“Telework and Local Tax Performance”

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Introduction

Technological Change and Tax Policy

- “Digitalization” of consumption/labor allows people to buy goods from vendors around the world and supply labor to firms globally.
  - E-commerce, telework, ….
- These changes pose challenges for policy, making consumption and factors more footloose.
- Digitalization also changes what people buy and how people work.
- Effects on local tax bases within places and across space?

WFH and Local Tax Revenues

- The “urban doom loop” after WFH….
- Little existing empirical evidence on local tax revenues and services.
  - Focus on prices not sufficient for revenue due to tax rules.
- Literature also ignores the substantial differences in how various tax bases are structured---even within a given city or town.
- Emphasis in the public economics literature has generally focused on income taxes and interstate migration.
- Our focus: heterogeneity across sales and property tax responses.

Key Takeaways

- Declines in sales tax revenues due to telework result from two factors:
  - Changes in the place where goods are sold: shift from larger taxing jurisdiction to smaller taxing jurisdiction.
  - Telework consistent with e-commerce (Agrawal and Shybalkina 2023, 2024)
  - Changes in what people buy: WFH correlated with a shift toward non-taxable services away from taxable goods (digital services, leisure services, etc).
  - Consistent with Finan and Bloom (2023): WFH increased mid-week golf 83%.

- Key takeaway: WFH creates pressures on antiquated sales tax rules that are best suited for goods rather than the current digital economy.
  - Especially problematic for cities.

DATA

Disaggregated Data from TN Revenue Dept

- Vendors required to file a sales tax return each month.
  - Because goods and food are taxed at different rates, we know food vs. non-food purchases.
  - Contains NAICS code for the vendor so we know the type of seller (general merchandise, accommodation, gas station, etc.)
  - Local taxes means sales are allocated to “situs” locations (county of sale, “city” of sale, non-city part of county, special district).

Tax Form: We Have Every Line Item

1. Gross sales.....(1) _____
2. Cost of personal property purchased on a resale certificate but used.....(2) _____
3. Cost of out-of-state purchases and property imported into Tennessee for use.....(3) _____
4. Fair market value of tangible personal property fabricated, produced, compounded, or severed from the earth for use in Tennessee.....(4) _____
5. Total sales and purchases (add Lines 1-4).....(5) _____
6. Exempt transactions from Schedule A Line 11.....(6) _____
7. State net taxable total (subtract Line 6 from Line 5).....(7) _____
8. State sales and use tax (multiply Line 7 by 7%).....(8) _____
9. State food tax (multiply Schedule A, Line1 by 4%).....(9) _____
10. Local sales and use tax from Schedule B, Line 8.....(10) _____
11. Tax collected in excess of state and local levies.....(11) _____
12. State tax on transactions subject to single article and reduced rates from Schedule C Line 9.....(12) _____
13. Local tax on transactions subject to the special tax rate from Schedule C Line 15.....(13) _____

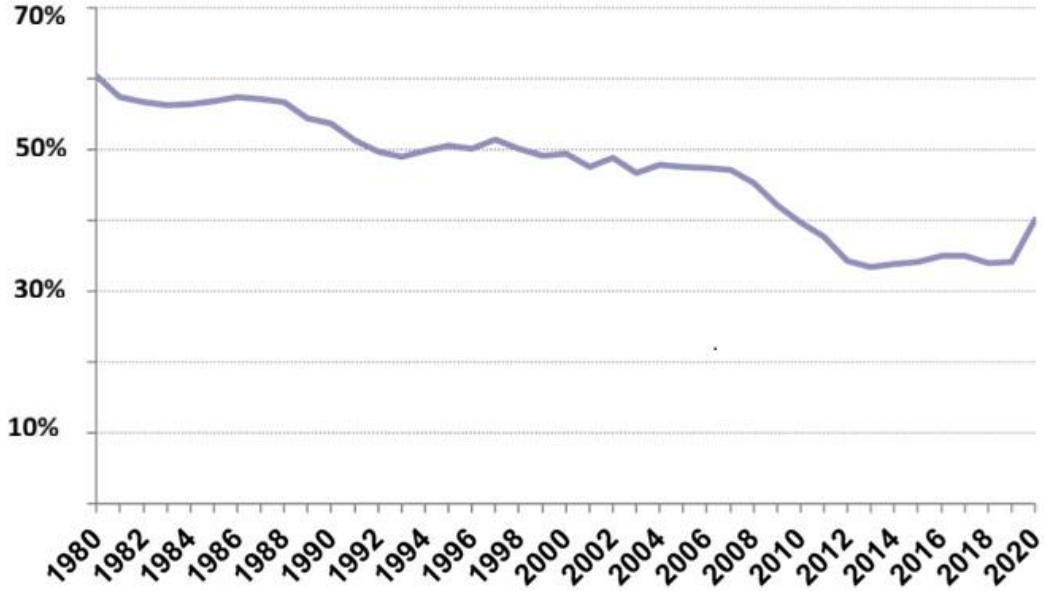
Institutions

TN Sales & Property Tax

- TN one of 9 states with no income tax, so sales tax reliant
- Approximately 100 taxing counties + 350 taxing cities on top of state
- State rate of 7%. Food (for home) only 4%.
- Large items more than $1600 only taxable by state at 9.75%, excess of $3200 at 7%.
- Property tax: commercial, farm, residential bases. Reassessment staggered and slow to update.
- 85% of state and local revenue from both sources.

Sales Taxes Are Goods Based

- The retail sales tax predominantly taxes goods, rather than services
- Thus, things like digital services, housing services, health services, and many leisure services remain untaxed.
- Sales tax base is only about 35% of gross state product.



METHODS

WFH Potential: Treatment/Comparison

- Follow Dingel and Neiman (2020) and Brueckner, Kahn and Lin (2023) to construct commuting zone-specific measures of WFH potential:

$$WFHPOT_{c(j)} = \sum_{i} s_{ic(j)} \, WFH_i$$

  - where WFH_j is the WFH potential of NAICS sector i from DN2020
  - $s_{ij(c)}$ is the employment share of industry i in county j in commuting zone c

Difference in Difference Design

- Aggregate monthly data to quarterly or annual level and implement:

$$\ln\left(R_{j(c)t}\right) = \beta WFHPOT_c \times POST_t + \gamma_j + \gamma_t + \varepsilon_{j(c)t}$$

- where $R_{j(c)t}$ is the revenue or tax base in the county
- In some specifications possibly subsector revenue or base of industry i (or property base) in that county

