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Capitalists, Workers and Landlords: A Comprehensive Analysis of Corporate Tax Incidence*

David Gstrein, Florian Neumeier, Andreas Peichl, Pascal Zamorski

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Abstract

This paper presents novel estimates of the incidence of corporate taxes that, for the first time, account for commercial real estate. We combine unique real estate data with administrative data on wages and profits in Germany. We leverage over 17,000 local business tax changes for our empirical analysis. Our estimates indicate that a one percentage point increase in local business taxes reduces commercial real estate prices by 2%, while residential real estate prices decline by 1%. Wages decline by approximately 1%, and profits decline by about 2%. Using the reduced-form estimates, we update current incidence measures within a spatial-equilibrium framework.

Keywords: Corporate taxation, tax incidence, real estate markets.

JEL Classification: H22, H25, H71.

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1 Introduction

A fundamental distinction in public economics lies between the legal obligation to pay a tax and the ultimate economic burden. Taxes are rarely borne entirely by those legally responsible for payment. Instead, the economic burden of a tax is passed on to other economic agents through price adjustments. The fact that the legal incidence of taxation differs from its economic incidence is particularly evident in the case of corporate income taxation. While the taxpayer is a legal entity, the economic burden of a tax can only be borne by individuals.

This paper offers the most comprehensive analysis to date of the incidence of corporate income taxation. Combining theoretical modeling with an empirical analysis, we investigate how changes in corporate income tax rates affect the economic welfare of four groups: firm owners, workers, owners of residential real estate, and owners of commercial real estate. The distribution of the tax burden between these groups has important implications for the progressivity of the tax system. If the bigger part of the corporate tax burden was borne by firm owners or landowners, the corporate income tax would be highly progressive, as these groups tend to be at the top of the income and wealth distribution. However, if workers bore a large fraction of the tax burden, the progressivity of the corporate income tax would be low or it could even be regressive.

In the first part of the paper, we extend the spatial-equilibrium model of Suárez Serrato and Zidar (2016) featuring mobile firms and workers by including a commercial real estate market. In this framework, corporate income tax shocks affect the scale and location choice of firms. In equilibrium, workers' wages, residential real estate prices, and commercial real estate prices adjust to equate demand and supply in these markets. We then derive closed-form incidence formulas and show that the incidence shares borne by firm owners, workers, residential real estate owners, and commercial real estate owners depend only on few key elasticities: the macro elasticities of labor and commercial-property demand, their cross-elasticities, and the effective supply elasticities of labor, housing, and commercial land. We demonstrate that the welfare relevant elasticities can be recovered by estimating the reduced-form impacts of tax changes on firm profits, wages, as well as residential and commercial real estate prices. Furthermore, we endogenously derive the income shares of each group to obtain income-weighted incidence shares. This approach provides clear guidance for the following empirical analysis and allows us to transparently compare our findings with the literature.

In the second part, we estimate the reduced-form effects of corporate income tax changes on profits, wages, and real estate prices empirically. To this end, we exploit the unique institutional design of the German system of business taxation and make use of extensive real estate data as well as administrative data on local wage levels and firm profits. In Germany, corporate income is taxed at two levels: first, at the federal level, and second, at the municipality level through the local business tax (LBT). The decentralized setup of the German LBT offers two important advantages for our research design. First, while municipalities can autonomously adjust the LBT rate every year, the tax base and liability criteria are set by the federal government and, hence, uniform across all municipalities. This allows us to distinguish local tax rate variation from changes in other tax provisions. Second, there is substantial variation in LBT rates across space and time as there are roughly 10,000 municipalities in Germany which adjust their taxes frequently.[1] During the period we study, there have been more than 17,000 LBT rate changes, providing the statistical power for robust identification.

Our empirical analysis combines administrative panel data on German municipalities, including their LBT rates, wage levels, and firm profits, with property-level microdata. The real estate data cover more than 16 million properties listed for sale and over 15 million properties listed for rent between 2008 and 2019. Among these, approximately 1.0 million (1.5 million) are commercial properties offered for sale (rent). Compared to prior research on real estate markets, our property data are unique in two key respects. First, whereas most existing studies only study residential real estate or cannot distinguish between commercial and residential real estate, our dataset provides detailed information on *commercial* properties separately, in addition to residential listings. Second, unlike most previous studies, we do not rely on one single (type of) data source or advertising platform. Instead, our data include information from more than 140 different sources and cover various leading online platforms and newspapers. Therefore, our data encompass nearly the universe of commercial real estate transaction offers and are thus representative of the commercial real estate market as a whole, serving as a proxy for the cost of property as a factor of production.

We apply a series of flexible event study designs exploiting the variation in LBT rates across municipalities and over time to estimate reduced-form effects of LBT changes on offered property sales prices and rents, wages, and profits. We then use this set-up to estimate the welfare-relevant elasticities.

Our main finding is that higher corporate income tax rates significantly reduce profits, wages, as well as residential and commercial property prices. The negative effect of tax hikes on property prices and wages increases in the years following the tax change, while the negative effect on profits becomes smaller (in absolute terms). With regard to sales prices, the baseline event study estimates suggest that a one percentage point increase in local business taxes de-

[1] This variation has been used by Fuest et al. (2018) to study the wage incidence of corporate taxation. It has also been used to study the effects of corporate taxation on investment (Link et al., 2024), R&D (Lichter et al., 2025), firm entry and exit (Riedel et al., 2020), MNE location choices (Becker et al., 2012), consumer prices (Dedola et al., 2023; Jacob et al., 2023) and the interaction of firm mobility and tax setting behavior (Langenmayr and Simmler, 2021, 2024; Merlo et al., 2023)

creases the offered sales price of commercial properties by two percent after four years. Prices for residential properties decline by about one percent after four years. Furthermore, we find that wages decline by about one percent following a one percentage point tax hike, which is close to the estimate by Fuest et al. (2018) for an earlier period. Finally, we also estimate the effect of LBT changes on net-profits using two separate methods. First, we directly estimate a reduced-form effect of tax changes on taxable profits. Second, we use our theoretical model and the reduced-form effects on wages and commercial real estate to quantify the incidence on profits. Both methods lead to very similar results. All results are robust to the inclusion of different sets of control variables, as well as accounting for shocks at the state or commuting zone level. The findings are also robust to using the estimator developed by De Chaisemartin and d'Haultfoeuille (2024) to account for potential problems stemming from treatment heterogeneity in Difference in differences (DiD) settings.

After estimating the welfare-relevant elasticities, we can compute the share of incidence borne by each economic agent. We report incidence shares applying the income weighted approach developed in Suárez Serrato and Zidar (2024).[2] The analysis reveals that firm owners are the most affected by tax changes. They bear about 58 percent of the tax burden in the medium run.[3] The second most affected group are the owners of commercial real estate. They bear about 20 percent of the burden. Residential landowners bear about 12 percent, while roughly 11 percent of the burden falls on workers. According to these estimates, landowners bear a larger burden than the previous literature suggests, while workers bear a smaller share. This is in part due to the mechanical effect of adding land as a production factor, but also due to our refinements to the theoretical and empirical implementation of the incidence analysis. We also investigate how the incidence shares develop over time. While the incidence in the year of the tax change is almost entirely borne by firm owners, it is slowly shifted to the other agents as time passes, most strongly to commercial landowners. We also find that the price declines for commercial and residential properties are accompanied by decreases in land prices. This suggests that the price declines are not primarily driven by reduced investment in structures. The incidence analysis is robust to differences in parameter calibration, the model-based quantification of profit effects, and alternative assumptions about the deductibility of capital and property costs.

