How Telework Affects the Composition of Local Taxes

by
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Introduction

The rapid expansion of fully remote or hybrid work from home (WFH) that has taken place during and since the Covid pandemic has been extensively discussed.[2] Increased WFH has potential implications across many economic dimensions, such as worker productivity,[3] the ability to hire workers across expanded geographic areas, changes in commuting patterns and so forth. We focus on one potentially major concern, impacts on state and local taxation.

Changing WFH patterns not only potentially impact where personal income taxes are remitted and the effective income tax rates confronted by workers at separate locations[4] but can alter the geographic distribution and levels of almost all state and local taxes. While much of the literature has focused on what jurisdictions should tax income, our focus is on other taxing instruments. For example, the distribution of sales taxes can change if teleworkers now eat at home instead of consuming downtown lunches, have food delivered, or eat in restaurants near their residence rather than near their place of work and these are in different jurisdictions. These actions potentially not only shift which jurisdiction receives the sales tax revenue, but in the case of switches from restaurant meals to food-at-home, potentially whether the transaction is taxed at all. Lower need for commercial and office space can reduce property taxes in central cities, though greater demand for housing to allow work at home may offset this to some extent.

Personal income taxes were the second largest source of revenue for U.S. state and local governments (25.4 percent of taxes) in 2022, but this means about three-fourths of tax revenues come from the other sources, which also may be affected by WFH.[5] Focusing only on income taxes because telework directly affects the labor market ignores the important channels that work from home can have on other important revenue sources. Further, income taxes collect only 5.0 percent of local tax revenues and are only imposed in 10 states (with very small revenues in two others), meaning there will generally be limited effects on local government from within state changes in WFH. The broad set of non-personal income, state and local taxes raised nearly $2.7

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[2] See Aksoy, et al. (2022), Barrero, Bloom and Davis (2021), Dingle and Neiman (2020), and Zarate (2024).

[3] See Nicholas Bloom (2024) for comprehensive discussion of the productivity effects.

[4] See Agrawal and Stark (2022) and Agrawal and Brueckner (2025) for detailed discussions of implications for state and local personal income taxes. They point out that these depend on the extent of WFH behavior, the distance from former workplaces to home, and the institutional structures of state and local income taxes at both places. The institutional features often differ across the U.S and can themselves elicit WFH behavioral responses.

[5] https://www.census.gov/data/datasets/2022/econ/local/public-use-datasets.html and authors calculations.

trillion during fiscal 2022. This paper focuses on identifying effects on these non-income taxes, and in particular how greater WFH alters the level and distribution of sales and property tax revenues, highlighting the heterogeneity across sectors resulting from nuanced substitution patterns across goods and properties. Property taxes were 27.4 percent of state and local tax revenues in 2022, general sales taxes were 23.5 percent (local governments in 36 states impose local sales taxes), selective sales taxes were 9.8 percent and corporate income taxes were 6.7 percent.

Of course, the idea that WFH can affect non-income tax revenues is not new, as a literature in urban economics has studied the "urban doom loop" resulting from the spiral in commercial real estate prices after WFH (Gupta, Mittal, Van Nieuwerburgh 2022). The basic idea is that WFH causes businesses to demand less central-city office space, which causes prices to fall in the city. In turn, declining prices lower urban property tax revenues, which result in cuts to city services. Lower public services result in out migration from the city, which further lowers property tax revenue, resulting in a doom loop for cities. While the literature has studied the effect on prices, the empirical evidence on revenues is limited. And this literature generally ignored how telework changes consumption patterns, and thus sales tax revenues.

Relationship Between Taxes and WFH

Working from home but within the same taxing jurisdiction does not alter taxes in the narrowly defined case where *everything* is the same except the location of work. But WFH changes a variety of other transactions as households and businesses change what they buy and where they buy it. Likely behavioral changes associated with WFH may alter the size of the tax bases with institutional features such as tax exemptions for food-at-home, but not for restaurant meals, affecting both taxability and the size of tax bases. Changing jurisdictions where taxable activity occurs, as might happen if individuals no longer travel to the city from the suburbs, creates additional effects. As seen in the discussion below, the expected effects of WFH depend on specific items purchased, which requires precise decomposition of revenues into their individual components to quantify. We first discuss revenue effects within a single jurisdiction and then the cross jurisdictional implications.