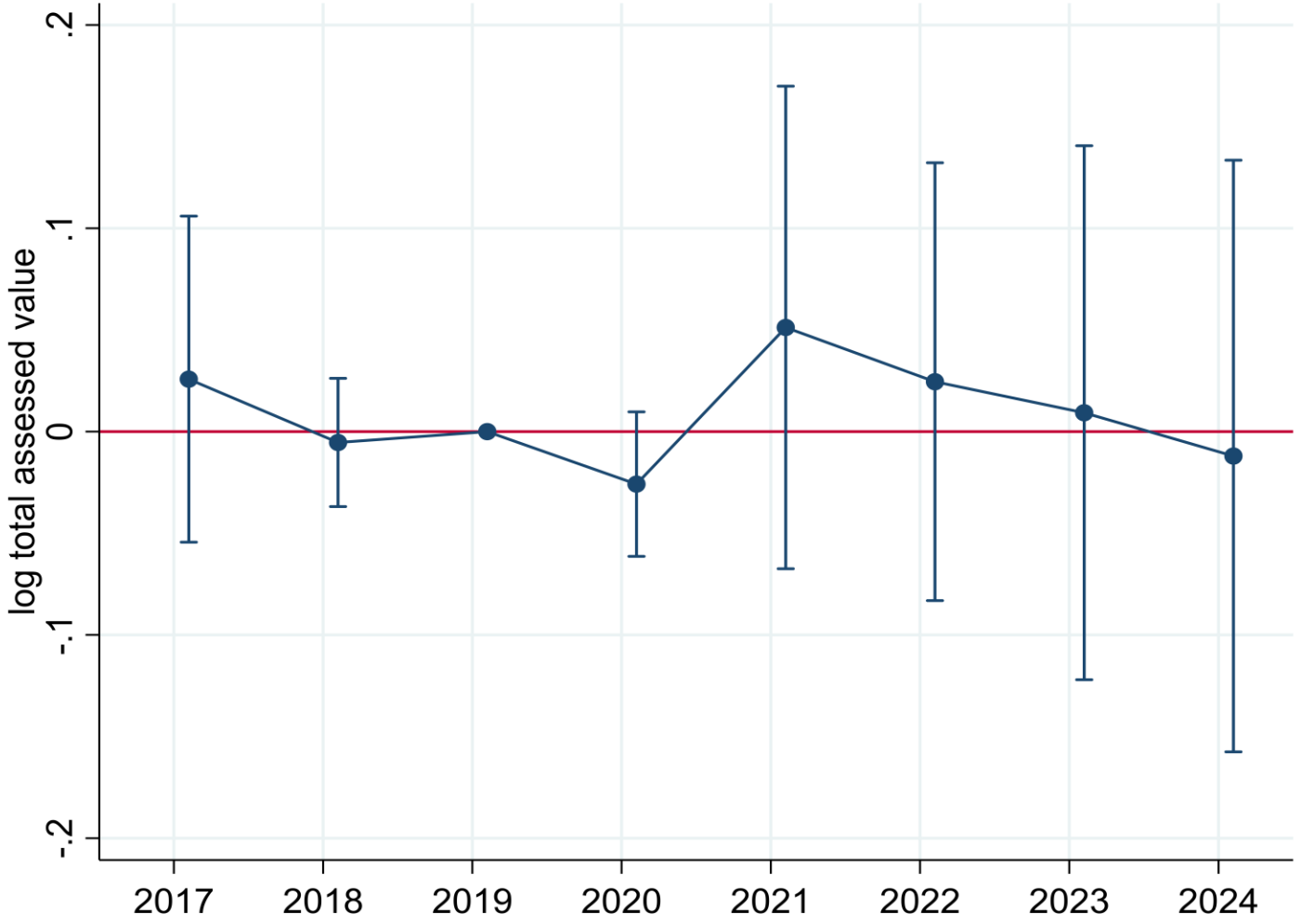
Identifying Assumption

- Continuous treatment: lower-dose units must reflect how higher dose units' outcomes would have changed had they had the lower dose.
  - And the presence of no pre-trends does not provide evidence in support of this stronger assumption.
- Thus, we follow Callaway, Goodman-Bacon, and Sant'Anna (2024, 2025) and aggregate across treatment doses by dichotomizing the continuous variable into high (or medium) and low dose treatments