The analysis of corporate tax incidence has a long tradition in economics. Most studies in this field, though, only focus on the division of the tax burden between capital and labor.[4] In his seminal contribution, Harberger (1962) shows that in a closed economy framework in

[2] Unweighted incidence shares are reported in the Appendix.

[3] This is in line with the findings of Link et al. (2024), who report a decline in investment after LBT increases.

[4] A notable exception are the studies by Suárez Serrato and Zidar (2016) and Suárez Serrato and Zidar (2024), on which we build. Combining a spatial equilibrium model with empirical analyses based on U.S. data, the authors show that a significant portion of the corporate income tax is shifted to owners of residential real estate.

which all adjustments take place through factor price changes, the burden of the corporate income tax is completely borne by capital owners.[5] Reviewing several open-economy general equilibrium models, Gravelle (2013) concludes that, for the U.S., a reasonable estimate would be that 60 percent of the corporate income tax burden is borne by capital and 40 percent by labor. This finding is well in line with the empirical estimates by Liu and Altshuler (2013), Suárez Serrato and Zidar (2016) and Kennedy et al. (2022) for the U.S., as well as with the estimates of Fuest et al. (2018) for Germany and Arulampalam et al. (2012) for a sample of nine European countries.[6]

We contribute to this literature in several important ways. First, on the theoretical side, we extend existing spatial equilibrium frameworks by explicitly modeling a commercial real estate market and thereby incorporating commercial land into firms' production function. This allows us to recover formulas for the corporate income tax burden falling on four different groups: firm owners, workers, owners of residential real estate, and owners of commercial real estate. In particular, it enables us to assess the incidence on commercial landowners, a margin that has not been explicitly considered in previous work, which mostly focuses on the distribution of the corporate tax burden between capital and labor. Previous research has focused on firm mobility (Giroud and Rauh, 2019), investment (Ohrn, 2018; Link et al., 2024; Chodorow-Reich et al., 2024; Zwick and Mahon, 2017), local labor markets (Fuest et al., 2018; Garrett et al., 2020) and spatial misallocation (Fajgelbaum et al., 2019). Therefore, our estimate of the effect on commercial real estate is particularly novel, as there is only a very scarce literature studying taxation and commercial real estate in general. An exception is Lockwood et al. (2023), who recently studied the effects of property tax relief measures on vacancy rates and rental prices for commercial properties.[7]

Including commercial real estate into the analysis of corporate tax incidence is important for at least three reasons. First, land is a central factor of production for many firms and, unlike labor or capital, it is immobile. This implies that commercial land likely bears a notable fraction of the corporate income tax burden. Consequently, if commercial land is omitted from the

[5] Although it has been shown that this conclusion depends on a number of critical assumptions (see Fuest and Neumeier, 2023, for a detailed discussion), the view that capital owners bear the lion's share of the tax burden is still widespread. For instance, the U.S. Congressional Budget Office (CBO) assumes that 75 percent of the corporate income tax burden falls on capital owners and 25 percent on workers (Congressional Budget Office, 2021). Estimates of the progressivity of the U.S. tax system based on distributional national accounts even tend to assume that the entire burden of the corporate income tax is borne by capital owners (e.g., Piketty and Saez, 2007; Piketty et al., 2018; Saez and Zucman, 2020).

[6] Winter et al. (2025) present survey evidence from German firm executives that suggests that incidence of business taxes can shift asymmetrically across agents, depending on the direction and size of tax changes.

[7] Our paper also relates to the local public finance literature examining local tax setting behavior and (corporate) tax competition. For instance, Janeba and Osterloh (2013) and Merlo et al. (2023) provide evidence that German municipalities compete for mobile capital and strategically interact in their tax setting behavior. We address this fact in a separate section in which we analyze spillover effects of LBT changes.

analysis of corporate tax incidence, the share of the tax burden borne by other economic agents will be overestimated. Furthermore, real estate owners tend to be at the top of a society's income and wealth distribution. Identifying the extent to which corporate taxation is shifted onto real estate owners is therefore crucial for evaluating the progressivity of the corporate income tax. Finally, the share of the tax burden borne property owners also has implications for efficiency. If the tax is shifted onto landowners (commercial and residential), it will, at least partly, function like a land value tax. In that case, part of the burden is capitalized into lower property values, so the tax has a smaller distortionary effect on firms' investment and location decisions, implying lower efficiency costs.

Our second contribution also concerns the theoretical framework: we provide a transparent mapping from reduced-form elasticities to tax incidence shares. This makes it possible to identify which theoretical assumptions drive differences between incidence measures, and to assess the sensitivity of results to alternative assumptions. By varying key parameters or neutralizing specific channels, we can implement the implicit assumptions of earlier studies and demonstrate how their results relate to the broader spatial equilibrium model. In doing so, our framework puts the existing literature into perspective: we not only derive new incidence estimates but also reconcile divergent findings and clarify the mechanisms and modeling choices responsible for differences across studies.

Third, on the empirical side, our contribution to the literature on corporate tax incidence is the use of an extensive micro-data set covering residential and commercial real estate prices and its combination with administrative data on local business taxes, wage levels, and firm profits in Germany. Our annual data cover real estate offered for sale and for rent in more than 8,000 German municipalities from 2008 to 2019, as well as firm profits and employee wages in those municipalities, and over 17,000 municipal tax changes used for identification. This allows us not only to estimate the share of the corporate tax burden borne by firms, workers, and real estate owners empirically, but also to track the development of the incidence shares year by year, thereby measuring how the distribution of the tax burden evolves dynamically after a tax change and how it is gradually shifted between factors over time.[8]

The remainder of this paper is structured as follows. First, we present the theoretical framework underlying our analysis in Section 2. Then, we outline the institutional setting of business taxation in Germany and the data we use in Section 3. The empirical model is presented in Section 4. In Section 5, we discuss the main reduced-form results and perform a variety of robustness checks. In Section 6 we estimate the incidence shares and check the sensitivity of our results. Section 7 concludes.

[8] Suárez Serrato and Zidar (2016), for instance, use decennial data in their empirical analysis, so that they estimate long-run effects of corporate tax changes on residential property prices, wages, and profits.