Behavioral responses associated with WFH decisions, and the institutional structures of the tax system determine the effects on sales and property taxes, even within a given jurisdiction. WFH entails less use of commercial and industrial property and presumably lower associated property tax payments, at least in the longer term after firm demand for property declines, leases expire and are not renewed, and market prices adjust to the new equilibrium and property has been reappraised. On the other hand, more housing demanded to provide workspace (Mondragon and Wieland, 2022; Stanton and Tiwari, 2021; Gamber, Graham and Yadav, 2023; Brueckner 2024) can increase property tax revenues, again, after full market adjustment and property reappraisal occurs.

In many states, property classifications may influence the degree to which gained revenues from residential properties offset lost revenues from commercial properties. In Tennessee, for example, residential property is taxed at 25 percent of full value, while commercial and industrial property is taxed at 40 percent. Thus, the total property tax base declines by 37.5 percent from simply substituting the same appraised housing value for commercial and industrial value. The total effect on property tax revenues also depends on the net effect of increased demand for housing and decreased demand for commercial/industrial property combined with the relative values of the two types of property. Reappraisal usually occurs in cycles, which differ across states; reappraisal is generally every four years in Tennessee. The net effects of these market and institutional forces mean the property tax responds to new market values with substantial lags, given the timelines for reappraisal cycles and need for property markets to adapt, so a significant window may be necessary to quantify the effects. While we plan to look at these relative shifts, with only 4 years of post-pandemic data, we expect identifying large effects to be challenging despite the dramatic changes in commercial and residential market values that have occurred.

Likewise, changes in purchasing decisions affect sales taxes, and the specific effects can depend on the institutional structure. For example, food consumed at home is exempt from sales tax in most states, but restaurant food is taxable at the general sales tax or higher rate, meaning transitions to eating at home reduce sales tax liabilities even if the same expenditures are made.[6] If WFH reduces restaurant meals at the expense of home-cooked meals, this can reduce sales tax revenues by up to 10% in some states, even if the dollar value of the food inputs necessary to prepare home-cooked meal is identical. Other purchasing decisions by either the firms or workers can also influence taxability. Simple examples, such as decisions to purchase more casual clothes, might influence tax liabilities. It is also possible that office purchases by businesses are exempt when the same purchase by employees for work at home is taxable. At the same time, WFH has spurred a boost in weekday leisure activities. For example, Finan and Bloom (2023) shows an over 150 percent increase in golf trips during the week. More generally, this could increase gym subscriptions or other leisure services, and the extent to which this translates into sales tax revenue depends on whether those services are taxable in the state.[7]

WFH potentially alters the distribution of tax revenues across jurisdictions and could raise or lower the total property and/or sales taxes in some jurisdictions at the expense of others.[8] Tax revenues redistribute across jurisdictions if increasing WFH alters the jurisdiction in which taxable activity occurs. On the one hand, hybrid WFH may result in individuals moving further

[6] At least 36 states exempt food for consumption at home and four states have favored rates. Tennessee taxes food at home at a reduced 4 percent rather than the general 7 percent rate. Food in Tennessee is also subject to the relevant local sales tax rate. See https://taxadmin.org/wp-content/uploads/resources/tax_rates/sales.pdf

[7] States differ significantly as to inclusion of services in their sales tax base. A survey of state and local sales taxation of services can be found at https://taxadmin.org/sales-taxation-of-services/ Trend expansion of the base to services has taken place over recent decades. For example, Kentucky expanded the base to 30 new services in 2023, such as recreation, photography and rental space. Tennessee did not expand the base to any new services during our panel.

[8] Presumably, workers seek to maximize some version of total utility and not minimize total taxes paid when making WFH decisions. Efficient decisions consider out of pocket and time commuting costs and other factors when making WFH decisions, which allows for the possibility that state and local taxes increase even as overall wellbeing rises.

away from the city center, shifting revenues from urban to suburban places. At the same time, less cross-border commuting may result in taxable activities occurring in different jurisdictions. These channels can affect both the property and sales tax bases. Total tax revenues may rise or fall depending on the tax rates in the two jurisdictions and the other institutional features that were discussed for within jurisdiction WFH.

