rate change indicator to be equal to one only for rate changes greater than or equal to one percentage point. For such large changes, we find even larger frequencies of coinciding rate changes of other tax types.

Panels B and C repeat this exercise separately for sales tax changes and corporate income tax changes. In both cases, we find significant increases in the likelihood of tax rate changes in years that feature a tax rate change of a different type. In all cases, larger tax changes are correlated with larger increases in the likelihood of a tax change of another type. Overall, given a base frequency of tax rate changes of under 10%–15%, depending on the tax type, these increases in rate change frequency are large and economically significant.

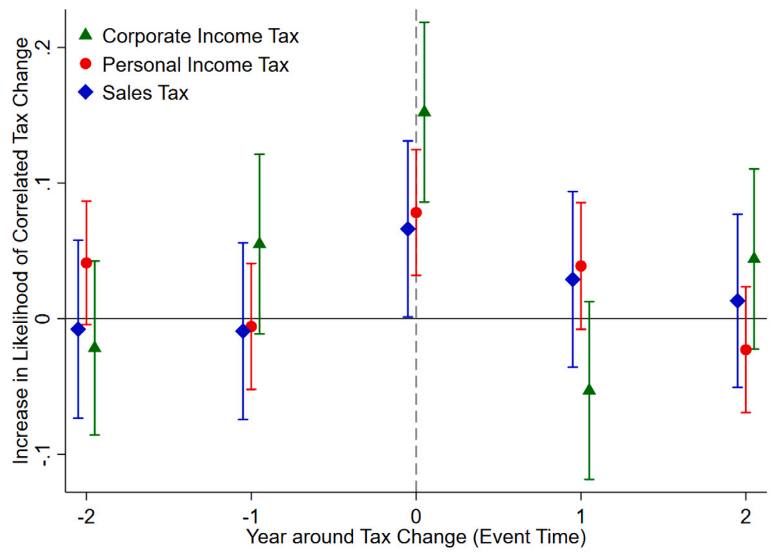


Fig. 2. Likelihood of a second tax change in years around tax change. *Notes:* This figure plots the results from three regressions in which the independent variables are binary indicators of contemporaneous, lagged, and future tax rate change of the listed type, while the dependent variable is a binary indicator for a change in a different tax type. For example, the green triangle point estimate at x-axis value zero means that, conditional on year and state fixed effects, if there is a change in corporate tax rates in a given year, then the likelihood of a second tax change in the same year of a different type increases by 15.2 percentage points. For personal income or sales tax changes, the increase in likelihood of another contemporaneous tax change is 7.8 and 6.5 percentage points, respectively. Data covers 1977–2022. 95 percent confidence intervals shown.

Table 4
Concurrent state tax changes.

	All tax changes		Large changes
	(1)	(2)	(3)
Panel A: Dependent variable – Non-income tax changes			
Income tax change	0.111***	0.0879***	0.168***
	(0.0204)	(0.0215)	(0.0341)
Observations	2231	2231	2231
Year FE	YES	YES	YES
State FE	NO	YES	YES
Panel B: Dependent variable – Non-sales tax changes			
Sales tax change	0.0892***	0.0662**	0.187*
	(0.0344)	(0.0332)	(0.105)
Observations	2149	2149	2149
Year FE	YES	YES	YES
State FE	NO	YES	YES
Panel C: Dependent variable – Non-corp tax changes			
Corp tax change	0.199***	0.157***	0.215***
	(0.0316)	(0.0315)	(0.0490)
Observations	2149	2149	2149
Year FE	YES	YES	YES
State FE	NO	YES	YES

Notes: Each panel denotes results from regressions in which the independent variable is a state-year binary indicator of a tax rate change of the listed type while the dependent variable is a tax rate change of a different type in the same state and year (across the three main state tax types: sales, personal income, and corporate income). Column 3 restricts the independent variable to be equal to one only if the absolute value of the tax rate change was greater than or equal to 1 percentage point. Fixed effects are included as listed. Data covers 1977–2022. Robust standard errors in parentheses: *** p < 0.01, ** p < 0.05, * p < 0.1.

Fig. 2 presents the dynamics of these tax rate changes in event time. Each series of points represents the coefficients from a regression of the form:

$$\mathbb{1}(\text{Non-Income Tax Change})_{s,t} = \alpha_s + \delta_t + \sum_{n=-2}^{2} \beta_s^{inc}\ \mathbb{1} \times (\text{Income Tax Change})_{s,t+n} + \varepsilon_{s,t} \quad (1)$$

$$\mathbb{1}(\text{Non-Sales Tax Change})_{s,t} = \alpha_s + \delta_t + \sum_{n=-2}^{2} \beta_s^{sales}\ \mathbb{1} \times (\text{Sales Tax Change})_{s,t+n} + \varepsilon_{s,t} \quad (2)$$

$$\mathbb{1}(\text{Non-Corporate Tax Change})_{s,t} = \alpha_s + \delta_t + \sum_{n=-2}^{2} \beta_s^{corp}\ \mathbb{1} \times (\text{Corporate Tax Change})_{s,t+n} + \varepsilon_{s,t} \quad (3)$$

where $\mathbb{1}(x \text{ Tax Change})_{s,t} = 1$ if there is a tax change of type $x \in$ {(Non-)Personal Income Tax, (Non-)Sales Tax, (Non-)Corporate Income Tax} in state s and year t and 0 otherwise. We run this regression separately for each tax type. We include both state (α_s) and year (δ_t) fixed effects.

The graph plots regression coefficients representing the change in likelihood of correlated tax rate changes in the 5 years centered on a tax change of a listed type. That is, we test whether tax rate changes of one type are associated with tax rate changes of other types in the current year but also in the preceding and following years. In general, we find that there is little correlated tax change activity in the years surrounding a tax rate change of any type; the vast majority of increased likelihood of rate changes of other tax types occurs during the same year as the original tax rate change.[6]

[6] Table A.2 displays these relationships in regression format, mirroring column (2) of Table 4 for each tax type, but also includes two leads and two lags of the year of a tax change.

Table 5
Changes in state economic outcomes following state tax changes.