RESULTS

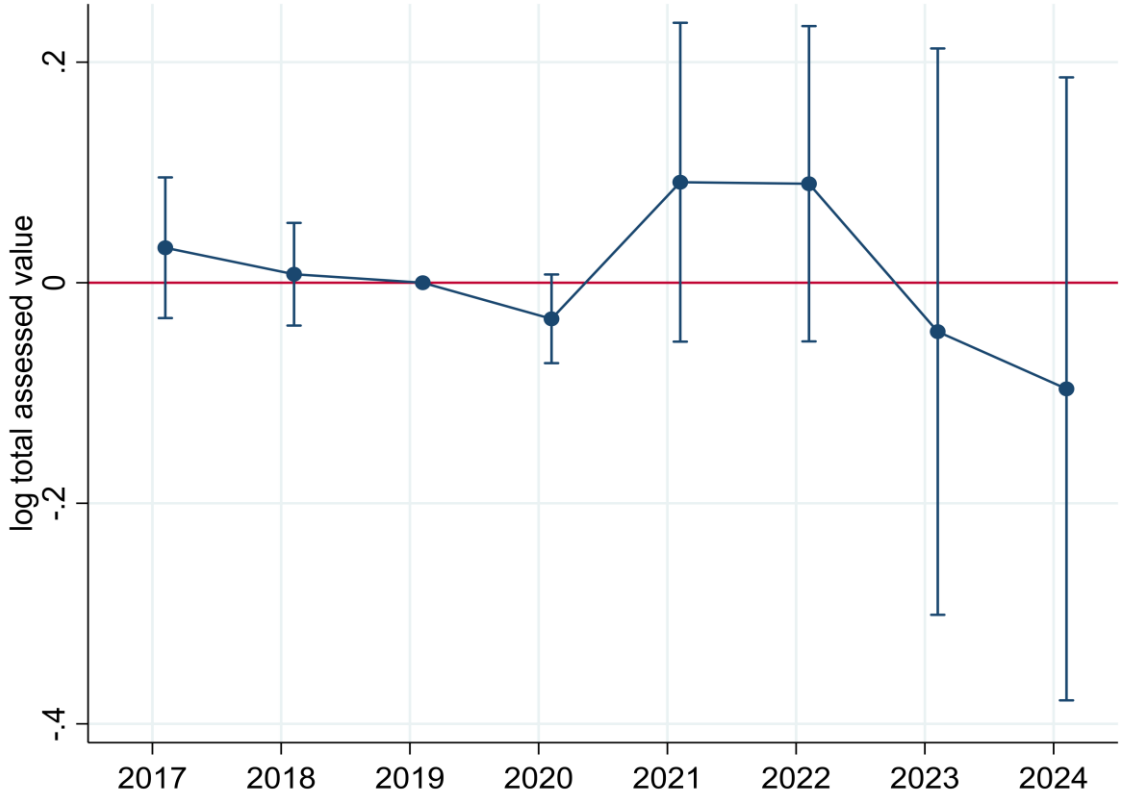
Property Taxes

Property Tax Results

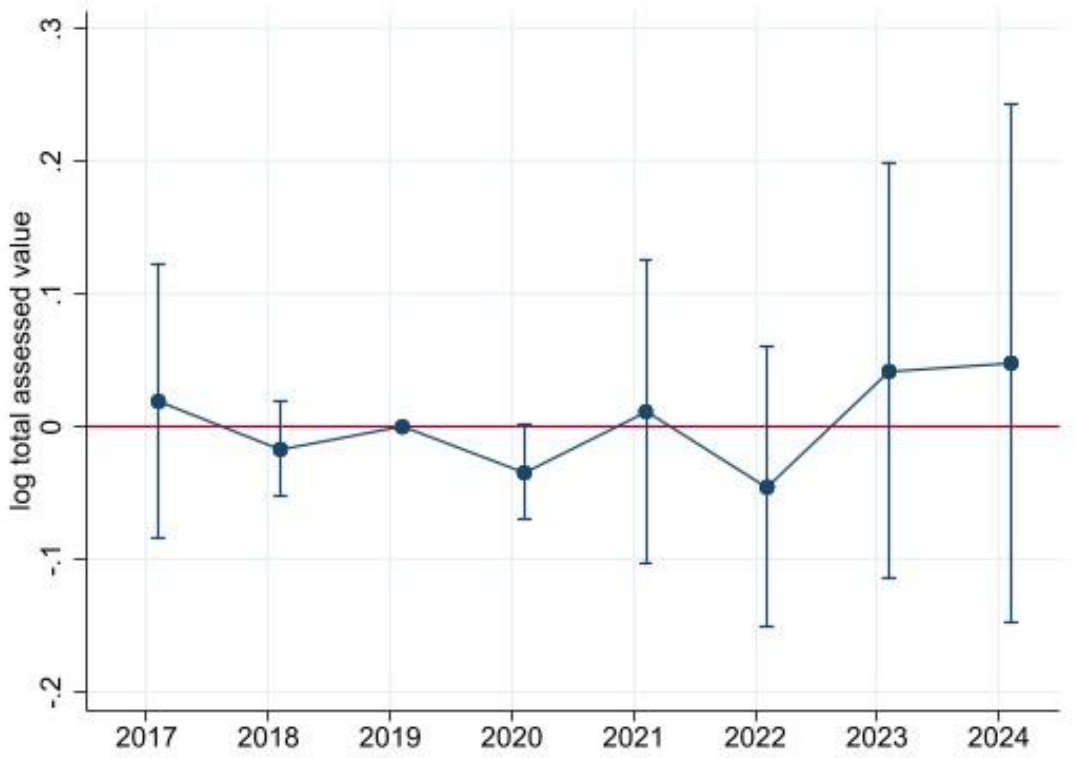


- Null effects perhaps due to data aggregation by base or location

Commercial/Industrial vs. Residential

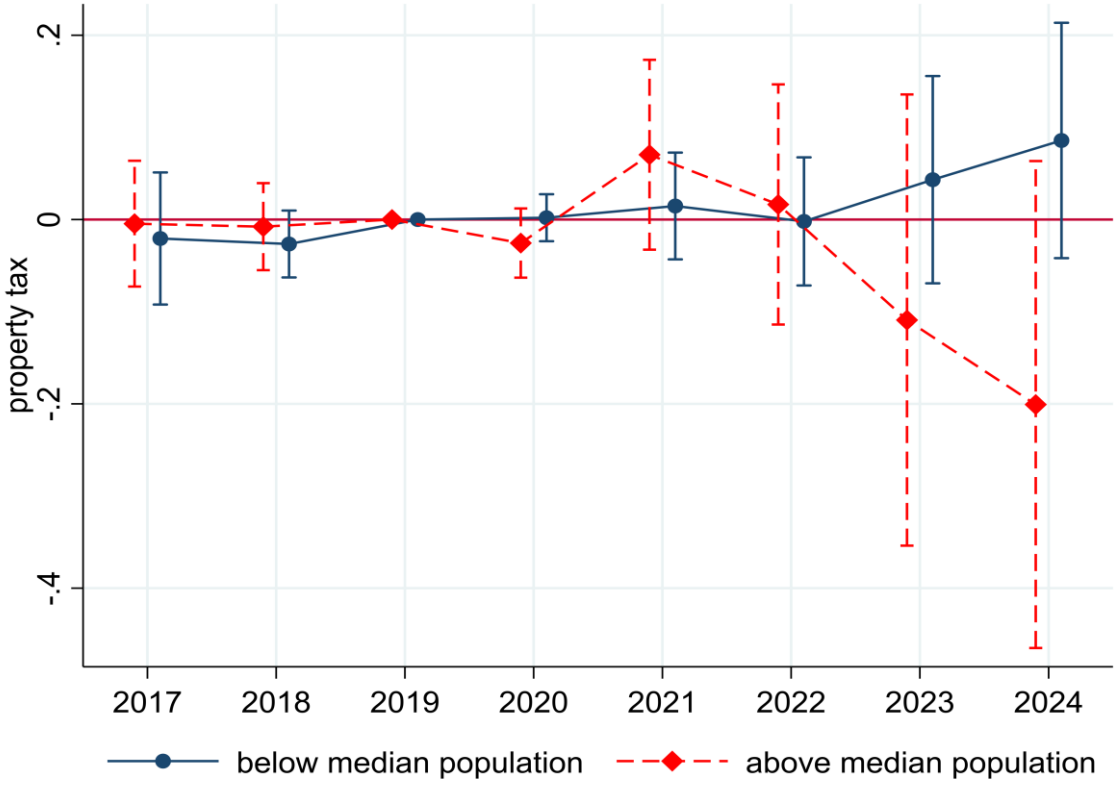


Industrial/Commercial

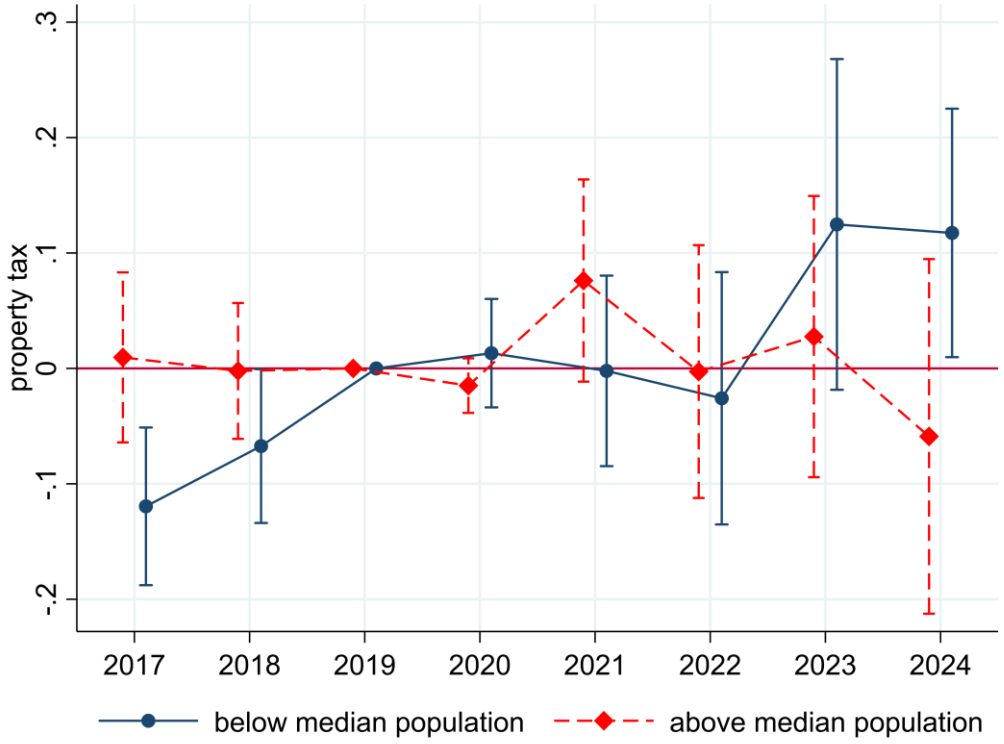


Residential

Central Cities vs. Smaller Suburbs