2 Theoretical Framework

Our theoretical model characterizes the incidence of local corporate taxes on the welfare of four agents: workers, firm owners, owners of commercial real estate, and owners of residential real estate. The effects on the welfare of each of these agents are characterized in terms of estimable reduced-form effects. These reduced-form effects reflect structural parameters that determine the supply of and demand for labor, residential real estate, commercial real estate, and goods. We build on the spatial equilibrium framework introduced by Suárez Serrato and Zidar (2016, 2024) (henceforth SZ) and extend it. In the model, workers maximize their utility by locating in one of many small open economies, landowners supply real estate to maximize profits, and firm owners maximize profits by choosing the location and scale of their production. Crucially, we model commercial real estate as an explicit production factor such that business-tax shocks affect prices for offices, shops, and factories in addition to wages and residential property prices. Goods and capital markets are global, whereas labor, housing, and commercial property markets are local.

This framework serves three central functions in our analysis. First, it provides a transparent mapping from reduced-form elasticities to incidence shares, which clarifies how different theoretical assumptions shape the attribution of the tax burden and allows us to test the sensitivity of incidence shares to alternative assumptions. Second, it enables us to measure the impact of corporate taxation on the welfare of commercial landowners, a margin that has not been considered in previous work. Third, the framework is flexible enough to generate incidence predictions under alternative assumptions and to reconcile divergent findings in the literature. By explicitly modeling different assumptions – either by varying key parameters or by shutting down particular channels – it becomes possible to replicate earlier approaches, highlight the margins responsible for differences across studies, and relate their results to the broader spatial equilibrium model. We focus on the welfare implications for agents in the local economy, an analysis of global welfare is beyond the scope of this paper (see Fajgelbaum et al., 2019, for an analysis of global welfare implications of US state taxes).

2.1 Spatial-Equilibrium Environment

Each location c hosts N_c identical workers, E_c monopolistically-competitive establishments, a representative residential landlord, and a representative commercial landlord.

Workers. In each locality c, a continuum of identical workers supplies one unit of labor and selects the location that maximizes V_{nc}^{W}, which depends on wages, residential property prices and amenities

$$V_{nc}^W = \underbrace{a_0 + \ln w_c - \alpha \ln r_c^H + \bar{A}_c}_{u_c} + \xi_{nc},$$

where w_c is the local wage, r_c^H the residential property price, and $\alpha \in (0,1)$ the Cobb–Douglas expenditure share on housing, $\bar{A}_c$ a location-specific amenity, and $\xi_{nc} \sim EV(0, \sigma^W)$ an idiosyncratic taste draw. Local housing demand is $H_c^D = \frac{N_c \alpha w_c}{r_c^H}$.[9]

Land markets. Representative residential and commercial landowners supply housing (residential real estate), $H_c^S = (B_c^H r_c^H)^{\eta_c^H}$, and commercial real estate, $G_c^S = (B_c^G r_c^G)^{\eta_c^G}$, where B_c^H and B_c^G denote the location specific productivity of residential and commercial real estate, η_c^H and η_c^G are the corresponding supply elasticities, and r_c^H and r_c^G are the per-period user cost of one unit of residential or commercial real estate. For renters this equals the contractual rent, for owner-occupiers it equals the opportunity cost of tying up capital in a building (interest, depreciation, property taxes).[10] With Cobb–Douglas preferences and equating demand and supply, residential costs satisfy

$$\ln r_c^H = \frac{1}{1+\eta_c^H} \ln N_c + \frac{1}{1+\eta_c^H} \ln w_c - \frac{\eta_c^H}{1+\eta_c^H} \ln B_c^H + \frac{1}{1+\eta_c^H} \ln \alpha.$$

After substituting this equation into the household location problem and thereby incorporating the housing market feedback we obtain the effective elasticity of labor supply[11]:

$$\frac{\partial L_c^S}{\partial w_c} = \varepsilon^{LS} = \frac{1+\eta_c^H - \alpha}{\sigma^W (1+\eta_c^H) + \alpha} \tag{1}$$

which depends on housing supply elasticity η_c^H, the housing expenditure share α and the dispersion of idiosyncratic location tastes σ^W.

[9]Local population is driven by the location choices of households. A household will locate in a location if the indirect utility there is higher than in all other locations. If ξ_{nc} are i.i.d. local population is determined by: $N_c = P\left(V_{nc}^W = \max_{c'}\left\{V_{nc'}^W\right\}\right) = \frac{\exp \frac{u_c}{\sigma^W}}{\sum_{c'} \exp \frac{u'_c}{\sigma^W}}$

[10]The framework does not allow for transfers between residential and commercial land use. While interesting in itself, such conversions are heavily constrained by zoning restrictions and planning regulations in practice in Germany. Modeling them explicitly would add complexity without materially changing the incidence results, as the aggregate burden on landowners remains unaffected by these constraints.

[11]We call this the effective elasticity of labor supply because it already incorporates the indirect effect of wage changes on residential property costs that mute the labor supply elasticity.

Production. Establishments draw an idiosyncratic productivity $B_{jc} = \bar{B}_c + \zeta_{jc}$ with $\zeta_{jc} \sim \mathrm{EV}(0, \sigma^F)$ and produce output

$$y_{jc} = B_{jc}\, l_{jc}^{\gamma}\, k_{jc}^{\delta}\, g_{jc}^{\eta}\, M_{jc}^{1-\gamma-\delta-\eta}, \qquad \gamma, \delta, \eta > 0,$$

under CES product demand ($\varepsilon^{PD} < -1$) and local corporate tax τ_c.[12] The firms use labor l_{jc}, capital k_{jc}, commercial real estate g_{jc} and intermediate goods M_{jc} as inputs.[13] Perfectly mobile capital earns the national rental rate ρ. A share κ_g of commercial real-estate costs is deductible from the corporate tax base, capturing different deductibility rules for bought and rented real estate. A share κ_k of capital costs is deductible from the corporate tax base, capturing differences in tax treatment between equity and debt financing. We discuss the implications of different deductibility assumptions in Appendix C.9.

In a given location c, establishments maximize profits over inputs and prices p_{jc} while facing a local wage w_c, local prices for commercial real estate r_c^G, national interest rates ρ, national prices p_v of each variety v, and local business taxes τ_c subject to the production technology:

$$\pi_{jc} = \max_{l_{jc}, k_{jc}, x_{v,jc}, p_{jc}} (1-\tau_c)\left(p_{jc}y_{jc} - w_c l_{jc} - \int_{v\in J} p_v x_{v,jc} dv\right) - (1-\kappa_g\tau_c)\, r_c^G g_{jc} - (1-\kappa_k\tau_c)\, \rho k_{jc},$$

In Appendix C.3 we solve the establishment problem by deriving the first order conditions for capital, labor and commercial properties. Then we derive the input factor demands and derive an expression of profits that only depends on factor prices:

$$\pi_{ijc} = (1-\tau_c)\, \tilde{w}_c^{\gamma\left(\varepsilon^{PD}+1\right)}\, \tilde{\rho}_c^{\delta\left(\varepsilon^{PD}+1\right)}\, \tilde{r}_c^{G\eta\left(\varepsilon^{PD}+1\right)}\, B_{jc}^{-\left(\varepsilon^{PD}+1\right)} \kappa$$

where κ is a constant term across locations. We use this expression to solve the establishment location problem.