	(1)	(2)	(3)	(4)
Panel A: Changes in state-level log employment growth				
Change in top income rate	−0.299***			−0.289***
	(0.103)			(0.106)
Change in corporate rate		−0.185**		−0.119
		(0.0906)		(0.0878)
Change in sales rate			−0.236*	−0.203
			(0.134)	(0.127)
Observations	2090	2090	2090	2090
R^2	0.625	0.620	0.620	0.626
State FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Panel B: Changes in state-level economic coincident indicator				
Change in top income rate	−0.107*			−0.0942
	(0.0632)			(0.0637)
Change in corporate rate		−0.170		−0.143
		(0.109)		(0.110)
Change in sales rate			−0.247	−0.228
			(0.162)	(0.163)
Observations	2072	2072	2072	2072
R^2	0.739	0.739	0.739	0.740
State FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Notes: In Panel A, each column notes results of a regression of changes in state-level logged employment on changes in the specified tax type(s). In Panel B, each column notes results of a regression of changes in state-level economic coincident indicator (from the Philadelphia Federal Reserve) on changes in the specified tax type(s). Changes in taxes are lagged one year relative to dependent variable. State and year fixed effects included in all columns. Standard errors clustered by state in parentheses: *** p < 0.01, ** p < 0.05, * p < 0.1.

As one example, the green triangle point estimate at x-axis value zero in Fig. 2 means that, conditional on year and state fixed effects, if there is a change in corporate tax rates in a given year, then the likelihood of a second tax change in the same year of a different type (sales or personal income tax) increases by 15.2 percentage points. Given that the baseline probabilities of a change in sales taxes or personal income taxes in a given year are 7% and 15% (Table 3), a 15.2 percentage point increase in this likelihood is large.

3.2. Effect of tax co-movement on tax elasticity estimates

How does the inclusion of tax changes of all types impact univariate estimates of tax elasticities? Given that state and local taxes tend to co-move both within and across states and counties, an analysis of a single tax type may suffer from omitted variable bias given concurrent changes in taxes of other types within the same or neighboring jurisdiction.

Table 5 performs a simple quantitative analysis of this concern. In each panel, columns (1) to (3) show results from regressing changes in state-level employment (Panel A) and changes in a measure of state economic conditions (Panel B) on changes of a single tax type. Column (4) then shows the results from regressing the same measure on changes in tax rates across all tax types, including controls for national time-varying trends.

Of course, even controlling for concurrent tax changes might not be enough to identify the direct or partial causal effect of these changes on employment. For instance, tax changes might be jointly driven by the business cycle, budgetary pressure, political changes, or some other common factor omitted from the analysis. The goal of the analysis in this section is to roughly quantify any *additional* bias introduced by correlated tax changes. Future research could then utilize the comprehensive database we build in this paper to identify exogenous variation in state and local taxes. For instance, one could carry out a narrative analysis of the motivation behind these state and local tax changes to isolate those that are taken for more exogeneous reasons, similar to the narrative analysis of federal tax changes in Romer and Romer (2010).

In Panel A, the economic measure we use as a dependent variable is the change in logged state-level employment from the Bureau of Labor Statistics. Panel B of Table 5 uses the log change in the average annual Philadelphia Fed Coincident Indicator.[7] Columns (1) to (3) in both panels show point estimates that indicate negative effects of increases in tax rates on measures employment or the broader measure of economic activity.

In Panel A, for instance, these relationships are sizable and statistically significant for these univariate regressions. In column (4) of each panel, we then modify the regression specifications to include tax changes of all types. We find that the point estimates change substantially when controlling for other concurrent tax changes (between 10%–40%) and uniformly move closer to zero. We take this as evidence that the positive co-movement of taxes of different types within states has meaningful effects on the calculated magnitudes of the impact of any given tax type on common economic outcomes, and that failing to control for other concurrent tax changes tends to overstate the effect of an isolated tax change.[8]

3.3. Drivers of correlated tax changes

What might drive this correlation of concurrent state tax changes? While a comprehensive analysis of drivers of tax changes is beyond the scope of this paper (see e.g., Robinson and Tazhitdinova, 2022 for a complementary analysis of the drivers of historical state tax policies), Table 6 works to better understand the conditions in which these *correlated* tax changes occur. We first define indicators for concurrent tax changes as state-year observations in which tax changes of two or more different types occur (inclusive of state level personal income, sales, and corporate income taxes). We regress these co-movement indicators on an indicator for a tax change of any of these types along with an interaction with a range of economic and political variables. Column (1) shows that a state-year with a single tax rate change is 16 percentage points more likely to feature a tax rate change of another type, consistent with the bivariate correlation coefficients in panel A of Table 3.

Columns (2) to (4) add interactions with three different variables relevant to the economic conditions each year: a shock to state budgets stemming from a large (more than 5%) decline in federal budget transfers, a state recession indicator based on the Philadelphia Federal Reserve State Coincident Indicator, and the level of this economic coincident indicator. In all three cases, we find little differential occurrence of correlated tax changes (consistent with results in panel C of Table 3). Overall, these two findings support a key result of Robinson and Tazhitdinova (2022), that economic factors (e.g., recessions) have low explanatory power for the timing and magnitude of state tax changes.

In contrast, column (5) of Table 6 includes an interaction with an indicator for the state being under single-party government across legislative and executive branches. That is, states in which the governorship, lower legislative house, and upper legislative house are all controlled by a single political party. This is the case in about 50% of state-year observations for which we have legislative and governorship data, back to 1993. Here we find large increases in the probability of tax rates co-moving across tax types. Conditional on the tax rate of

[7] The Philadelphia Federal Reserve State Coincident Indicator is an economic indicator that aims to track economic conditions across all 50 states in a single statistic by using a dynamic single-factor model developed by Stock and Watson (1989). The index is composed of four sub-indexes that vary by state and time: nonfarm payroll employment, average manufacturing hours worked, the unemployment rate, and CPI-deflated wage disbursements.

[8] Table A.3 mirrors the approach of Table 5 but uses long differences (i.e., 5-year differences) rather than annual changes in both dependent variables and tax rates.

Table 6
Drivers of correlated tax changes.