Industrial/Commercial

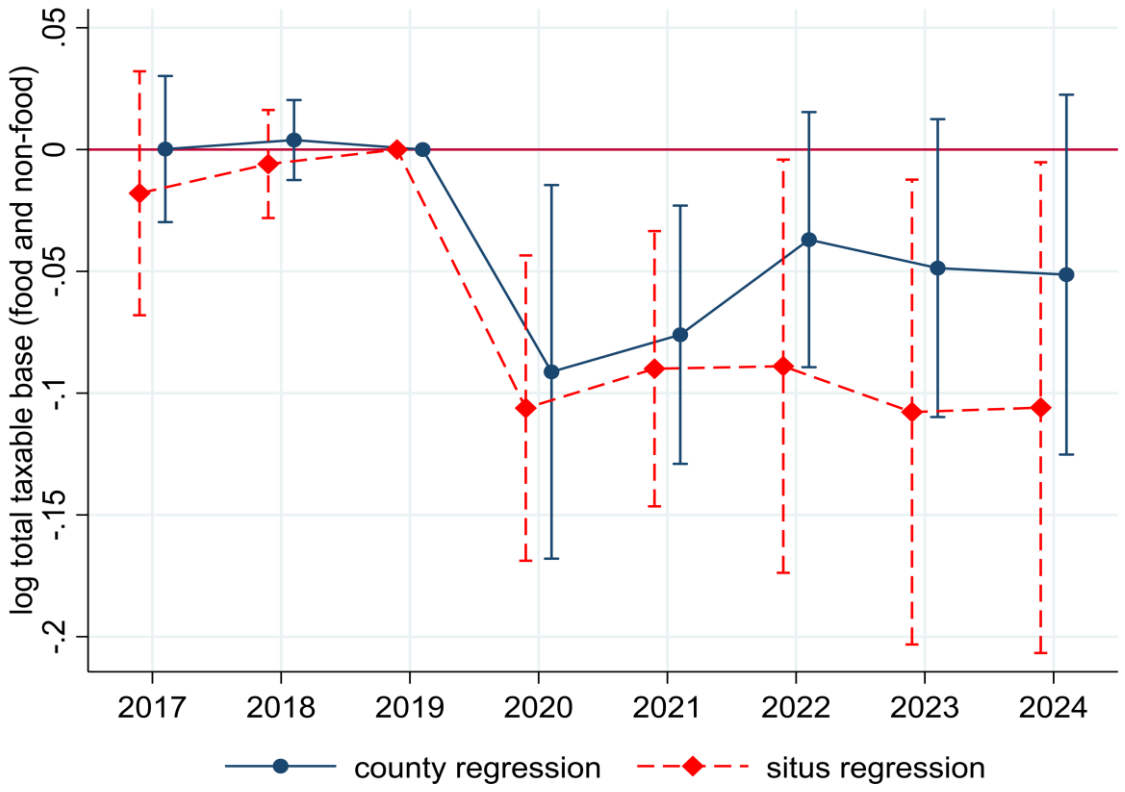


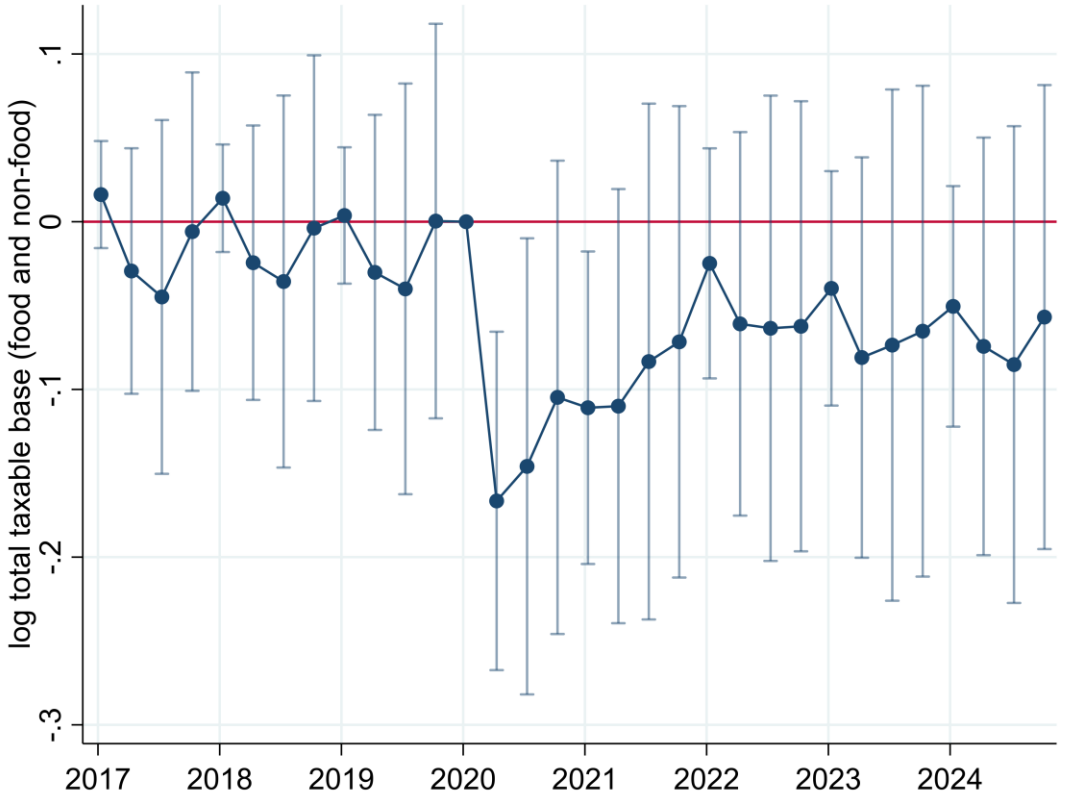
Residential

RESULTS

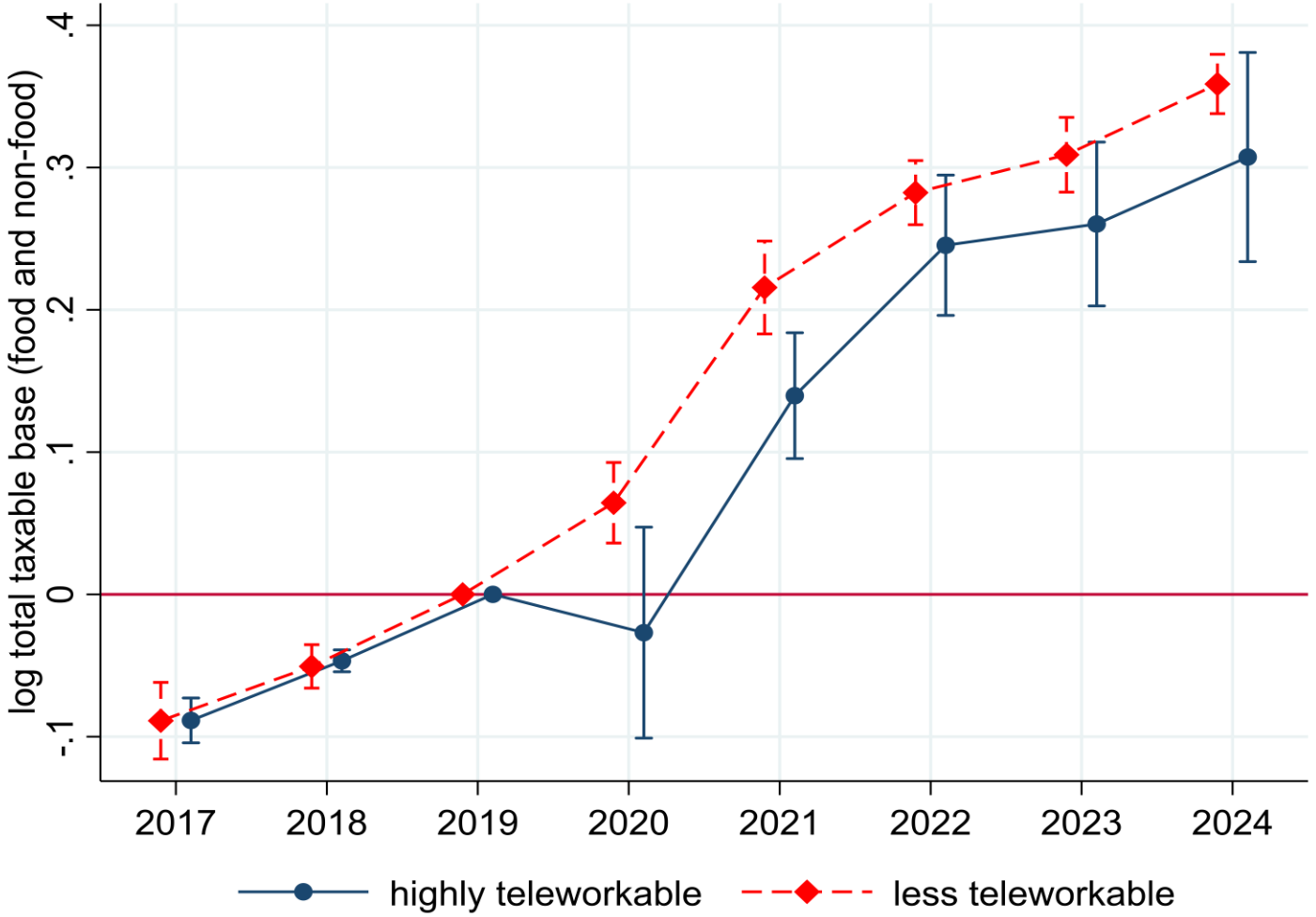
Sales Taxes

Sales Base: Food + Non-Food Purchase

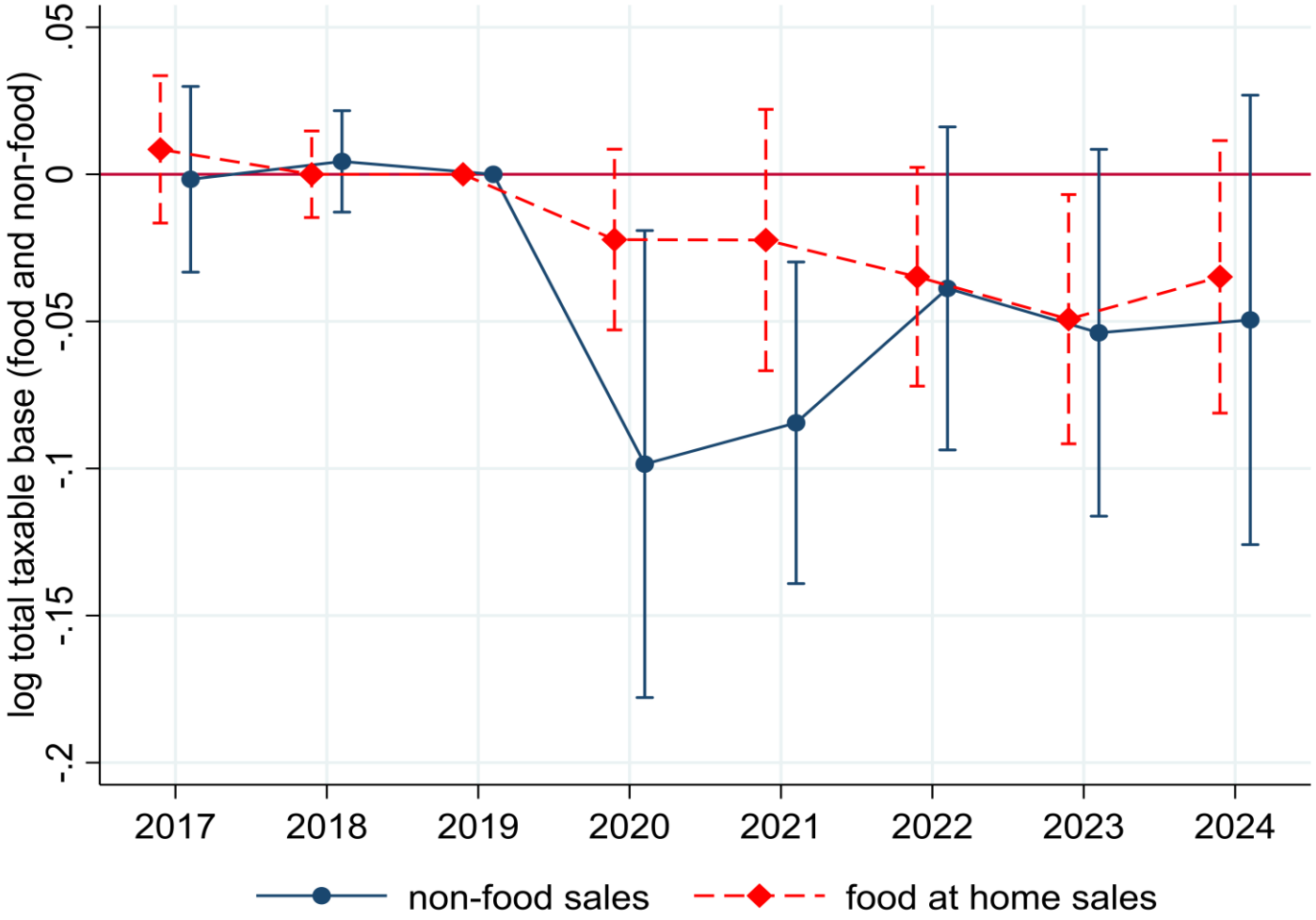




Trends in Treatment / Comparison Groups

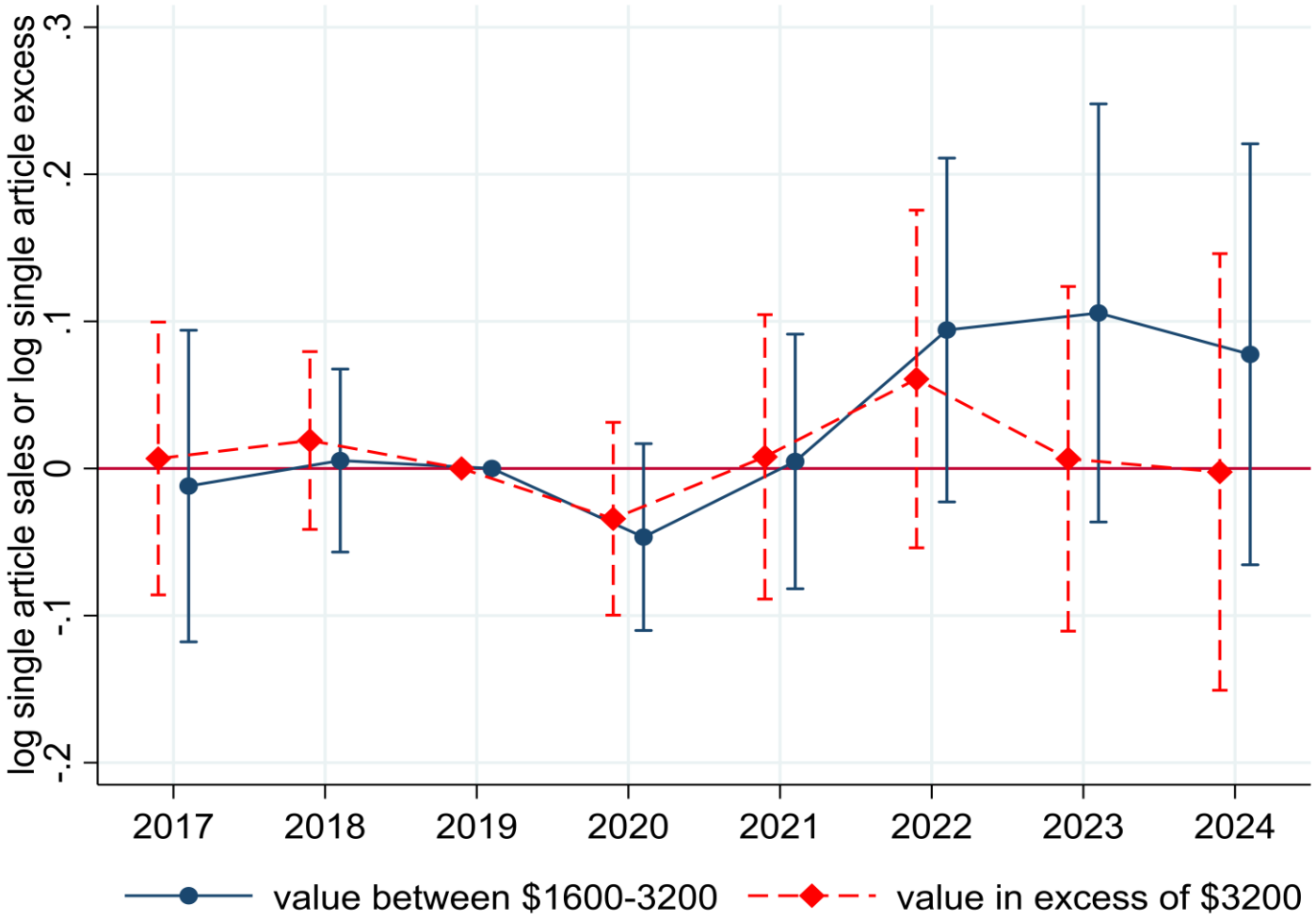


Food (for home) vs. Non-food