Changes in the property and sales taxes may be independent but may also be related. For example, property value changes may be a result of changes in sales taxable purchases and vice versa. For example, increases in demand for suburban retail space may raise commercial property values there. Alternatively, greater demand for housing may lead to decisions to purchase furniture, such as desks, which are sales taxable. Some sales taxable purchases may also be taxable as business personal property.

WFH may also encourage the digitalization of economic activity. Individuals who WFH may be more likely to buy goods online rather than brick-and-mortar. This affects tax revenues in two ways. First, in many states e-commerce taxes are sourced to the destination locality, meaning that a switch from a brick-and-mortar purchase shifts the taxable location from the county with the retail center to the county where the individual lives (Agrawal and Shybalkina 2023). Second, tax avoidance of online transactions may be easier if the vendor does not have an economic nexus in the state, meaning that revenue may decline.[9]

Data and Approach

We use highly detailed sales and property tax data from the state of Tennessee to investigate the relationship between increased WFH and the levels and distribution of property and sales tax revenues for all local governments in Tennessee. We use monthly state and local sales taxes data from January 2017 through early 2025 for the universe of registered sales taxpayers[10] and annual property tax data for 2017 through 2024 to analyze how rapid increases in WFH affected tax revenues. The unique sales tax data are disaggregated across various vendors by NAICS codes, allowing us to separately determine the revenue effects across various types of vendors, e.g., food versus non-food versus restaurant meals.[11] This is especially important in Tennessee because food is taxed at a reduced state rate, although still subject to local tax rates. This taxation of food allows us to collect data on food purchases, facilitating estimating of the shift between restaurant or non-restaurant meals, which in other states may have even more significant revenue implications due to the complete zero-rating of food.

[9] The switch to economic nexus increases tax revenues, yet some non-compliance still remains due to smaller vendors, difficulty in identifying taxable vendors, and so forth (Fox, Hargaden Luna 2022).
[10] 7.0 percent of vendors and 5.9 percent of state net taxable sales, including food, were redacted because of limited sample sizes in some NAICS codes and some smaller local governments.
[11] The data base separately identifies food purchased at the favored tax rate, which permits analysis of food-at-home across all types of vendors, including food stores, restaurants, department stores, gasoline stations, and so forth.

Tennessee's distribution of state and local tax collections differs from the national averages in two important ways that enhance our ability to focus on non-income taxes. First, Tennessee is one of nine states with no state personal income tax and does not permit local income taxes. Thus, we can isolate effects on non-income taxes without considering intrastate responses to personal income taxes.[12] Second, Tennessee relies more on sales taxes at both the state and local levels than national norms, which is not surprising given the lack of income taxes. But the state also relies on property taxes somewhat less than the national average. Property taxes generated 70.2 percent of total local taxes in the country, versus 65.0 percent in the state. Local governments in Tennessee offset lower property taxes by raising 22.1 percent from sales taxes versus 14.1 percent across the nation. Tennessee's local sales tax share is higher than average, but much below states such as Louisiana (51.5 percent) and New Mexico (42.3 percent). Combined sales and property taxes raise 87 percent of local tax revenues in Tennessee.

The sales tax data permit us to examine how revenues respond in places where more WFH occurs relative to places where work formerly occurred in business offices. Availability of sales tax data by NAICS code allows investigation of more nuanced behavioral responses in where and what people and businesses purchase as WFH grows. The Tennessee Department of Revenue collects and distributes the revenues for 450 counties and cities that are recipients of local sales tax revenues, permitting detailed analysis of geographic and institutional effects.[13]

In the data, remote sellers (from out of state vendors without physical presence) are isolated from sales by vendors with physical presence. Tennessee, like all other sales taxing states, adopted new sales tax statutes for remote vendors after the *South Dakota v. Wayfair*[14] decision. As a result, the Department of Revenue data permit us to distinguish between sales by remote vendors and those located in Tennessee. Out-of-state vendors began self-identifying as remote firms through the compliance process in December 2017 and requirements for remote vendors to collect sales taxes began in July 2019, though some began to voluntarily comply prior to this date.[15]