	(1)	(2)	(3)	(4)	(5)	(6)
Tax change (Any Tax)	0.162***	0.161***	0.159***	0.176***	0.0786***	−0.0386
	(0.0105)	(0.0107)	(0.0115)	(0.0352)	(0.0182)	(0.0704)
Tax change × Fed Budg shock		0.0137				0.0742
		(0.0541)				(0.0504)
Federal budget shock		0.00259				−0.00368
		(0.0291)				(0.0281)
Tax change × Recession			0.0158			−0.00434
			(0.0273)			(0.0332)
Recession			−0.00379			0.0275
			(0.0198)			(0.0253)
Tax change × Coincident Ind.				−0.000173		0.00117*
				(0.000399)		(0.000698)
Coincident indicator				0.000750		−0.000387
				(0.000655)		(0.000868)
Tax change × Single Party Gov.					0.101***	0.0935***
					(0.0236)	(0.0240)
Single party government					−0.0107	−0.00774
					(0.0123)	(0.0124)
Observations	2072	2072	2072	2072	1257	1257
R^2	0.205	0.205	0.205	0.205	0.198	0.202
Year FE	YES	YES	YES	YES	YES	YES
State FE	YES	YES	YES	YES	YES	YES

Standard errors in parentheses.
*** p < 0.01, ** p < 0.05, * p < 0.1
Notes: Each column denotes results from regressions in which the independent variable is a state-year binary indicator of a tax rate change while the dependent variable is an indicator for there being a tax rate change in that state and year of a different type (across the three main state tax types: sales, personal income, and corporate income). In columns (2)–(5), we include indicators for economic and political variables, as well as interactions between these variables and there being a tax change in that state-year. Fed Budget Shock indicates years in which there is a decline in nominal federal transfers of more than 5%, while Recession indicates that there was a decline in business activity in the state as measured by the Philadelphia Fed Coincident Indicator. Single Party Government equals one when all houses of the state legislature and share a party with the governor. Fixed effects are included as listed. Data covers 1977–2022. Robust standard errors in parentheses: *** p < 0.01, ** p < 0.05, * p < 0.1.

Table 7
Changes in state tax rates by political ideology.

	Income (1)	Corporate (2)	Sales (3)	Income (4)	Corporate (5)	Sales (6)
Left-most quartile	0.0410	−0.0118	0.0249**	0.209	−0.161	0.393**
	(0.0273)	(0.0155)	(0.0115)	(0.137)	(0.210)	(0.161)
Right-most quartile	−0.0471***	−0.0353*	0.0105	−0.376***	−0.411*	0.181
	(0.0120)	(0.0201)	(0.0105)	(0.0778)	(0.221)	(0.177)
Observations	2295	2190	2373	326	191	169
R^2	0.001	0.002	0.002	0.010	0.019	0.030

Notes: Each column notes results of a regression of annual changes in state-level tax rate (from a given tax type) on indicators for whether a state was in the left-most or right-most quartile of political ideology of the state house of representative during the previous year. For instance, column (1) reports the relative change in income tax rate in left-leaning vs. right-leaning states compared to moderate states. In columns (4)–(6), the sample is limited to observations with non-zero tax rate changes. Data covers 1977–2022. Robust standard errors in parentheses: *** p < 0.01, ** p < 0.05, * p < 0.1.

one tax type changing, a state that features single party government is more than twice as likely to observe a tax rate change of a different tax type in the same year. This tendency exists for both Democratic and Republican controlled governments with similar magnitudes and has remained stable over the years of our sample. Column (6) includes all previous controls and interactions, with the impact of a single-party government retaining its size and significance.

In the previous section, we noted that rates tend to co-move within a state. Some of these changes may be driven by changes in the ideology of the majority party in a state legislature. We test whether state-level political ideology correlates with tax rate changes across all major tax types among states. Table 7 reports the results of regressions of annual changes in state-level tax rates (within a given tax type) on indicators for whether a state was in the left-most or right-most quartile of political ideology of the state legislatures lower house (generally termed the house of representatives) during the previous year. That is, the reported results are relative to moderate states, as defined by the middle two quartiles of political ideology. We use the State Legislative Aggregate Ideology Data (Shor and McCarty, 2011) to classify the ideology of state house of representatives during our sample period.

Columns (1) to (3) include all state-year observations, while columns (4) to (6) restrict to state-year observations in which there was a change in tax rates of the labeled type. Overall, we find that the most conservative legislatures tend to decrease tax rates and the most liberal legislatures increase tax rates, though the effect varies considerably across tax types. Columns (1) and (2) show that the most

Table 8
Concurrent local and state tax changes.

	Local-level tax change of the indicated type:						
	Any	Non Prop	Non Prop	Income	Non Prop	Sales	Non Prop
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
State-level tax change of the indicated type:							
Any	0.0280***	0.0437***					
	(0.00628)	(0.00450)					
Income			0.0412***	0.0101***			
			(0.00527)	(0.00186)			
Sales					0.0933***	0.104***	
					(0.00898)	(0.00887)	
Corporate							−0.00888
							(0.00561)
Mean of Dep. Var.	0.730	0.184	0.184	0.025	0.184	0.161	0.184
Observations	36,103	57,479	57,479	57,479	57,479	57,479	57,567
R^2	0.273	0.279	0.279	0.383	0.280	0.271	0.268
Year FE	YES	YES	YES	YES	YES	YES	YES
County FE	YES	YES	YES	YES	YES	YES	YES

Notes: Each column notes results of a regression of annual changes in local-level taxes (from a given tax type or types) on indicators for whether the locality's state had a tax change of the indicated type in the same year. Data covers 1977–2022. Robust standard errors in parentheses: *** p < 0.01, ** p < 0.05, * p < 0.1.

conservative legislatures decreased median personal income rates by around 0.05 percentage points per year and corporate income taxes by nearly 0.04 percentage points per year, while the most liberal legislatures had no significant changes. In contrast, for sales taxes, the most liberal legislatures saw significant increases in tax rates. Naturally, the magnitude of these results is amplified when restricting to non-zero differences in rate changes across years, because they represent estimates of the average size of the tax rate change conditional on making a change.

3.4. Correlation of county and state tax changes

During our sample period, county-level taxes do not exhibit the same level of correlation across tax types observed among state-level taxes.[9] This is partly due to the fact that local tax revenue is much more highly concentrated in a single tax type than is state tax revenue, typically in property taxes (see Table 1). As a result, there is less ability for local jurisdictions to trade off one tax type with another while adjusting only on intensive margins (e.g., not imposing a new tax such as a personal income tax when there had been none before). Also of note is the fact that property tax rates are highly variable, though rate changes are often fairly small in magnitude.[10]

While counties do not have strong correlations across tax types within county, they do play an important role in correlation in overall tax changes observed by households and businesses. This is because they tend to be adjusted concurrently with changes in *state* tax rates, especially state tax rates of the same type. For instance, while the fraction of local jurisdictions seeing a change in personal income tax rates is under 2%, unconditionally, the fraction increases by over 50% (to over 3%) when the state changes personal income tax rates in the same year. An even larger increase in the rate of changes is seen for local sales taxes. While each year about 8% of counties change sales taxes, almost 20% of counties change sales taxes during a year in which their state also changes sales taxes.