- Possible evidence of trip bundling effects (Baker, Johnson, and Kueng 2021).
- Food decline entirely driven by non-“grocery” stores.
- Grocery sees mild increases!

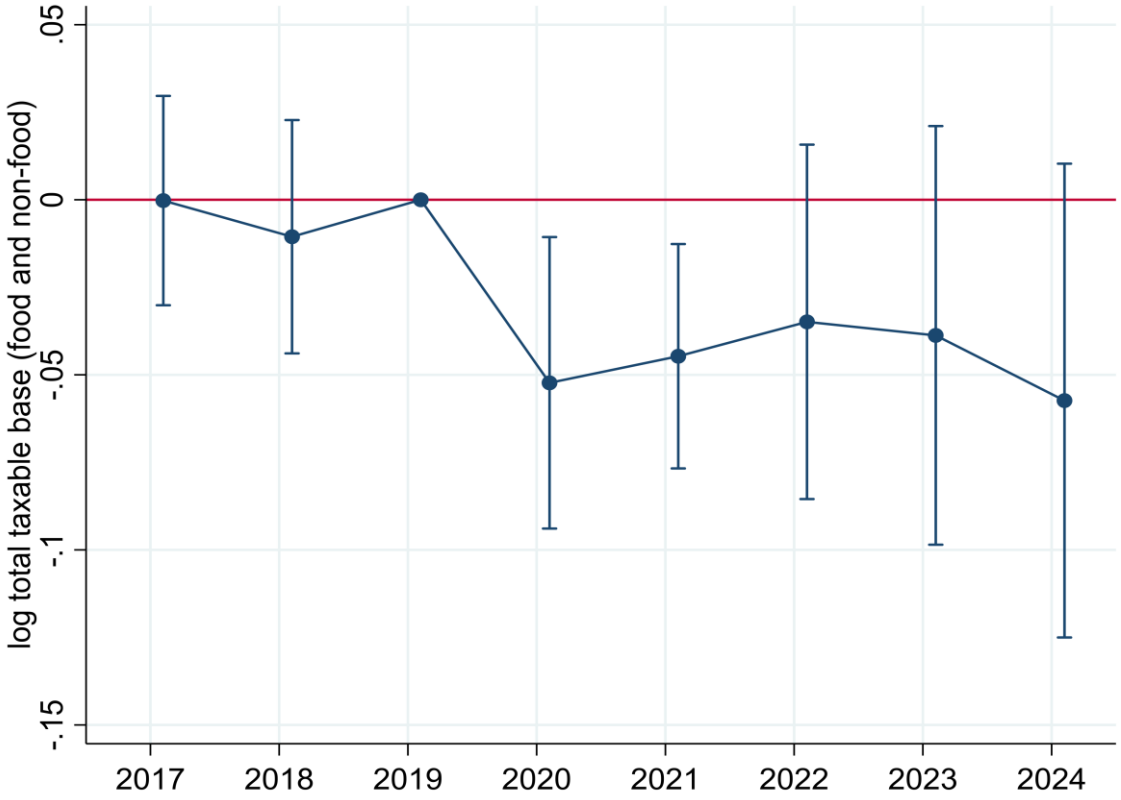
Large Value Purchases



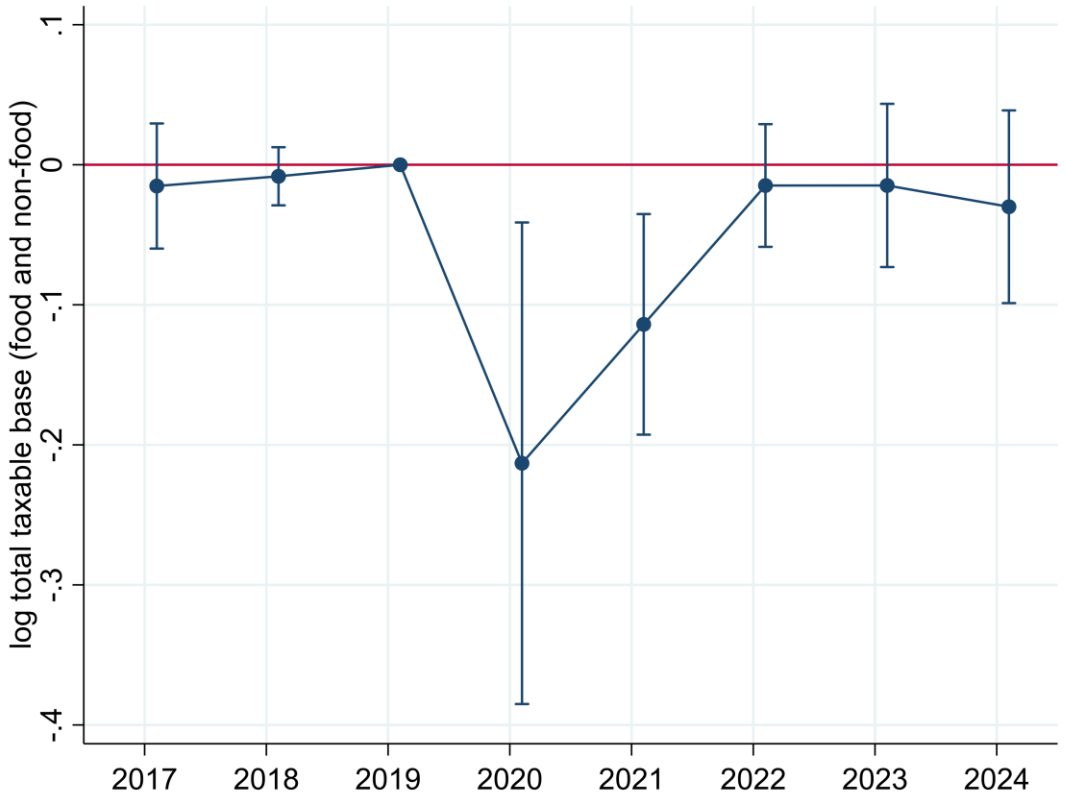
- Blue series as a proxy for large item quantity
- Suggestive people buying more large items but their total value relatively constant