Location choice of firms. Establishments' productivity $B_{jc} = \bar{B}_c + \zeta_{jc}$ consists of a common location specific productivity level $\bar{B}_c$ and an idiosyncratic establishment specific productivity level ζ_{jc}, which is i.i.d. type I extreme value. Using the profit function derived above, taking logs and dividing by $-(\varepsilon^{PD}+1)$[14], the expected value of locating in c is

[12]To simplify the exposition, we focus on the case of single-plant firms. The interaction with formula apportionment is detailed in Appendix B.1 of SZ.

[13]$M_{jc} \equiv \left(\int_{v\in J} (x_{v,jc})^{\frac{\varepsilon^{PD}}{\varepsilon^{PD}}} dv\right)^{\frac{\varepsilon^{PD}}{\varepsilon^{PD}+1}}$ is establishment j 's bundle of goods of varieties v. Goods of all varieties can serve as either final goods for household consumption or as intermediate inputs for establishment production.

[14]As pointed out by SZ, taking logs and dividing by $-(\varepsilon^{PD}+1)$ does not affect the choice ranking as it is a strictly monotonic transformation.

$$V_{jc}^F = v_c + \zeta_{jc} = \underbrace{\frac{\ln(1-\tau_c)}{-(\varepsilon^{PD}+1)} + \bar{B}_c - \gamma \ln w_c - \delta \ln \tilde{\rho}_c - \eta \ln \tilde{r}_c^G + \frac{\ln \kappa_1}{-(\varepsilon^{PD}+1)}}_{v_c} + \zeta_{jc}$$

where $\tilde{\rho}_c = \frac{(1-\kappa_k \tau_c)\rho}{1-\tau_c}$ and $\tilde{r}_c = \frac{(1-\kappa_g \tau_c) r_c}{1-\tau_c}$ are the tax deduction inclusive costs of capital and commercial properties. Under full deductibility ($\kappa_k = \kappa_g = 1$) they simplify to ρ and r_c.

The share of establishments that locates in c is given by:

$$E_c = \frac{\exp(v_c/\sigma^F)}{\sum_{c'} \exp(v_{c'}/\sigma^F)}.$$

where σ^F is the dispersion of the location specific idiosyncratic establishment productivity ζ_{jc}

Local demand for inputs. Putting together the location choices and the intensive margin scale decisions, it is possible to derive the local demand for labor and commercial real estate (the exact derivations are shown in Appendix C.3.5 and C.4:

$$L_c^D = E_c \times w_c^{(1+\varepsilon^{PD})\gamma - 1} \rho_c^{(1+\varepsilon^{PD})\delta} r_c^{(1+\varepsilon^{PD})\eta} \kappa_0 e^{(-\varepsilon^{PD}-1)\bar{B}_c} z_c$$

$$G_c^D = E_c \times w_c^{(1+\varepsilon^{PD})\gamma} \rho_c^{(1+\varepsilon^{PD})\delta} r_c^{(1+\varepsilon^{PD})\eta - 1)} \omega_0 e^{(-\varepsilon^{PD}-1)\bar{B}_c} z_c$$

where κ_0 and ω_0 are common terms across locations, z_c is a term related to the idiosyncratic productivity parameter ζ_{jc}.

2.2 Key Reduced-form Elasticities

From these equations we can obtain key elasticities driving the incidence on workers, landowners, and firm owners. The first of those elasticities is the macro elasticity of labor demand:

$$\frac{\partial \ln L_c^D}{\partial \ln w_c} = \underbrace{-1}_{Substitution} + \underbrace{\gamma(\varepsilon^{PD}+1)}_{Scale} - \underbrace{\frac{\gamma}{\sigma^F}}_{Firm-Location} - \underbrace{\gamma\left(\varepsilon^{PD}+1\right)}_{Compositional-Margin} = -\left(1 + \frac{\gamma}{\sigma^F}\right) = \varepsilon^{LD} \quad (2)$$

where γ is the output elasticity of labor, ε^{PD} is the product demand elasticity and σ^F is the dispersion of idiosyncratic productivity. As noted by Malgouyres et al. (2023) the scale margin cancels out with the compositional margin. Hence, the elasticity simplifies to ε^{LD} =

$-\left(1+\frac{\gamma}{\sigma^F}\right)$. Similarly, we can derive the macro elasticity of commercial real estate $\varepsilon^{GD} = -(1+\frac{\eta}{\sigma^F})$. Two other important demand elasticities are the cross-elasticities. First, the elasticity of labor demand with respect to commercial property prices $\varepsilon^{LC} = -\frac{\eta}{\sigma^F}$. Second, the elasticity of commercial property demand with respect to local wages $\varepsilon^{GC} = -\frac{\gamma}{\sigma^F}$.

The commercial property demand equation can also be used to derive the equilibrium on the commercial property market. Commercial property prices obey the following expression that links $\ln r_c^G$ to $\ln N_c$ and $\ln w_c$:

$$\ln r_c^G = \frac{1}{1+\eta_c^G}\ln N_c + \frac{1}{1+\eta_c^G}\ln w_c - \frac{\eta_c^G}{1+\eta_c^G}\ln B_c^G$$

Through this, we can derive another key object that describes how wages and commercial real estate price are related through their respective supply elasticities:

$$\frac{\partial \ln r_c^G}{\partial \ln w_c} = \frac{1}{1+\eta_c^G}\left(\frac{\partial \ln N_c}{\partial \ln w_c}+1\right) = \frac{1+\varepsilon^{LS}}{1+\eta_c^G} \tag{3}$$

Finally, we can characterize the effects of local tax changes on local demand for labor and commercial real estate:

$$\frac{\partial \ln L_c^D}{\partial \ln(1-\tau_c)} = \frac{\partial \ln G_c^D}{\partial \ln(1-\tau_c)} = \frac{\partial \ln E_c}{\partial \ln(1-\tau_c)} - 1 = \frac{1}{-(\varepsilon^{PD}+1)\sigma^F} - 1 + \frac{\delta}{\sigma^F} \tag{4}$$

where we now assume that capital costs are not deductible and commercial real estate costs are fully deductible. We show the derivations for different assumptions in Appendix C.9.

2.3 Incidence of a Local Tax Change

We denote $\dot{w}_c = \partial \ln w_c / \partial \ln(1-\tau_c)$ and similarly for other variables. We characterize the incidence of corporate taxes on wages, property prices, and profits and relate these effects to the welfare of workers, landowners, and firms. We focus on the welfare of local residents, as the policies we study are determined by policymakers at the local level (with the objective of maximizing local welfare – at least in our model). Because we study small open economies, price changes affect the consumers globally, but the effects on consumer welfare in the local economy is approximately zero. Therefore, the consumer price channel is not relevant for our local welfare analysis.