Table 8 documents this relationship between state and local tax changes across all tax types as well as within tax type. We also separate out non-property tax changes (i.e., restricting them to local sales and local income tax changes) as property tax changes drive an overwhelming majority of local level tax changes (making up about 75% of local tax changes in any given year). Column 1 notes that, in a year in which a state changes a state-level tax rate, counties in that state have a 2.8 percentage point higher likelihood of changing a county-level tax rate. For non-property taxes at a county level, the effect is larger, representing a 4.4 percentage point increase in the likelihood of a change (on a base of 18.4%). That means that, in a year with a state tax change, counties in that state are approximately 24% (0.04/0.184) more likely to change their sales or income tax rate.

These relative increases are even larger within tax types. That is, when states adjust income tax rates, counties in that state are about 40% more likely to change income taxes (0.0101/0.025) and when states adjust sales taxes, counties in that state are 65% more likely to change sales taxes (0.104/0.161). Following changes in state corporate taxes, which have no appreciable corresponding local level tax, we see no significant impact on local level taxes of any type.

The correlation between state and local tax changes, especially within tax type, could indicate that counties are either systematically offsetting changes made by state politicians (i.e., reducing local income taxes as state income taxes increase) or reinforcing such policy changes (e.g., increasing local sales taxes in concert with state-level increases). Fig. 3 plots the size and direction of these local changes against changes in the same type of tax at a state level. For sales taxes, we see a strong negative relationship between these changes. That is, when a state increases the sales tax rate, we tend to be much more likely to see declines in local sales taxes, and vice versa. These changes are consistent with the effects seen in Agrawal (2015), who notes that border jurisdictions often exploit the cross-border tax gradient to raise local funds from cross-border shopping. For personal income taxes, while Table 8 documented an increase in the frequency of local rate changes, we see no correlation in direction and size in response to state personal income tax rate changes.

4. Long-run trends towards dominant tax types

The previous section has focused on the contemporaneous correlations of tax changes across tax types, limiting the dynamics to two years before and after a tax change. While there are a few tax changes that occur in quick succession (e.g., due to a new policy phasing in tax changes over a short period), the correlation of state and local tax changes within a specific tax type (auto-correlation) is generally small. In this section, we turn our analysis to longer-run trends in tax rates and revenue shares.

[9] See Table A.4 for the corresponding county-level version of Table 3.

[10] Local tax jurisdictions can also adjust the property tax base, e.g., by changing the frequency of property value tax reassessments or by changing the tax assessment ratio. More generally, collecting similar data about the base of state and local taxes (including tax credits and exemptions) is an important task for future research.

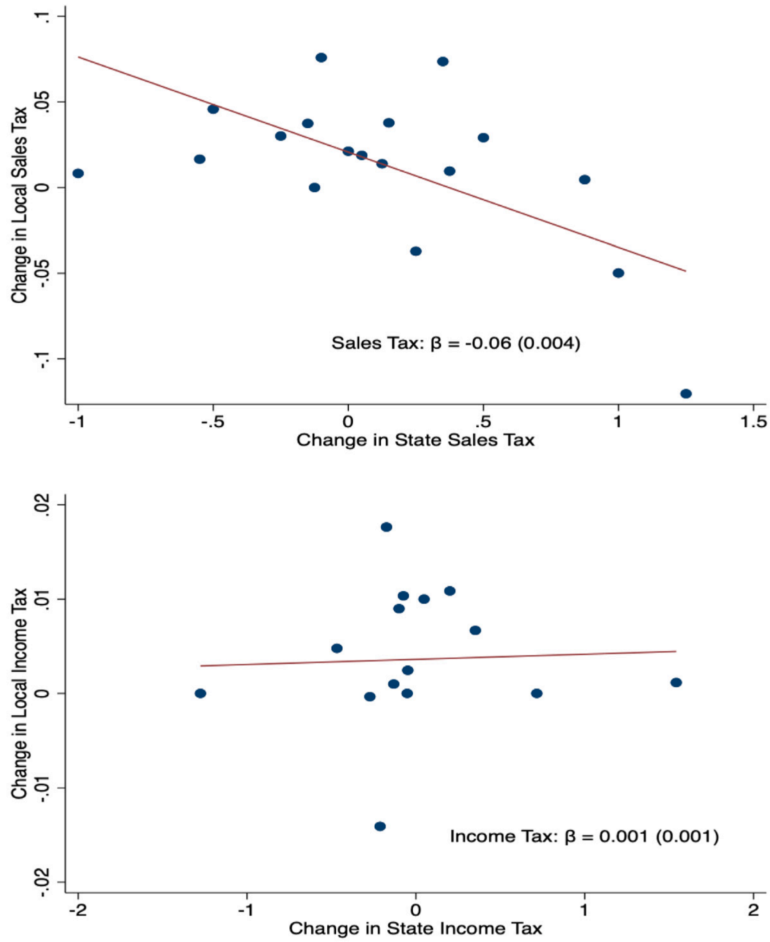


Fig. 3. Relation between changes in state and local taxes by tax type,2000–2022. *Notes:* These binned scatter plots show the correlation between contemporaneous changes in state and local taxes of the same type. The top panel displays data for sales taxes and the bottom panel displays data for income taxes.

4.1. The mix of tax types and revenue across states

While there is little systematic relationship between the levels of the various tax types within states, most states tend to get a disproportionate amount of revenue from a single tax type, which we refer to as the 'dominant tax'. The top panel of Fig. 4 reports the modal tax type that yields the highest amount of revenue for each state across all years in our sample. Out of the 50 states, 48 states receive the most tax revenue from either sales taxes or personal income taxes. New Hampshire receives the most revenue from corporate income taxes while Alaska receives the most revenue from excise taxes (possessing neither a sales tax nor a personal income tax).

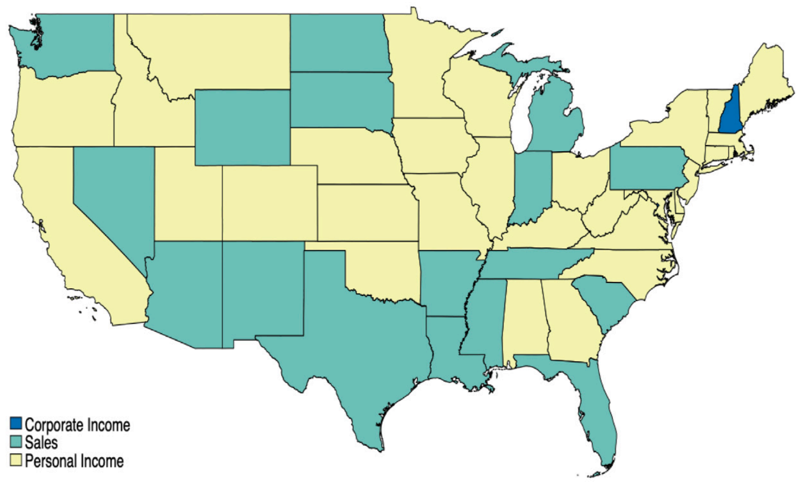
The bottom panel of Fig. 4 demonstrates clearly that property taxes are the most common dominant local tax, with property taxes providing the largest share of tax revenue in over 80% of counties in our sample period. Local sales and local personal income taxes represent the dominant local tax for nearly all of the remainder of the 20% of counties.