Results by Vendor Type

Retail (NAICS 44/45)

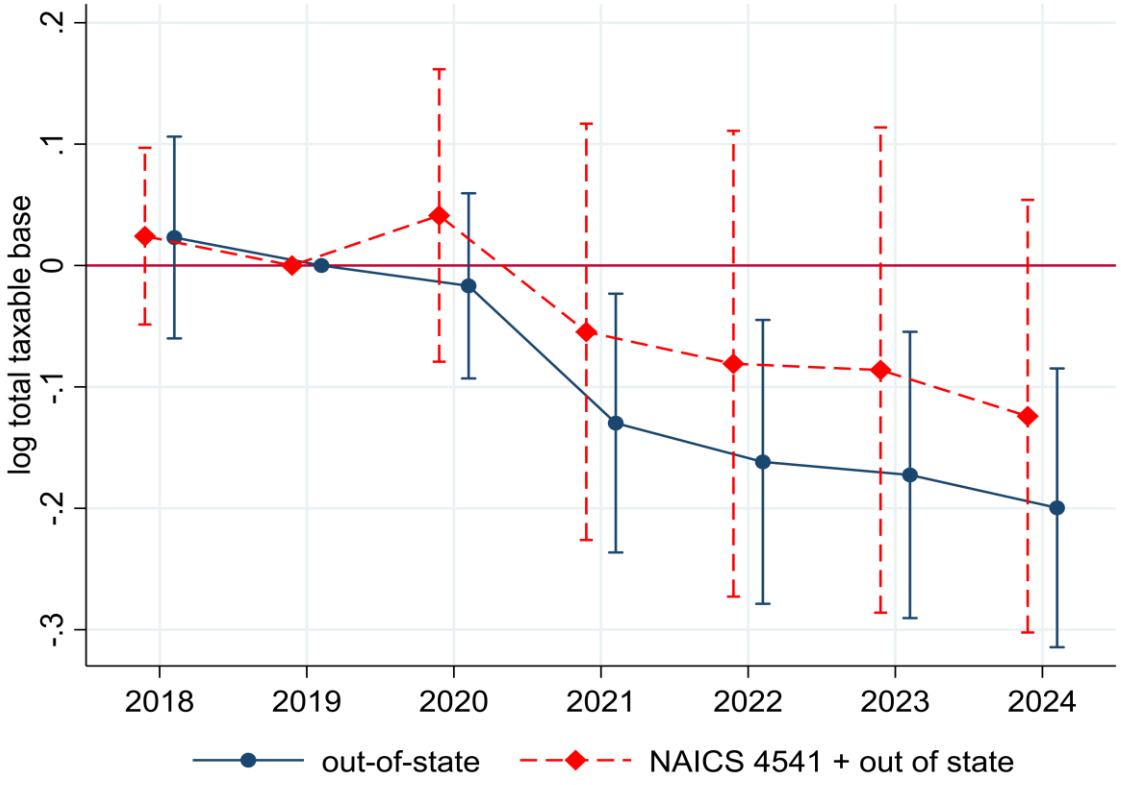


Accommodation and Food Services (NAICS 72)

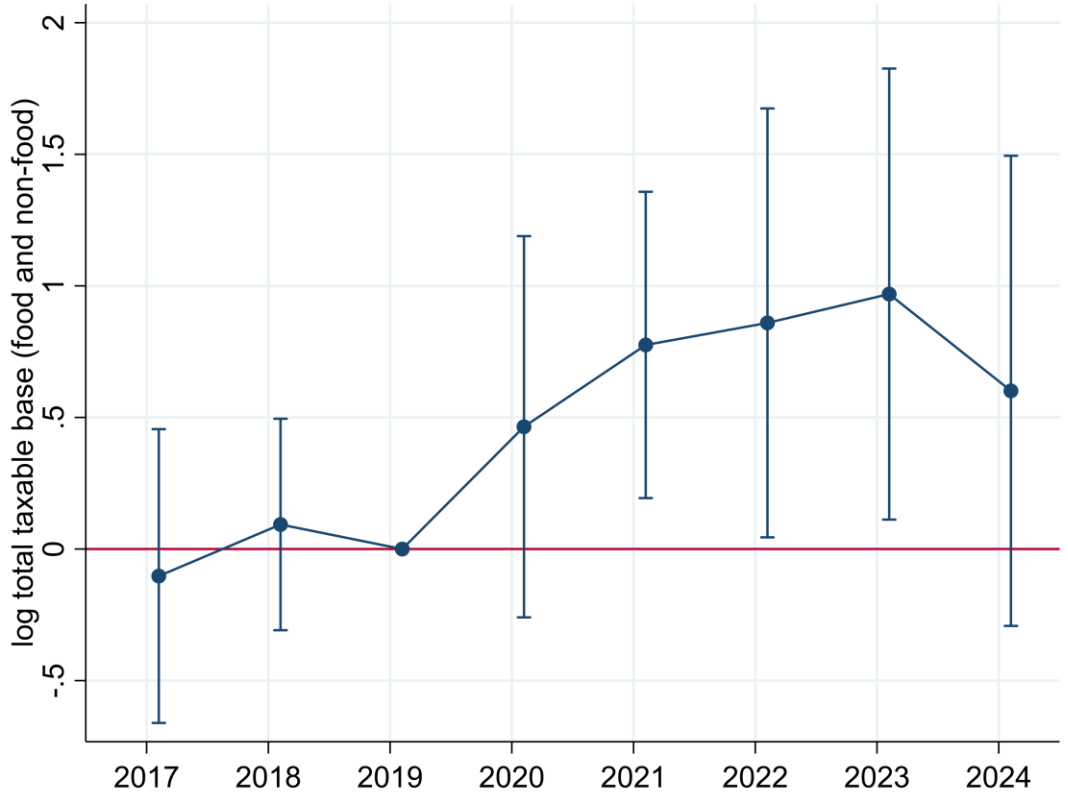


Results by Vendor Type

Electronic Shopping and Mail Order (NAICS 4541) + Out-of-State Sellers



Computer System Design & Related Services (NAICS 5415)