Tennessee levies the sales tax on instate sales at the point of sale and not at the residence or location of the purchaser, even if delivered to another jurisdiction in the state. Of course, these purchases are in the same jurisdiction unless cross-border shopping occurs. Out-of-state sales delivered into Tennessee, on the other hand, are situsted at the destination, rather than the point of sale. Remote firms can remit local sales tax revenue at a fixed rate to the state for formula distribution, which most firms did in the early months. By November 2019, over 80 percent of

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[12] Of course, WFH responses to personal income taxes may arise as migrants into or out of Tennessee consider other states' personal income taxes in their location decisions. Inbound migration to Tennessee rose from 192 thousand annually from 2016-2019, prior to the rapid expansion in WFH, to 217 thousand annually from 2021-2023, potentially suggesting some increase in working from Tennessee to avoid other state and local income taxes. https://www.census.gov/data/tables/time-series/demo/geographic-mobility/state-to-state-migration.html

[13] We do not examine effects on the modest distribution of state sales tax collections to cities.

[14] South Dakota v. Wayfair, Inc.,138 S. Ct. 2080, 201 L. Ed. 2d 403, 2018

[15] The collection threshold for vendors was reduced from $500,000 to $100,000 in sales during the past 12 months during 2020.

revenue was sitused to the destination jurisdiction and by April 2020 over 90 percent was sourced to the destination. Remote sales tax revenue has risen rapidly, from $362 million in calendar 2019 to $1048 million in calendar 2024, but still represents only 7-8 percent of sales tax collections. In some cases, the State considers many large vendors that supply online orders, such as Walmart and Amazon, as instate rather than remote because they have physical presence in the state, though the sales may be sitused to a physical fulfilment center. Marketplace sales are always destination sourced to the buyer, regardless of the vendor.

We link the sales tax data with property tax base/revenues from the corresponding counties and cities, which permits us to investigate how WFH affects property taxes and how the two taxes interact. The property tax base is separated by residential, commercial, and industrial, utilities, and tangible personal property. Thus, we can examine how several types of property respond to WFH and investigate the possibility that the different categories of base move in different directions. Counties can impose property taxes on their entire area and cities can impose property taxes on the area within their borders, so the city and county tax bases are often overlapping. [16]

Property tax data are only available annually, so our property tax panel is much smaller than for the sales tax, though it includes the same years. Property tax base, revenue, and rates are available for at least 414 city and county areas. Cities are generally located within a single county, but cross county lines in a small number of cases.

Disentangling the effects of WFH on local government revenues poses some challenges because the expansion of WFH occurred during the pandemic, which also had revenue implications. The first part of the paper will be descriptive and show broad revenue trends in the last decade. While interesting, these effects will confound pandemic effects with telework effects.

In order to isolate the effects of WFH, we exploit data from Dingel and Neiman (2020). These authors construct an indicator for each occupation that equals 1 if the occupation is easily susceptible for telework and 0 if not. The indicator is then aggregated at the NAICS level to construct a measure of how susceptible each industry is to WFH. In other words, they obtain a measure of the share of employment in occupations that can be done from home for each industry.

As our interest comes in exploring the effect of WFH on local sales and property taxes, we will introduce a spatial component to the index following Brueckner, Kahn and Lin (2023). We will then merge the indicators on NAICS WFH potential to county data on employment by NAICS

[16] Sales taxes in most counties are attributed to the city or county (outside a city) where the transaction occurs, as unique tax bases, though at least one-half of the sales tax revenues must go to local schools, regardless of where collected. However, about 40 cities have sales tax rates that exceed the county rate, and the city retains all this differential revenue.

code from the County Business Patterns. Then a county, or potentially commuting zone-specific[17] measure of WFH potential (WFHPOT) in county c is given by

$$WFHPOT_c = \sum_j s_{jc} WFH_j$$

where WFH_j is the WFH potential of NAICS sector j and s_{jc} is the employment share of industry j in county c. This will provide variation in WFH across the counties in Tennessee, though it should be noted that the metric is likely correlated with urbanicity and jurisdiction size, placing a minor caveat on our ability to identify causal effects. To address this we will do a subset analysis focusing mainly on the larger urban areas in Tennessee.