Fig. 5 plots the distribution of state-level tax rates (top panel) and revenue shares (bottom) by tax type at three points in time: 1980, 2000, and 2020. We see different trends in the distributions of tax rates across the three major state tax types (sales, personal and corporate income taxes). For instance, from 1980 to 2020, the share of sales tax revenue increases consistently across the distribution. In contrast, personal income tax rates have undergone a concentration, with states generally gravitating towards rates near 4% rather than the wider distribution in rates seen in 1980. The distribution of corporate income taxes shifted upwards from 1980 to 2000 before undergoing a general reduction in rates across states by 2020. Similar to effects that we see among states, tax revenue at a local level has become more concentrated in the years from 2000 to 2022.

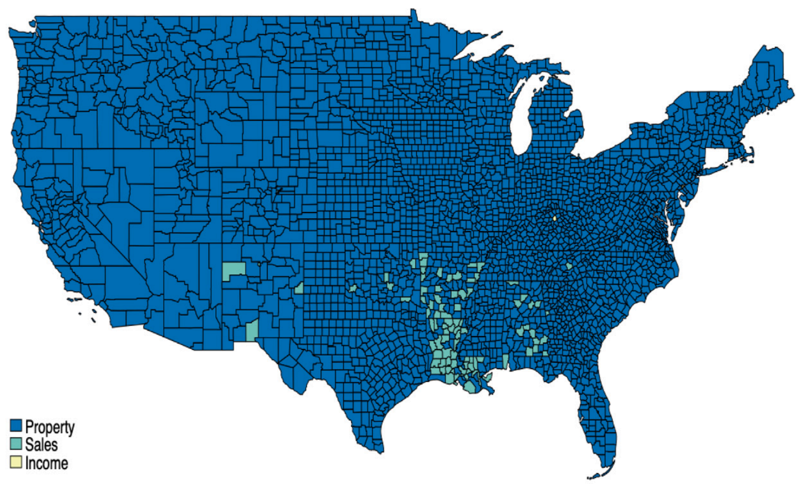
The changes in rates are not perfectly inelastic with respect to revenue collected, however. In fact, in the bottom panel, we find that greater shares of tax revenue come from personal income taxes in 2020 relative to 1980 despite the distribution in rates not shifting as strongly. In contrast, the distribution of revenue shares from sales taxes in 2020 is fairly similar to that in 1980, despite a large increase in sales tax rates across the distribution. Corporate income tax revenue now makes up a much smaller proportion of state tax revenue relative to 1980.

4.2. Long-run trends in taxes within states

Interestingly, the fraction of revenue stemming from the most dominant state tax type has been increasing during our sample period. That is, state tax revenue has become increasingly concentrated across tax types. The top panel of Fig. 6 demonstrates this trend over time,



(a) States, 1977–2022



(b) Counties, 2000–2022

Fig. 4. Type of dominant tax with highest revenue share. *Notes:* Shading denotes the dominant tax that provides the highest amount of revenue on average for a given location across all years in the sample. Alaska and Hawaii are represented in the data but not in the maps. Alaska is the only state in which excise taxes provide the most revenue. Property taxes do not provide the most state tax revenue for any state.

plotting the average share of state tax revenue derived from the largest single tax type in each state, by year. The top panel calculates this average share across all 50 states and Washington DC, while the bottom panel splits the sample across states who receive the highest share of their tax revenue from the personal income tax and the sales tax, respectively. In both cases, we see that the fraction of revenue from the dominant tax type has increased substantially over time, rising from around 38% of tax revenue at the beginning of the sample to nearly 44% of total tax revenue in 2022.[11]

This increasing share of dominant taxes could be driven by differential trends in the income source across states. That is, states with higher levels and higher growth rates of income may be prone to levy income taxes and therefore see an increase in the share of revenue derived from that source over time, even with no change in tax rates. We next investigate the time-series evolution of the tax *rates* for dominant revenue sources and find that they have also increased over our sample period.

Table 9 transforms our state-year panel into a panel wherein an observation is the tax rate for a state-year-tax type. Each column notes results of a regression where the dependent variable is the 10-year change in a state-level tax rate for all observations in columns (1) to (4) and for all observations in columns (5) to (6). We regress these tax rate changes on an indicator variable taking the value of 1 if the tax constitutes the majority of tax revenue in that year, i.e., is the dominant tax (columns (1), (3), and (5)), and on a continuous measure of the share of this tax of total tax collected (columns (2), (4), and (6)). Columns (3) and (4) weight observations by logged state level tax revenue. Overall, we find that, in addition to dominant tax revenues increasing as a share of total tax revenue, the tax rates underlying these dominant tax types have also increased. Dominant tax rates have increased by approximately 0.14 percentage points per decade, and the more dominant the tax type, the larger the increase in rates over time.

Another potential driver of this trend could be that states with a non-dominant tax rate set to zero may find it more difficult politically

[11] In the top row of Fig. A.1, we plot the distribution of the fraction of revenue obtained from the most dominant tax type across states in both 1980 and 2020. The left panel's distribution weights equally across states while the right panel weights states by total state tax revenue. In each, we can see that the share of revenue stemming from the most dominant tax type is weakly increasing throughout the distribution.