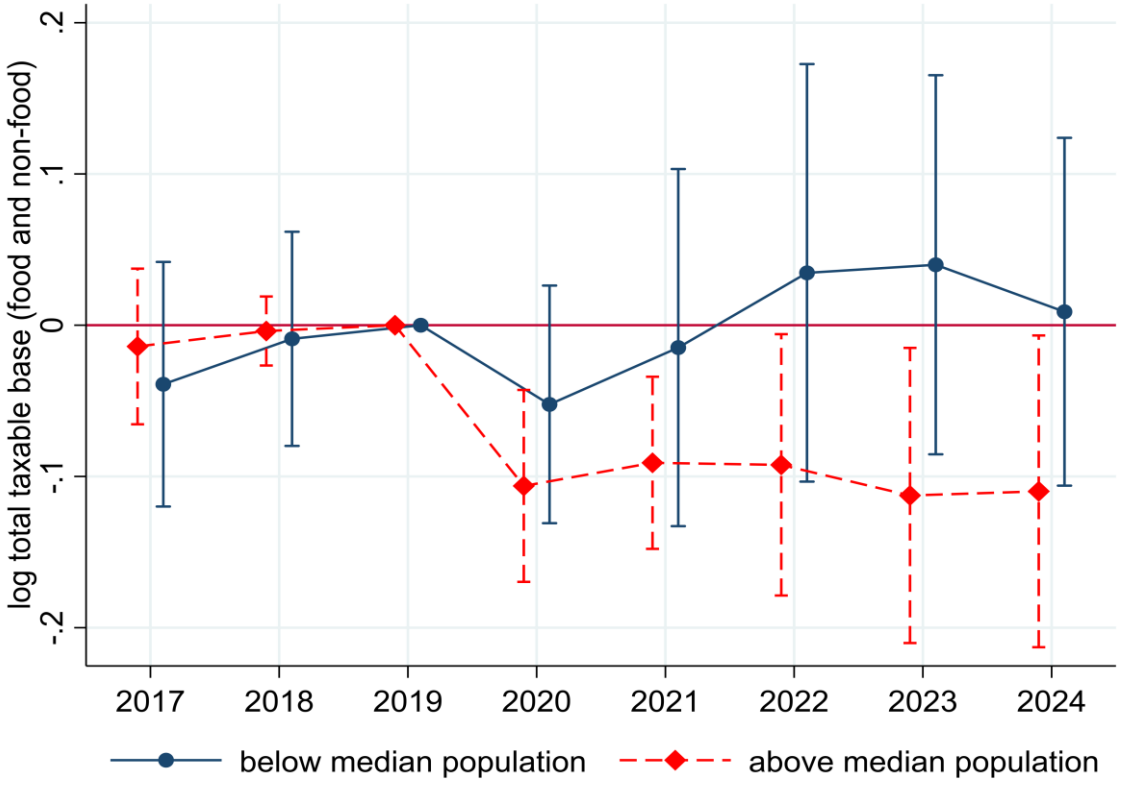
Other NAICS Codes

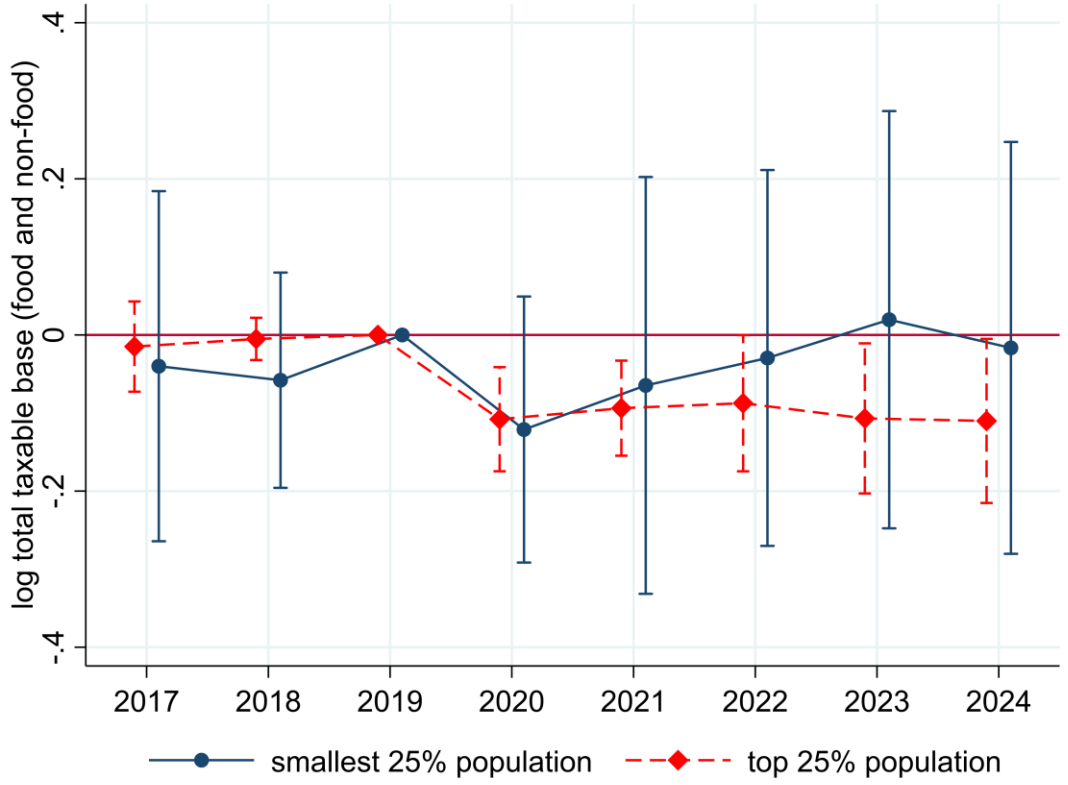
- Decreases in:
  - General merchandise stores, miscellaneous store retailers, gasoline stations, home centers, e-commerce proxy
- COVID era decrease that later rebounds:
  - Food service and drinking places, arts entertainment and recreation, accommodation, appliance stores
- Increases in:
  - Computer systems, finance and insurance
- Null effects in:
  - Food and beverage stores (implies the food decrease is entirely driven by food not sold at the grocery)

Results by Geography

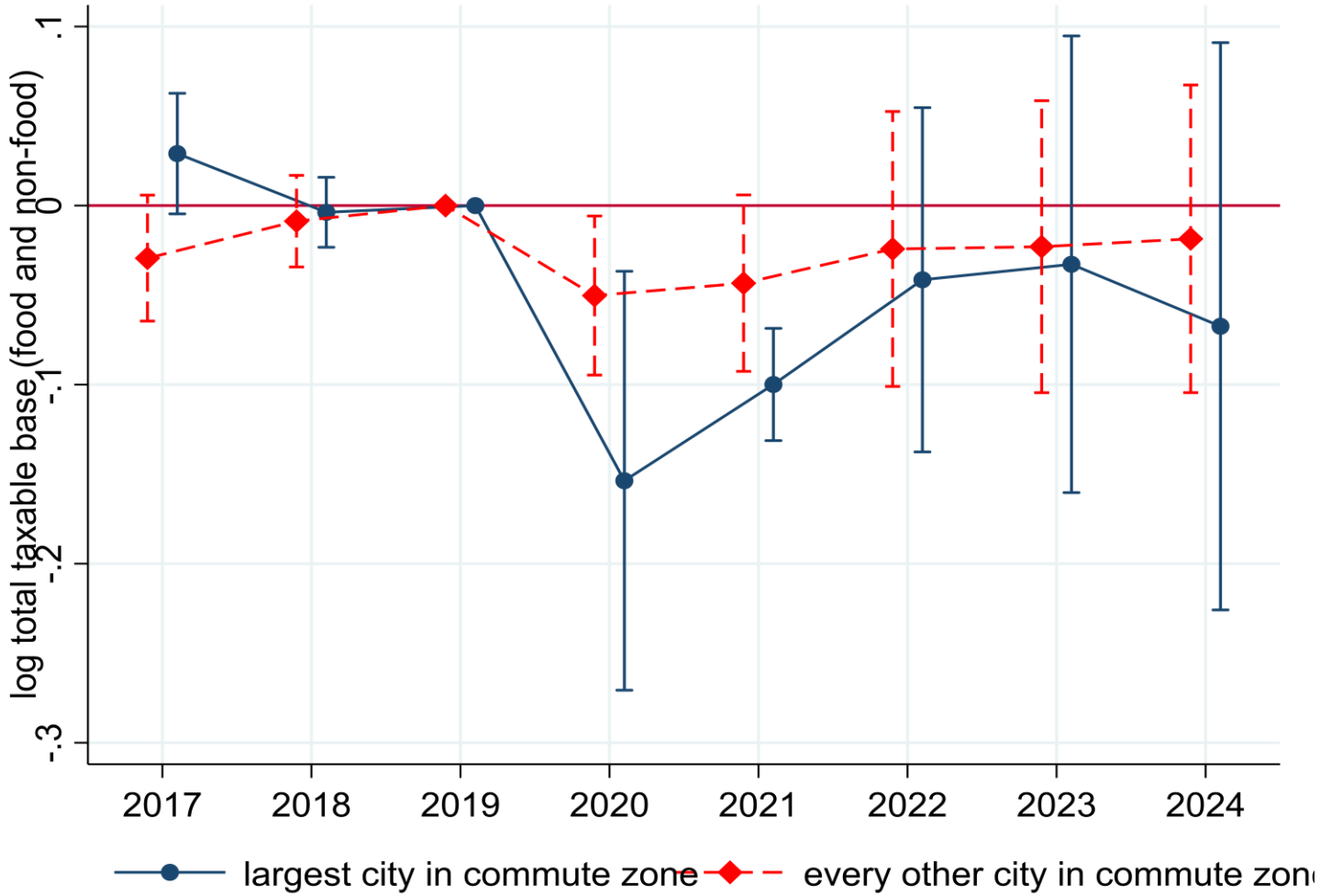
- TN allows for city and county level transactions (+ special districts), so we know the precise situs of all sales.
- Take special districts (e.g., Titans Campus) and roll them up into the cities and counties they are located in.
- Any sale not in a city is in the “remainder” of the county.
- We merge population tabulations for each situs.
- DiD separately for large/small places.

Results by Size





Principal City Versus Everyone Else



- Largest city in commuting zone vs. everyone else.

CONCLUSION

Local Taxation and Telework: Lessons

- We find that jurisdictions from which telework now occurs lose sales tax revenues as the propensity for telework is higher.
- Revenue losses are heavily concentrated in above median population size places.
  - On net, revenues appear to decline over the panel.
- But also suggestive of a shift toward a service and leisure based economy.
- Taxes associated with large items / tourism are less likely to be affected, while those associated with general merchandise stores are more likely to fall.
- Growing remote sales, including those sitused to the location of physical businesses, on the other hand, may increase with telework.

Policy conclusion

- Our results are consistent with no fiscal crisis from telework….
- But larger jurisdictions are losing tax revenues from sales, property and (and from the prior literature) personal income taxes when available
- While simultaneously experiencing loss from growth in e-commerce in the economy
- Important to think about the future of the sales tax and how what is taxed must change due to technological changes in the economy altering consumption patterns

BONUS SLIDES

Preview of Results

- Comparing counties with high telework potential vs. low telework potential in a DiD, we find:
  - no noticeable effect of WFH on property tax revenues (with some minor caveats).
  - Consumption tax revenues decline in high WFH areas.
  - Due to declines in large cities, not smaller.
  - Mainly due to non-food declines; e-commerce sales, computers systems see increases.