Assuming full labor force participation, i.e., $L_c^S = N_c$, clearing in the housing, labor, capital, and goods markets gives the following labor market equilibrium:

$$N_c\left(w_c, r_c^H; \bar{A}_c, \eta_c^H\right) = L_c^D\left(w_c, \rho_c, r_c^G, \eta_c^G, \tau_c; \bar{B}_c, z_c\right)$$

This expression implicitly defines equilibrium wages w_c. The market clearing condition implies that

$$\dot{N}_c = \varepsilon^{LS}\dot{w}_c = \dot{L}_C^D = \frac{\partial \ln L_c^D}{\partial \ln(1-\tau_c)} + \frac{\partial \ln L_c^D}{\partial w_c}\dot{w}_c + \frac{\partial \ln L_c^D}{\partial r_c^G}\dot{r}_c^G$$

where the total labor demand elasticity $\dot{L}_C^D$ depends on a direct effect and effects through wages and commercial real estate prices. Rearranging the equation yields:

$$\dot{w}_c = \frac{\frac{\partial \ln L_c^D}{\partial \ln(1-\tau_c)}}{\varepsilon^{LS} - \frac{\partial \ln L_c^D}{\partial w_c} - \frac{\partial \ln L_c^D}{\partial r_c^G}\frac{1+\varepsilon^{LS}}{1+\eta_c^G}} = \frac{\frac{1}{-(\varepsilon^{PD}+1)\sigma^F} - 1 + \frac{\delta}{\sigma^F}}{\varepsilon^{LS} - \varepsilon^{LD} - \varepsilon^{LC}\frac{1+\varepsilon^{LS}}{1+\eta_c^G}} \tag{5}$$

which extends the standard incidence framework by incorporating commercial real estate into the denominator through the term $\varepsilon^{LC}\frac{1+\varepsilon^{LS}}{1+\eta_g}$. As ε^{LC} is expected to be negative, the addition of commercial real estate reduces the wage elasticity. Furthermore, the incidence depends on the effect of the tax change on labor demand, and the demand and supply elasticities of labor and commercial real estate.

Similarly, we can derive the effect of a tax change on commercial real estate prices:

$$\dot{r}_c^G = \frac{\frac{\partial \ln L_c^D}{\partial \ln(1-\tau_c)} + \varepsilon^{GC}\dot{w}_c}{\eta_c^G - \varepsilon^{GD}} = \frac{1+\varepsilon^{LS}}{1+\eta_c^G}\dot{w}_c \tag{6}$$

which simplifies to the effect on wages scaled by the labor and commercial real estate supply elasticities.

The effect on residential real estate prices can be derived similarly and is given by:

$$\dot{r}_c^H = \left(\frac{1+\varepsilon^{LS}}{1+\eta_c^H}\right)\dot{w}_c \tag{7}$$

The effect on net profits differs from the standard framework by incorporating an additional term for the change in commercial property costs:

$$\dot{\pi}_c = 1 \underbrace{-\delta\left(\varepsilon^{PD}+1\right)}_{\text{Reducing capital wedge}} + \underbrace{\gamma\left(\varepsilon^{PD}+1\right)\dot{w}_c}_{\text{Higher labor costs}} + \underbrace{\eta\left(\varepsilon^{PD}+1\right)\dot{r}_c^G}_{\text{Higher property costs}} \tag{8}$$

Hence, including commercial real estate in the analysis reduces the incidence on firm owners. All these elasticities can be estimated in the data or alternatively calibrated from external data. In the next section, we show that these elasticities map directly into welfare changes.

2.4 Incidence on Welfare

In this section, we relate the elasticities derived above to welfare changes of the four agents. We focus on welfare in the local economy, which is the relevant concept for the policymakers setting the local taxes. Analyzing global welfare is beyond the scope of this paper[15] We assume that the tax change in location c has no effect on wages and property prices in other locations. We present the main results here, the full derivations are reported in Appendix C.7. The effect of a tax cut on the welfare of workers in location c is:

$$\frac{d\mathcal{V}^{W}}{d\ln\left(1-\tau_{c}^{c}\right)} = \left(\dot{w}_{c} - \alpha\dot{r}_{c}^{H}\right)$$

The effect of a corporate tax cut on a firm owner is:

$$\frac{d\mathcal{V}^{F}}{d\ln\left(1-\tau_{c}^{c}\right)} = \dot{\pi}_{c}$$

Next, consider the effect on the welfare of residential landowners in location c. Landowner welfare in each location is the difference between housing expenditures and the costs of supplying that level of housing. This difference can be expressed as follows:

$$\mathcal{V}^{LR} = N_{c}\alpha w_{c} - \int_{0}^{N_{c}\alpha w_{c}/r_{c}} G^{-1}\left(q; Z_{c}^{h}\right) dq = \frac{1}{1+\eta_{c}^{H}} N_{c}\alpha w_{c},$$

Importantly, landowner welfare is proportional to housing expenditure. The effect of a corporate tax cut on the welfare of the representative residential real estate owner can then be expressed as

$$\frac{d\mathcal{V}^{LR}}{d\ln\left(1-\tau_{c}^{c}\right)} = \frac{1}{\alpha w_{c} N_{c}}\frac{\alpha}{1+\eta_{c}^{H}}\left(w_{c}\frac{dN_{c}}{d\ln(1-\tau_{c}^{c})} + N_{c}\frac{dw_{c}}{d\ln(1-\tau_{c}^{c})}\right) = \frac{\dot{N}_{c}+\dot{w}_{c}}{1+\eta_{c}^{H}} = \dot{r}_{c}^{H}$$

The total expenditure on commercial real estate is given by:

$$\ln\left(G_{c}^{D}\tilde{r}_{c}^{G}\right) = \ln\left(\frac{\eta}{\gamma}N_{c}w_{c}\right)$$

[15] See Suárez Serrato and Zidar (2016) for more information on how the forces in the model relate to global welfare and Fajgelbaum et al. (2019) for an analysis of global incidence for US state taxes.

By the same logic as above, the effect of a corporate tax change on the welfare of the representative commercial real estate owner is given by:

$$\frac{d\mathcal{V}^{LC}}{d\ln\left(1-\tau_c^c\right)} = \frac{\dot{N}_c + \dot{w}_c}{1+\eta_c^G} = \dot{r}_c^G$$

Therefore, the welfare changes of the four agents are directly linked to the empirically estimable elasticities. The full derivations are provided in Appendix C.7.

2.5 Income Share Weighting

The model makes it possible to derive the endogenous income shares of each of the four types of agents. Following Suárez Serrato and Zidar (2024) we weight the four incidences by the local income shares $(\theta_w, \theta_H, \theta_G, \theta_\pi)$ to get an income weighted incidence. The shares are characterized in the following way:

$$\underbrace{\frac{1}{I}}_{\text{Workers}}, \underbrace{\frac{\alpha}{I}}_{\text{Residential Land}}, \underbrace{\frac{\eta/\gamma}{I}}_{\text{Commercial Land}}, \underbrace{\frac{(1+\eta/\gamma)\frac{(1-\left(\varepsilon^{PD}+1\right)\delta)}{-(\varepsilon^{PD}+1)(1-\delta)}}{I}}_{\text{Firm Owners}}$$

where $I = \left[1+\alpha+\eta/\gamma+(1+\eta/\gamma)\frac{(1-\left(\varepsilon^{PD}+1\right)\delta)}{-(\varepsilon^{PD}+1)(1-\delta)}\right]$. Therefore, the shares depend on α, δ, η/γ and ε^{PD}. We calibrate these parameters in Section 6. A complete set of derivations, alternative deductibility cases, and additional comparative statics are reported in Appendix C.