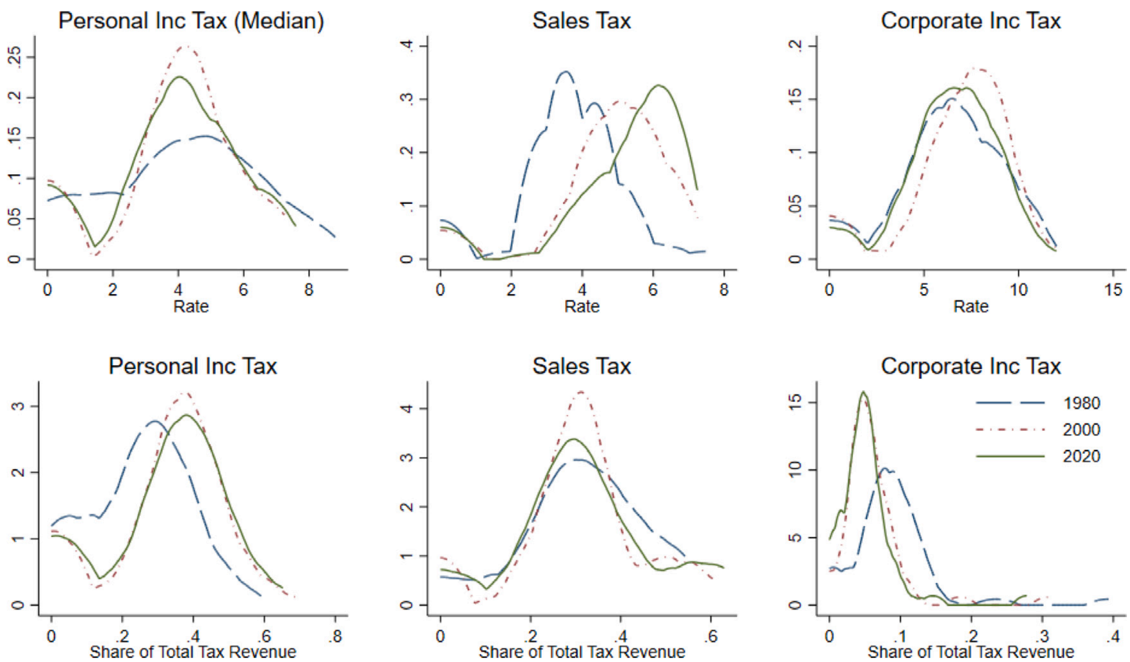


Fig. 5. Distribution of state-level tax rates and revenue shares, by tax type. *Notes:* This figure plots kernel densities of the tax rates (top row) and the fraction of total revenue shares (bottom row) that are generated by each tax type, by state. Distributions are plotted for 1980, 2000, and 2020.

Table 9
Changes in tax rates by dominant tax type.

	(1)	(2)	(3)	(4)	(5)	(6)
Dominant tax Type	0.227***		0.240***		0.142***	
	(0.0437)		(0.0431)		(0.0251)	
Tax Revenue Share		1.276**		1.205***		0.487***
		(0.499)		(0.464)		(0.128)
Observations	1823	1823	1823	1823	3648	3648
R^2	0.219	0.218	0.215	0.212	0.111	0.109
Year FE	YES	YES	YES	YES	YES	YES

Notes: Each column notes results of a regression of changes in state-level tax rate on an indicator variable taking the value of 1 if the tax constitutes the majority of tax revenue in that year (columns 1, 3, and 5) and on a continuous measure of share of tax as a proportion of total tax collected (columns 2 4, and 6), controlling for the dominant-tax type (either income or sales). Columns (1) and (2) restrict to the sample of non-zero tax rate changes. Columns (3) and (4) restrict to non-zero tax changes and weight by logged state tax revenue. Columns (4) and (5) examine all observations, without weighting. Robust standard errors in parentheses: *** p < 0.01, ** p < 0.05, * p < 0.1.

to adjust the zero-rate tax. Fig. A.2 splits states into those with all non-zero tax rates for the major tax types and those with a tax rate of zero on one tax type. During our sample period of 1977–2022, we find that these two groups both see similar increases in the share of revenue derived from the dominant tax type.

5. Concluding remarks

In this paper, we develop a dataset of state and local taxes — from 1977–2022 for states and 2000–2022 for localites — that includes personal income taxes, property taxes, corporate income taxes, sales taxes, and a range of state level excise taxes. Given the range of overlapping local tax jurisdictions, we aggregate local tax rates to a county level using jurisdictional population weights, yielding a comprehensive view of tax rates across states and counties and over time.

Using this comprehensive view, we demonstrate that both state and local taxes tend to exhibit correlated changes within a jurisdiction. That is, a change in the rate of one tax type (e.g., sales tax) is often associated with changes in tax rates of other types (e.g., personal or corporate income taxes). For researchers studying effects of tax changes on households or firms, these correlations highlight the importance of understanding the full range of tax changes a location may have experienced at a given time. While a household may have seen a reduction in one type of tax, their net tax burden may have been left unchanged given offsetting changes in other rates. We highlight the fact that these changes are not driven by any set of particular economic conditions but do tend to be much more common in times when a single party controls both executive and legislative branches.

We also illustrate how these taxes have changed over time. While it is well known that various jurisdictions vary greatly in the composition of their taxes (e.g., some states receive most of the revenue from sales taxes where others focus on income taxes), we show that these differences have tended to become more pronounced over time at both state and local levels. One consequence of an increasingly dominant tax type in a location is that this tax revenue concentration likely increases the exposure of state and local tax jurisdictions to shocks to their (dominant) tax base, because their tax base is less diversified.