Administrative Data from TN

- Our focus: rich administrative data on property and consumption
  - Property: commercial vs. residential vs. farm
  - Consumption: retail goods, goods in service sector, food at home vs. food at restaurant, e-commerce, etc.

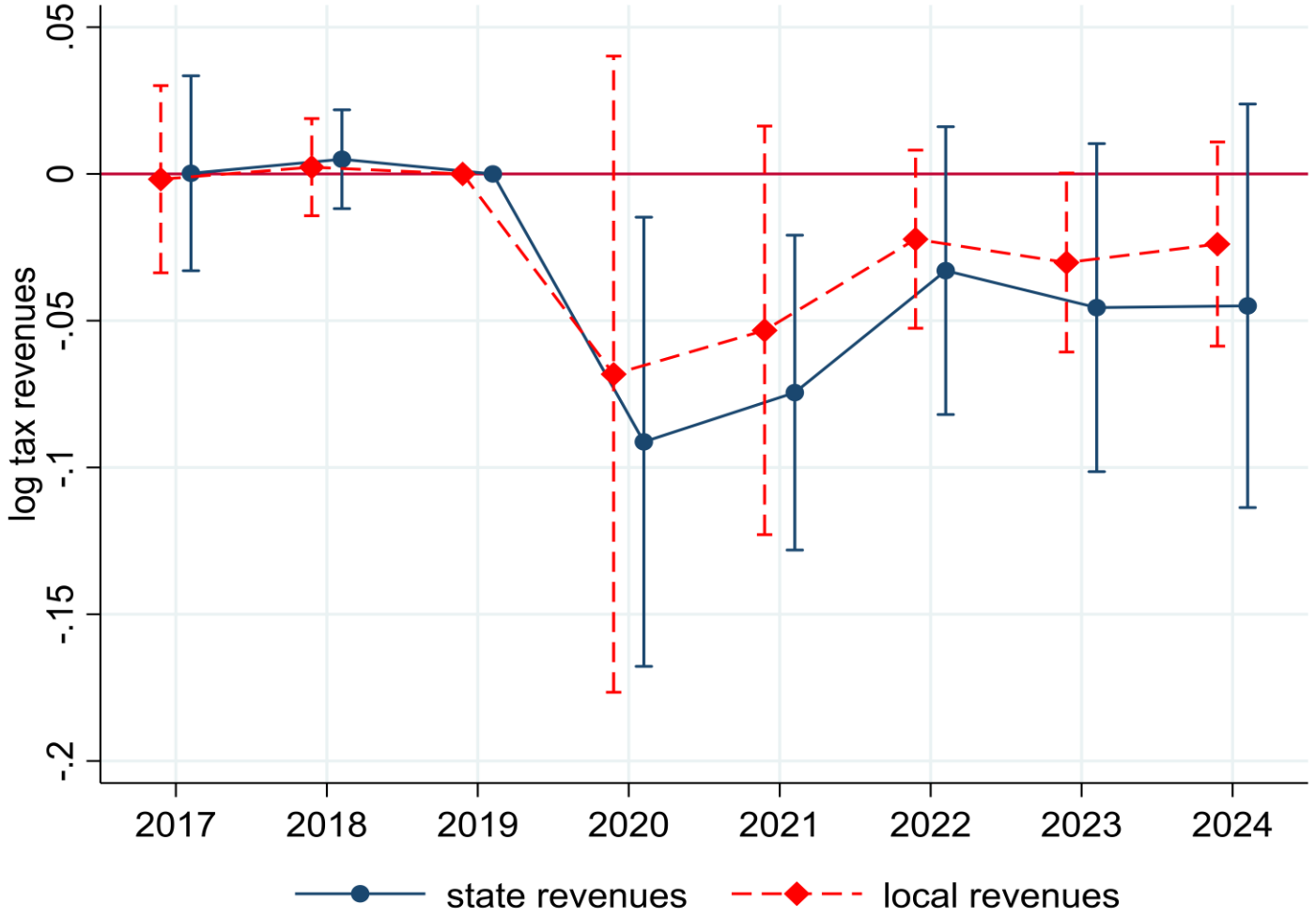
- Information on the precise situs of the tax base.

- Which and where are subcomponents affected by telework?

Data Advantages and Disadvantages

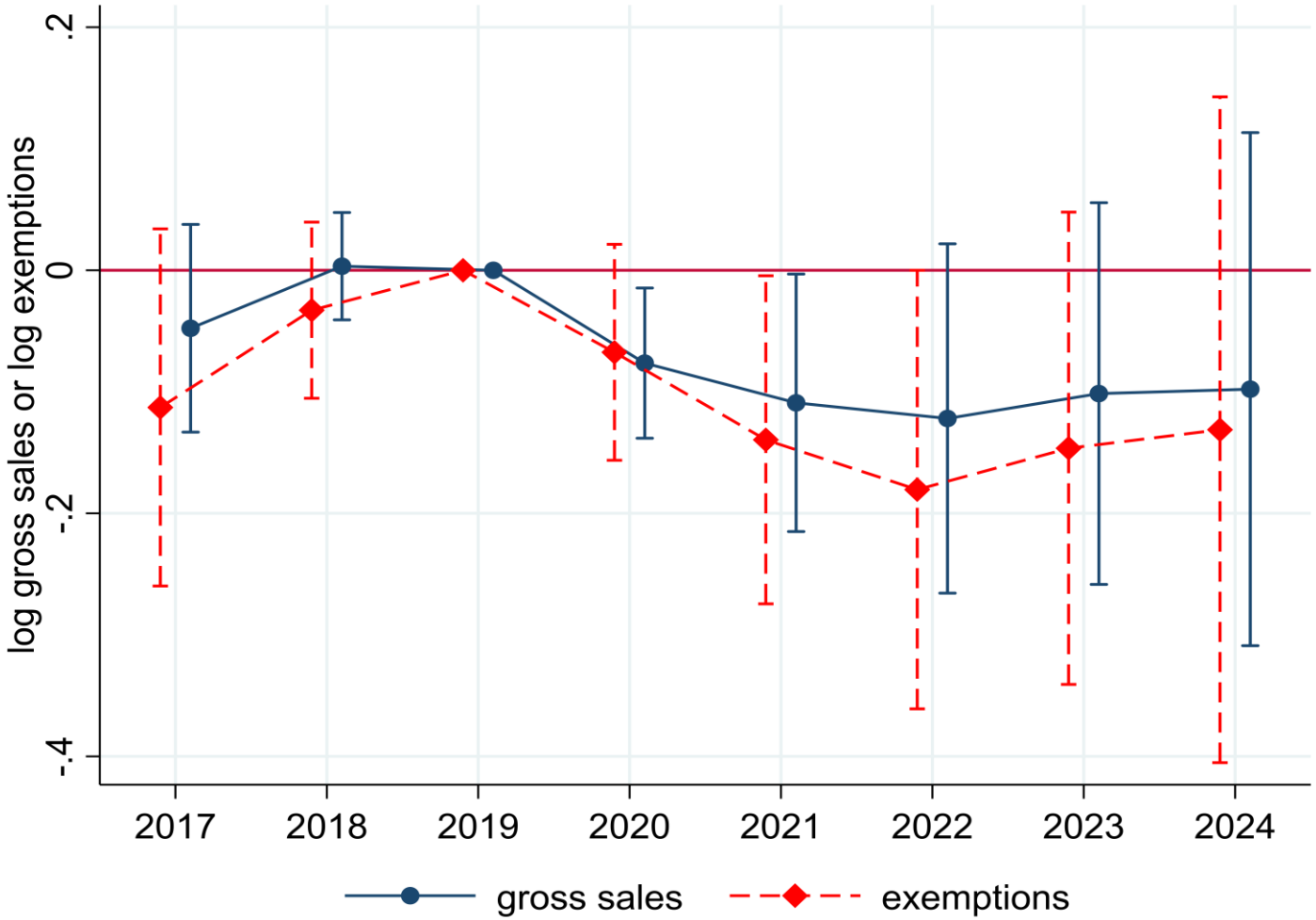
- Data are great! In terms of local revenue data, this is the most detailed data possible. No state release these data publicly.
- Cells with fewer than 4 firms are redacted. Not problematic for large counties or unless looking at very fine NAICS codes.
- TN has complicated rules on determining the situs for e-commerce and out-of-state sellers have less information.
- Property tax data: Data on appraised property base at city/county level and by type (commercial, residential, farm).

State Versus Local Revenue



- Localities differ in:
  - What they can tax
  - Maximum taxable amount
  - Tax rates

Tax Base = Gross Sales - Exemptions



- Exemptions:
  - sales shipped out-of-state
  - sales for resale
  - sold to non-taxable buyer
  - food paid with SNAP

Robustness Checks

- Change treatment threshold to be high/low WFHPOT.
- Add covariates (unemployment, tax rates, population, etc.)
- Compare low with medium dose treatments.
- Weighted/unweighted regressions.