3 Institutions and Data

To empirically estimate the effect of corporate tax changes on factor prices, we exploit Germany's decentralized institutional setting of local business taxation.

3.1 Business Taxation in Germany

In Germany, business profits are taxed at two levels. At the national level, depending on a firm's legal status, profits are either subject to the corporate income tax (CIT/*Körperschaftsteuer*; applies to corporate firms) or the personal income tax (PIT/*Einkommensteuer*; applies to non-corporate firms). At the municipality level, firms are subject to the local business tax (LBT). In 2019, the LBT generated a revenue of 55 billion euros, which corresponds to 48.9% of municipal tax revenues (Federal Statistical Office (Destatis), 2022). This equals 65% of total profit tax revenues from corporate firms, making the LBT a substantial part of overall corporate taxation (Federal Statistical Office (Destatis), 2022).

The LBT is levied on firms' profits and applies to all corporate and non-corporate firms, with very few exemptions.[16] For firms with establishments in different municipalities, formula apportionment based on each establishment's payroll share allocates to municipalities.

The LBT rate τ_{LBT} is the product of a basic rate (*Steuermesszahl*) t^{fed}_{LBT} and a municipality-specific scaling factor (*Hebesatz*) $\theta^{\text{mun}}_{LBT}$, such that: $\tau_{LBT} = t^{\text{fed}}_{LBT} \times \theta^{\text{mun}}_{LBT}$. The basic rate t^{fed}_{LBT} is determined at the federal level and identical across all municipalities and firms, as are the tax base and liability criteria. However, municipalities can autonomously set the scaling factor $\theta^{\text{mun}}_{LBT}$ subject to a legal minimum of 200% (which implies a minimum tax rate of 7%). The municipal council annually decides on the scaling factor. The resulting LBT rate is thus locally determined and typically set by municipal councils at the end of the calendar year, taking effect on January 1 of the following year. In our empirical design, we exploit changes in τ_{LBT} driven exclusively by variation in $\theta^{\text{mun}}_{LBT}$.[17]

Using variation in the municipal scaling factor θ_{LBT} as the source of identification offers two key advantages for causal inference. First, Germany's more than 10,000 municipalities can be regarded as small open economies embedded within a nationally integrated economy. In this setting, the parallel trends assumption – central to event study and difference-in-differences (DiD) approaches – is more likely to hold than in studies relying on cross-country variation. General equilibrium spillovers, such as shifts in interest rates or consumer prices, are unlikely to meaningfully bias the estimates, even in sectors producing non-tradable goods. For example, residents may easily substitute services across nearby municipalities, minimizing location-specific price effects (see also Fuest et al., 2018). Second, all observed changes in the LBT rate during our sample period stem from municipal policy decisions. The tax base and liability criteria are set at the federal level, and there were no concurrent federal tax changes in the relevant period. This institutional structure ensures that the variation we exploit is likely orthogonal to firm behavior, unlike many prior studies where tax rate changes coincide with adjustments to the tax base.[18] Additionally, municipalities also set the local property tax (LPT) rate. Importantly, adjustments to LBT and LPT are often enacted jointly. To avoid omitted variable bias, all of our empirical specifications include scaled leads and lags of LPT changes as controls, ensuring that our estimates isolate the effect of LBT variation. We also provide

[16]Exemptions include certain professional services (e.g., lawyers, physicians); see Paragraphs 2–3 of the LBT Act (*Gewerbesteuergesetz*): `https://www.gesetze-im-internet.de/gewstg/BJNR009790936.html`, accessed January 14, 2023.

[17]In 2008, the federal base rate t^{fed}_{LBT} was reduced from 5.0% to 3.5%. As this rate has remained unchanged since, all post-2008 variation in τ_{LBT} is attributable to changes in the local scaling factor. For 2008, we do not consider tax changes that were caused by the federal reform, except in those municipalities where $\theta^{\text{mun}}_{LBT}$ increased sufficiently to raise the overall LBT rate relative to 2007. We also conduct a robustness check in Table B.9, where we exclude any variation driven by the federal 2008 reform and focus entirely on the changes of the local scaling factors. The results are very similar to our baseline estimates.

[18]Notable exceptions include Fuest et al. (2018) and Kawano and Slemrod (2012).

further robustness checks with different sets of LPT controls or different sample definitions based on the number of LBT and LPT changes during our estimation window.

3.2 Municipal Variables and Business Tax Data

The municipality-level dataset is constructed from administrative records provided by the Statistical Offices of the German Federal States (*Statistische Landesämter*). The core variable of interest is the annual municipal scaling factor ($\theta^{\text{mun}}_{LBT}$), which determines the LBT rate. We augment these data with district-level economic indicators – specifically, gross domestic product (GDP) and unemployment rates – as well as data on local LPT rates and municipal population. These serve as proxies for local business cycle fluctuations.[19] To capture broader locational and economic structure, we include the Federal Institute for Research on Building, Urban Affairs and Spatial Development's (*BBSR*) typology of settlement structure (*Siedlungsstrukturelle Kreistypen*) and assign each municipality to one of 258 commuting zones (CZs). Following Fuest et al. (2018), we exclude 648 municipalities affected by merger reforms, as we cannot consistently assign them a unique LBT rate.[20] Our final panel comprises 10,091 municipalities, observed annually from 2004 to 2023.

Appendix Figure A.2 visualizes spatial variation in LBT rates. Panel A.2a shows that average rates are relatively high in Northrhine-Westphalia and Saxony and comparatively low in Bavaria and much of Eastern Germany. LBT rates range from 7% to 31.5%. Panel A.2b illustrates that municipalities in Northern Germany adjusted their LBT rates more frequently than those in the South. While 1,522 municipalities made no changes over the sample period, 691 increased their rates five or more times between 2004 and 2023. On average, every year, about 10% of municipalities adjust their LBT rate.

Appendix Figure A.1 compares the size of tax changes for the LBT and the LPT. While we allow for both LBT increases and decreases in our baseline estimation, LBT cuts are rare and small. Most changes in the LBT are hikes below 2 percentage points, with an average hike of 0.81 percentage points. In 2019, the mean (median) LBT rate was 12.76% (12.78%). That is, the average LBT change corresponds to 6.3%. In contrast, LPT levels and changes are generally much smaller – ranging from 0.05 to 0.5 percentage points – with an average increase of 0.12 percentage points.

Measuring Municipal Firm Profits To estimate the incidence on firm owners, we use data on LBT revenues to approximate firm profits at the municipality level. Gross profits before taxes are estimated by dividing total LBT revenues by the local tax rate, yielding the pre-tax

[19] Due to changes in reporting standards, data on municipal expenditures and revenues are only available until 2014 and are excluded from most of our analyses.

[20] We also exclude two municipalities whose reported LBT scaling factors fall below the legal minimum.