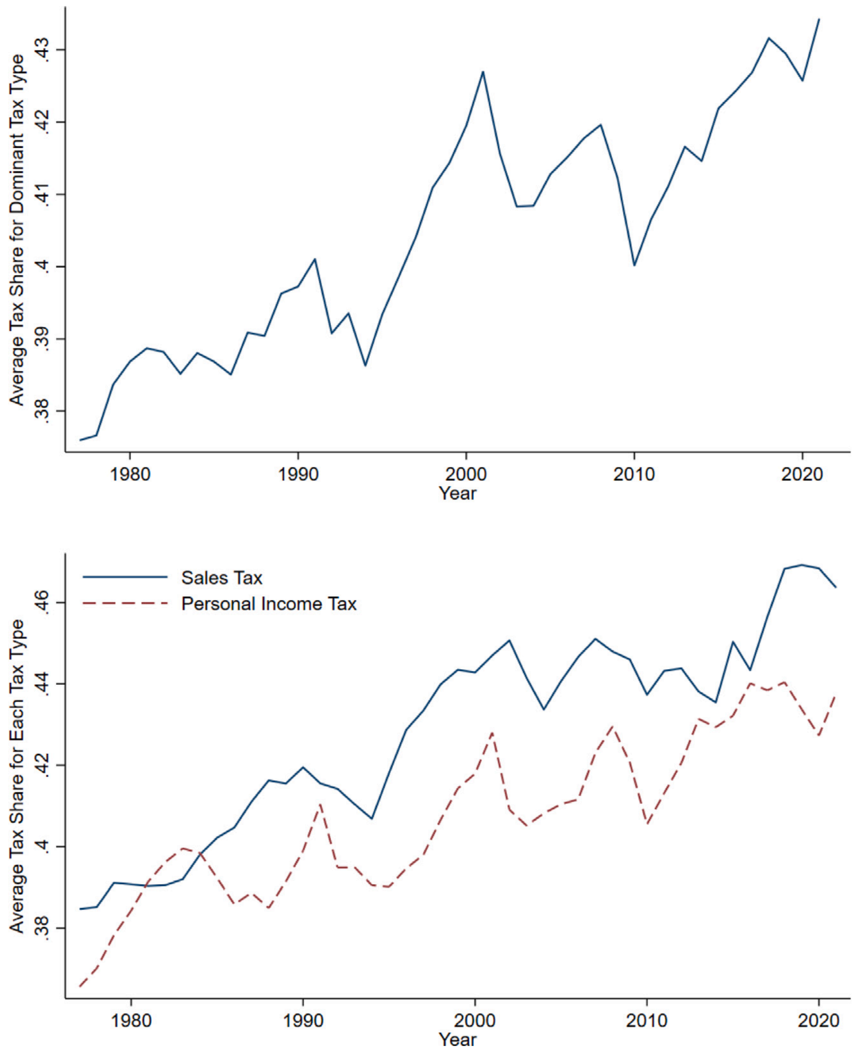


Fig. 6. Dominant tax shares across states,1977–2022. *Notes:* Top panel displays the cross-state average fraction of revenue derived from the dominant tax type within each state, that is, the average of the tax type that generates the largest share of revenue. Bottom panel displays this cross-state average separately for states with sales or personal income taxes as the dominant tax type. The slope of the linear trend is 0.11 in the top panel and 0.18 for the sales tax and 0.14 for the income tax in the bottom panel.

An important related, and to the best of our knowledge still open question is whether this trend towards concentrating revenue from a single tax type can exacerbate deadweight losses from taxation. While it is intuitive that increases in tax rates progressivity would raise the deadweight loss associated with an additional dollar of tax revenue — with the marginal deadweight loss driven by the square of marginal tax rates while revenue is dependent on the average marginal rate (Feldstein, 1999; Harberger, 1964) — the optimal tax literature tell us that this is not necessarily the case.

For instance, in the most basic model where consumption equals after-tax income, a labor income tax and a consumption tax are identical and thus they both have equally distortionary impacts on labor supply. Therefore, dividing tax revenue equally between sales and labor income taxes is not more efficient than getting revenue entirely from one of the two tax sources. In fact, it is even possible to reduce deadweight losses by concentrating tax revenue. For instance, in a basic model like (Auerbach and Hassett, 1992), if corporate taxation allows for full deductibility of investment, then optimal taxation suggests that all else equal, a tax jurisdiction should get as much of its revenue as possible from the corporate income tax alone.

Nevertheless, even if in principle two taxes are identical (like sales and labor income taxes in a simple static model), in practice, frictions in implementing them could make it optimal not to try to get all revenue from only one of them (e.g., Slemrod, 1990; Alm, 1996; Slemrod and Yitzhaki, 2002), even when we abstract from the diversification of revenue risk mentioned above. However, the nature of these frictions likely matters. For instance, distributing tax revenue across multiple tax types might be optimal if implementation costs are convex in the tax base. If, on the other hand, these frictions are in the form of fixed costs of tax collection (e.g., fixed costs of setting up income tax withholding or sales tax enforcement), then concentrating the tax base into a single or only a few revenue sources might be optimal and might explain the new pattern documented in this article. Clearly more research is needed on this front.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix. Figures and tables

See Figs. A.1, A.2 and Tables A.1–A.4.

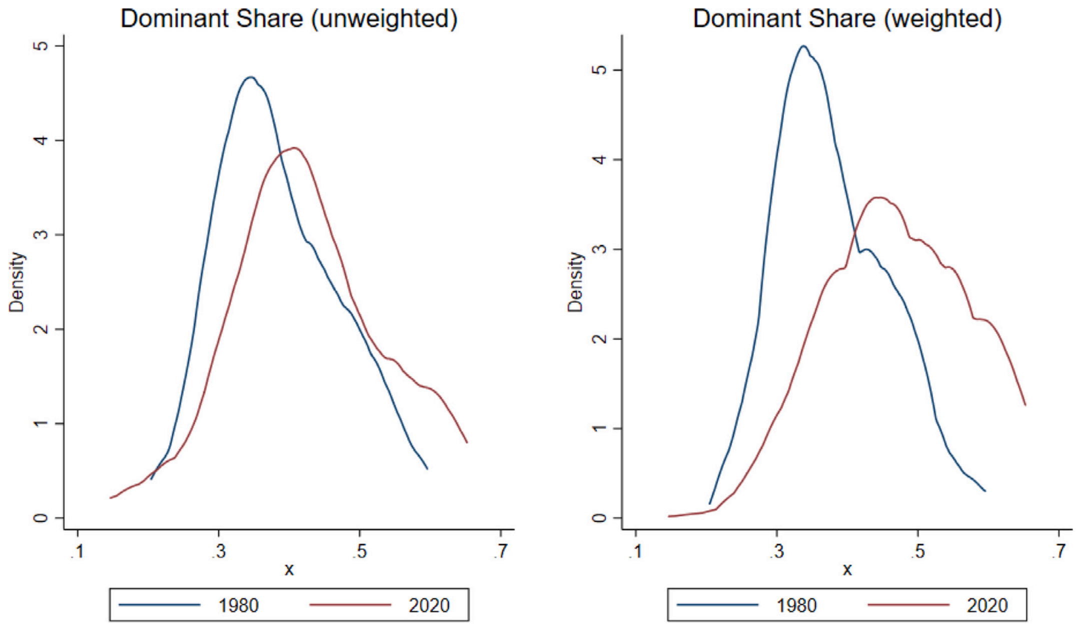


Fig. A.1. Fraction of state revenue from primary tax. *Notes:* This graph plots the share of revenue generated by the dominant tax type across states. That is, a value of 0.6 means that 60% of state tax revenue was generated from the tax type (e.g., sales tax) with the most revenue in that state. Distributions for both 1980 and 2020 are plotted. The left panel's distribution is weighting equally across states, the right panel weights states by total tax revenue.