Empirical Design

The empirical design will then exploit a difference-in-difference design. Focusing here on the finer sales tax regressions, we will first estimate regressions of the form:

$$\ln(R_{jct}) = \beta WFHPOT_c \times POST_t + \gamma_c + \gamma_t + \varepsilon_{jct}$$

where γ_c are county fixed effects, γ_t are time fixed effects, $\ln(R_{jct})$ is the log of revenue in NAICS code j of county c and time (month) t, and $POST_t$ equals one for periods after March 2020.[18] We will explore including sector fixed effects or possible interactions of the fixed effects. While we initially plan to do this at the county level, there may be reasons to focus on commuting zones, as telework may be driven by common labor market rather than county level characteristics. For this reason, we will explore using the approximately 20 commuting zones in Tennessee. While our measure of WFH potential could be included in continuous form, the recent literature suggests dichotomizing such metrics in this setting and we will do so in certain specifications.

To study the property tax, we will use a similar regression equation, except where instead of the j indexing sectors, it will index the commercial and residential property tax base. Given the time lags in assessment, we believe identifying revenue effects in the property tax may be more challenging than the sales tax. Counties reappraise every four years but on different schedules, introducing heterogeneity in the data. Annual sales ratio studies permit analysis of how market prices are adjusting between reappraisal cycles.

One concern of using local revenue data, especially disaggregated at the sector level, is that the data can be noisy. Part of the monthly noise results from seasonal demand factors. One approach to mitigate these fluctuations is to follow Agrawal and Shybalkina (2023) and replace the

[17] We can also explore sub-county data on revenues, though doing so would require assuming each place has the same WFH potential as the county.

[18] In many places, the county fixed effects will absorb the inclusion of tax rates, though certainly we can control for tax rates as well.

dependent variable with the year-over-year growth rate, so that any monthly seasonal factors are differenced out.

Limitations of the study relate to the focus on a single state, which lowers the extent of variation in WFH potential across places. However, this limitation is offset by the rich Tennessee data that allows us to finely look at revenue across sectors and categories. To our knowledge, this type of rich data is not publicly available in any other state, with perhaps the single exception of Missouri. As a result, we believe the Tennessee case study can provide important implications for differentiated-rate structures within the sales and property tax. Further, wide cross-state institutional differences in tax structures complicate multi-state analysis in this area.

A second empirical concern relates to the measure of WFH potential. As WFH is correlated with particular sectors and occupations, we believe the high WFH areas will mainly be the larger urban areas in Tennessee. Of course, it is possible that these larger urban areas may differ in other important ways that may affect tax revenues. For example, urban areas saw larger declines in the sales tax base than rural areas during the pandemic or may have been differentially exposed to other health related shocks. In an attempt to address these concerns, we will focus on a long-difference specification that studies the effects from 2019 to early 2025, with the idea that the effects of the pandemic have died down, but WFH persists.

Expectation of What Will Be Complete by NBER Conference

As you can tell from this proposal, we do not have any preliminary results yet for this paper. However, we have secured access to all of the data sources mentioned in this paper. Given the September date of the conference, we expect to have preliminary difference-in-difference designs and event studies to present at the conference. Nonetheless, as discussed via email, there is still some uncertainty over what those results will look like: null results or significant results. There are also open questions as to whether the assumptions of the empirical design will be consistent with the data (e.g., no pre-trends). At worst, this means that the causal design may yield something that is more correlational, in which case we would supplement the descriptive analysis with excellent policy analysis of the nuanced effects in this proposal. In this way, we believe a policy focused paper will be highly valuable. Nonetheless, given the dramatic trends in the sales tax data that we are familiar with, we expect to be able to identify important causal effects in the data. We thank you for considering the proposal, despite us not having a draft. We realize there is some uncertainty on your end, but as experts in local public finance, we are confident in our ability to develop a good paper on the topic.

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