LBT base. To derive net profits, we subtract the amount of taxes paid from this gross estimate. This provides a proxy for the income that firms retain after meeting their local tax obligations. These profit measures allow us to estimate the elasticity of firm profits with respect to tax changes and to quantify the share of the tax burden borne by firm owners. Disadvantages of this approach are that yearly tax revenues might include effects from loss offsetting in other years and that tax planning might affect the measurement. Therefore, we also follow Malgouyres et al. (2023) and Suárez Serrato and Zidar (2023) and quantify the profit elasticity using the theoretical model.

Municipal Wage Data To measure the impact of LBT changes on wages, we use administrative data on average yearly gross manufacturing wages at the municipality level from the *Regionalatlas* of the German Statistical Offices. We collect annual observations for the period 2009–2019 and merge them with our municipality-level panel.

3.3 Property Data

To estimate the commercial and residential property price channels as one key dimension of corporate tax incidence, we employ a large and unique micro-dataset of the German real estate market provided by the consultancy firm *F+B*. The dataset compiles information from real estate advertisements across both residential and commercial property types listed for rent or sale. It is based on about 140 sources, including major online portals (e.g., *ImmobilienScout24*), (trans-)regional newspapers, and real estate agencies. Key advantages of the F+B data are its extensive coverage and careful cleaning: properties listed across multiple platforms at the same time are consolidated into a unique observation. For each listing, we observe the first and last day it was advertised, along with a proxy for the realized transaction price.[21]

To assess the validity of the price information, we benchmark our residential price index against the *GREIX (German Real Estate Index)*, constructed from administrative transaction data collected by local property valuation committees (*Gutachterausschüsse*) in major German urban areas. As shown in Figure A.4 in the Appendix, the two series exhibit highly aligned price trends, suggesting that the listing prices reliably capture underlying market dynamics.

Crucially, besides a rich panel of residential property listings, the *F+B* data provides the first comprehensive source on commercial real estate prices in Germany, allowing us to assess how local corporate taxes affect both the welfare of residential property owners and the welfare of owners of commercial properties. We use the data from January 2008 to December 2019, yielding over 31 million observations: roughly 29 million correspond to residential listings (in-

[21]This proxy corresponds to the offering price on the final day of the listing, adjusted by an estimated discount. The discount is derived by *F+B* through matching a subsample of the advertisements to actual transaction data.

cluding over 14 million rentals and over 15 million sales) and around 2.5 million to commercial properties (including 1.5 million rentals and 1 million sales).

This micro-dataset represents the most granular and comprehensive source of data on the German real estate market, capturing close to the universe of all properties listed for sale or rent. While administrative records are available only at a more aggregated level – and micro-data are not accessible for research – many previous studies rely on data from a single real estate platform. In contrast, our data allow us to aggregate the value of all properties offered for sale in each year, thereby allowing us to estimate annual transaction volumes and to compare them to administrative records. Appendix Figure A.7 presents estimated transaction volumes based on our data for each year from 2008 to 2019. These range from €36 billion in 2008 to over €70 billion in 2019 and closely align with external estimates by Burkert et al. (2019), who report average yearly commercial transaction volumes of €35 billion (2004–2018) and €54 billion (2014–2018). This comparison suggests that our data capture a substantial share of Germany's commercial property market.[22]

In our empirical analysis, we separately study the price effects of an increase in the LBT on properties offered for rent and those offered for sale. Therefore, our two outcome variables of interest are the rental and sales prices per square meter (sqm) of a property on the final day a property was listed. As previously noted, we observe listing prices rather than actual transaction prices.[23] Besides price information, the dataset covers a wide range of property characteristics. For each property, we have information on floor size, the number of rooms, the construction year, its location, as well as indicators for amenities and locational characteristics. Commercial properties are categorized into five different types: offices, retail, storage, production, or restaurant spaces.[24] Residential properties are categorized into single-family houses, apartments, and multi-family houses.[25]

[22]The annual real estate reports by the *Gutachterausschüsse* document approximately one million property transactions per year (Arbeitskreis der Oberen Gutachterausschüsse, 2019), of which around 10% involve commercial properties and 70% residential properties. For example, in 2018, they report 727,000 residential and 84,000 commercial transactions. In comparison, our dataset records an average of roughly 1.3 million residential and 100,000 commercial listings offered for sale per year. Although our figures reflect listings rather than realized transactions, they are of a comparable order of magnitude.

[23]This implies that properties never listed on the market are not covered in the dataset. However, as discussed above, listing prices closely track transaction prices. Prior studies have treated final listing prices as a reliable proxy for actual prices (e.g. Löffler and Siegloch, 2024; Dolls et al., 2025; Fackler et al., 2024; Krolage, 2023), and in our case, using the estimated transaction price provided by F+B leads to virtually identical results. Moreover, Figure A.4 in the Appendix further corroborates the validity of the listing prices by showing that they closely follow transaction-based price indices from the GREIX database.

[24]Figure A.5 in the Appendix shows the distribution of property types for the commercial sales and the commercial rents sample. In both samples, offices constitute the most common type of properties offered, though there are some differences in the composition between the samples. The sales sample consists of comparatively more restaurant and production spaces.

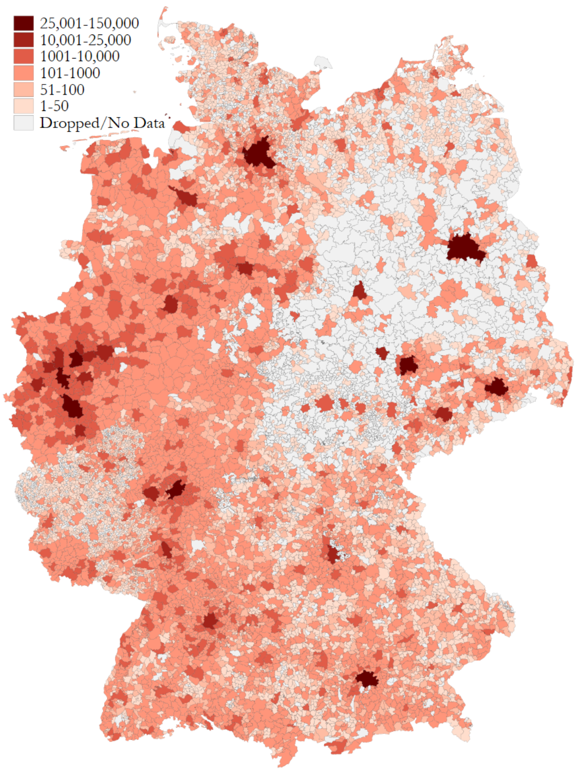
[25]Figure A.6 in the Appendix shows that in the sales sample, single-family houses and apartments are similarly represented while multi-family houses account for a much smaller share. By contrast, the rents sample is

3.4 Estimation Sample

We integrate and harmonize municipal panel data including information on LBT rates, wages, firm profits, and other local variables with the property dataset to construct an annual panel. We subsequently partition the data into four subsets based on property use (commercial vs. residential) and listing type (sale vs. rental). These data cover all German municipalities, with municipality-year observations spanning the period from 2008 to 2019. To account for leads and lags in our event study estimation, we incorporate LBT rates for the years 2004 to 2023.