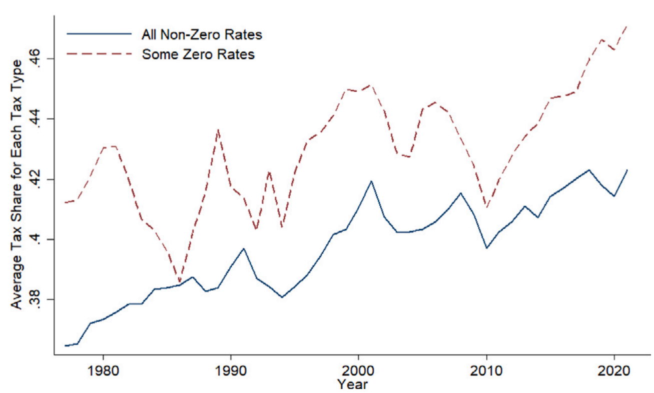


Fig. A.2. Dominant tax shares across states for states with all non-zero tax rates,1977–2022. *Notes:* Bottom panel displays the cross-state average fraction of revenue derived from the dominant tax type within each state separately for states that had non-zero tax rates or some zero rates across all three main tax types (income, sales, corporate) in the beginning of our sample in 1977. The slope of the linear trend is 0.11 for the all-nonzero rate states and 0.10 for states with some zero tax rates in 1977.

Table A.1
Changes in state and local tax revenue following state tax changes.

	(1)	(2)	(3)	(4)	(5)
Panel A: Changes in state-level tax revenue					
Tax:	Median Inc	Top Inc	Corp Inc	Sales	Excise
Tax rate change	0.518***	0.539***	0.315**	0.325***	0.514***
	(0.057)	(0.057)	(0.145)	(0.061)	(0.080)
State FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Observations	1751	1747	1881	1815	1890
R^2	0.369	0.374	0.305	0.277	0.120
Panel B: Changes in county-level tax revenue					
Tax:	Mean income	Sales	Property		
Tax rate change	0.178***	0.301***	0.0272		
	(0.0580)	(0.0966)	(0.0694)		
County FE	YES	YES	YES		
Year FE	YES	YES	YES		
Observations	59,707	52,718	35,922		
R^2	0.044	0.170	0.177		

Notes: In panel A, each column notes results of a regression of changes in state-level tax revenues (from a given tax type) on changes in that tax type. For instance, column (1) reports the logged change in income tax revenue following a change in the income tax rate across states and years. In panel B, we run the same regressions at a county level using county taxes and county revenue.

Table A.2
Concurrent tax changes – State level – Time series.

	Non-income taxes (1)	Non-sales taxes (2)	Non-corporate taxes (3)
Two years prior	0.0412*	−0.00769	-0.0216
	(0.0233)	(0.0337)	(0.0329)
One year prior	−0.00576	−0.00915	0.0550
	(0.0238)	(0.0334)	(0.0340)
Year of tax change	0.0783***	0.0662**	0.152***
	(0.0238)	(0.0333)	(0.0340)
One year after	0.0389	0.0290	-0.0530
	(0.0239)	(0.0332)	(0.0336)
Two Years After	−0.0229	0.0132	0.0440
	(0.0238)	(0.0327)	(0.0340)
R^2	0.122	0.173	0.167
Observations	2029	2092	1986
Year FE	YES	YES	YES
State FE	YES	YES	YES

Notes: Each column denotes results from regressions in which the dependent variable is a binary indicator for a tax rate change of the listed type, while the independent variable is a binary indicator for a tax change of the complementary type (eg. personal income tax rate changes in column (1), sales tax rate changes in column (2), and corporate income tax rate changes in column (3)). Also included are two years of leads and lags of these tax rate change indicators. Fixed effects are included as listed. Data covers 1977–2022. Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.3
Changes in state economic outcomes following state tax changes - 5 year changes.

	(1)	(2)	(3)	(4)
Panel A: Changes in State-Level Log Employment Growth				
Change in top income rate	−0.657**			−0.587**
	(0.262)			(0.279)
Change in corporate rate		−0.882***		−0.725**
		(0.310)		(0.308)
Change in sales rate			−0.971	−0.806
			(0.740)	(0.664)
Observations	1886	1884	1886	1884
R^2	0.438	0.436	0.431	0.446
State FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Panel B: Changes in state-level economic coincident indicator				
Change in top income rate	−0.503***			−0.466**
	(0.173)			(0.192)
Change in corporate rate		−0.514*		−0.407
		(0.298)		(0.292)
Change in sales rate			−0.407	−0.304
			(0.455)	(0.430)
Observations	1872	1870	1872	1870
R^2	0.561	0.557	0.555	0.563
State FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Notes: In Panel A, each column notes results of a regression of 5-year changes in state-level logged employment on 5-year changes in the specified tax type(s). In Panel B, each column notes results of a regression of 5-year changes in state-level economic coincident indicator (from the Philadelphia Federal Reserve) on 5-year changes in the specified tax type(s). Changes in taxes are lagged one year relative to dependent variable. State and year fixed effects included in all columns. Standard errors clustered by state in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.4
Concurrent local-level tax changes.

	Fraction of taxes that changed:		
	Income tax (1)	Prop. tax (2)	Sales tax (3)
Panel A: Fraction of counties changing taxes in same year			
Unconditional fraction of tax changes	0.025	0.66	0.16
Concurrent income tax change	1.00	0.76	0.10
Concurrent property tax change	0.024	1.00	0.16
Concurrent sales tax change	0.015	0.63	1.00

(continued on next page)

Table A.4 (*continued*).

	Fraction of taxes that changed:		
	Income tax (1)	Prop. tax (2)	Sales tax (3)
Panel B: Fraction of counties changing taxes in same or next year			
Unconditional fraction of tax changes	0.037	0.81	0.23
Concurrent income tax change	1.00	0.90	0.14
Concurrent property tax change	0.04	1.00	0.23
Concurrent sales tax change	0.024	0.78	1.00
Panel C: Budget pressure			
State recession	0.03	0.66	0.17
Federal budgetary shock	0.026	0.68	0.16
Panel D: Relation with state-level tax changes			
Change in state-level income tax rate	0.04	0.66	0.21
Change in state-level sales tax rate	0.04	0.62	0.29
Change in state-level corporate tax rate	0.03	0.67	0.15

Notes: Each row shows the fraction of counties that saw changes in the listed type of taxes when subject to the condition in the left-most column. That is, unconditionally, 2.5% of counties changed income taxes in a given year. When there is a sales tax change in a county in a given year (row 4), 1.5% of states see an change in income taxes in that year. Panel B reports the fraction of counties changing taxes in *either* year t or year $t+1$ when a tax of a different type changes in year t. Panel C looks at years in which there is a decline in nominal state transfers of more than 5% or if there is a decline in business activity in the county's state as measured by the Philadelphia Fed Coincident Index.

Data availability

Data will be made available on request.

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