In our baseline specification, we require at least one advertisement per municipality-year cell over all years, yielding a sample of 8,560 municipalities covering all property types. Figure 1 illustrates the spatial variation in the average number of postings per year over the period 2008–2019. As expected, the number of postings is highest in densely populated areas of West Germany and major agglomeration zones, with large municipalities registering up to 150,000 postings per year.

Figure 1: Average Number of Postings per Year (2008-2019)



Notes: The figure illustrates the spatial variation in the average annual number of advertising postings across 8,560 German municipalities between 2008 and 2019. Grey areas denote municipalities for which we do not observe at least one posting per sample year or which were excluded due to municipal merger reforms occurring during the sample period (2008–2019). *Source*: Own calculation based on data from *F+B* and the Statistical State Offices.

When disaggregating the data into our estimation samples, we retain 8,430 municipalities per

overwhelmingly dominated by apartments.

year in the residential sales sample (over 15 million price observations) and 6,129 municipalities per year in the residential rental sample (over 14 million price observations). In the commercial market, we observe 3,250 municipalities per year in the sales sample (1,033,264 price observations) and 2,574 municipalities per year in the rental sample (1,526,310 price observations).[26] Figure A.3 in the Appendix shows the spatial distribution of the commercial and residential estimation samples separately for rents and sales.

Table A.1 in the Appendix documents the sample selection procedure we follow to generate our baseline estimation samples. Municipalities are excluded either due to administrative reforms (e.g., mergers) or because they have too few observations per year in a sample. These excluded municipalities are primarily located in rural areas of Eastern Germany (notably Saxony-Anhalt and Mecklenburg-Western Pomerania), as well as in small jurisdictions across Southern and Western Germany. Table A.2 in the Appendix presents descriptive statistics for property, tax, and municipal variables in each of the estimation samples. Table A.4 presents the descriptive statistics for the tax and municipal variables in the wage and profit samples.[27]

4 Research Design and Identification

4.1 Empirical Design

In our empirical analysis, we estimate the reduced-form elasticities that map directly into welfare changes according to the model in Section 2. We use an event study design to estimate the causal effect of LBT changes on our outcome variables of interest: commercial and residential property prices as well as rents, wages, and firm profits. Because our outcomes vary in granularity – property-level for real estate outcomes and municipality-level averages for wages and profits – we define a generalized outcome variable y_{kmt}, where k indexes either individual properties or denotes a municipality-level observation, depending on the outcome.[28]

[26] Additionally, 2,186 municipalities have at least one annual posting in each real estate subsample. Although this subset includes only around 20% of German municipalities, it still captures approximately 78% of all postings in our dataset population. This concentration is expected: in 2018, the median German municipality had 1,810 inhabitants, and the 25th percentile municipality had 653 or fewer inhabitants.

[27] The profit sample is the most comprehensive covering the largest number of municipalities, while the wage sample and the commercial rents sample cover the smallest number of municipalities. For the profit regressions, we keep only municipalities that have positive reported profits over the whole period (covering more than 98% of the population) and exclude municipalities that experience two or more tax drops over the sample period (dropping less than 4% of the population). These municipalities are likely special outliers (Fuest et al., 2018). In these municipalities, the estimated profit responses are quite large; we interpret this as reflecting accounting profits rather than changes in real activity. Excluding them leaves the estimates for all other outcomes essentially unchanged. We show how estimates change for different sample definitions in Figure B.8 and Table B.12.

[28] For real estate outcomes, $y_{kmt} = ln(p_{imt})$ represents the log rent or sales price per square meter of property i in municipality m and year t. For aggregated outcomes such as wages and profits, $y_{kmt} = ln(w_{mt})$ and $y_{kmt} = ln(\pi_{mt})$ respectively, where the outcome is observed at the municipality-year level.

Each municipality is nested in a commuting zone cz and a state s.[29]

We set up our panel-event study design to allow for municipalities experiencing multiple tax changes in the event window. In addition, instead of using dummies, we scale our event study indicators by the tax change, i.e. the actual change in the LBT rate caused by changes in the municipal scaling factor.[30] Thus, we allow for varying and continuous treatment intensities. Formally, all of our regressions are based on some variant of the following model:

$$ln(y_{kmt}) = \sum_{j=-\underline{j}+1}^{\bar{j}} \beta_j \Delta LBT_{mt}^{t-j} + \sum_{j=-\underline{j}+1}^{\bar{j}} \delta_j \Delta LPT_{mt}^{t-j} + \zeta X_{kmt} + \mu_m + \theta_{rt} + \varepsilon_{kmt}. \quad (9)$$

where the $\hat{\beta}_j$ capture the estimates of interest that measure the dynamic causal effects before ($j < 0$) and after ($j \geq 0$) treatment with $\bar{j}$ lags and $\underline{j}$ leads of the treatment variable. The event study indicators in ΔLBT_{mt}^{t-j} capture the treatment as a change in the LBT rate in year $t - j$ and municipality m relative to the year $t - j - 1$ triggered by a change in the local scaling factor. The main control variables included in all specifications are the scaled leads and lags of LPT rate changes ΔLPT_{mt}^{t-j} in municipality m at time $t - j$ relative to the year $t - j - 1$. It is important to control for changes in property tax rates for two reasons. First, the property tax has a direct effect on property prices (Oates, 1969; Löffler and Siegloch, 2024) such that our estimates can be biased if we do not control for it. Second, similar to the LBT rate, the LPT rate is also set by municipal governments each year, which suggests that there could be a connection between changes in both of these tax rates.[31] Equation 9 also includes a set of time-varying controls, denoted by X_{kmt}, which are incorporated in some specifications. For property-level outcomes, X_{kmt} includes property characteristics such as floor size, construction year, the number of rooms, indicator variables representing other amenities as well as an indication of whether an ad was posted on- or offline (see Section 3.3 for a description of the property data). In some specifications the controls include dynamic measures such as district GDP, district unemployment rate, municipal population (in logs and lagged by two periods) to control for time-varying shocks that may occur shortly before or after a tax change. Unobserved municipal characteristics that are constant over time are captured in the municipal fixed effects, μ_m. We further include region-by-year fixed effects θ_{rt} to flexibly control for time-varying shocks at different regional levels. Depending on the specification, the region r is defined either at the

[29]There are several ways to define a commuting zone in Germany. The arguably most common way (see, e.g., Fuest et al., 2018) is to use the so-called definition of *Arbeitsmarktregionen ("Labor Market Regions")* from the *BBSR* which leaves us with 258 CZs.

[30]Note that these changes can be negative in case of a tax cut.

[31]Blesse et al. (2019) study the joint decision to set LBT and LPT rates. They find that the municipal tax policy is not consistent with an inverse elasticity rule, i.e. most municipalities impose relatively higher rates on business profits than on immobile land. To address potential concerns regarding the interaction between LBT and LPT, in Section 5.1, we present a robustness analysis excluding property tax controls. Additionally, we provide results for a subset of municipalities that did not experience an LPT change during the sample period.

state level (s) or at the level of commuting zones (cz), allowing us to account for differential trends in local economic areas. ε_{kmt} denotes the error term. The standard errors are clustered at the municipality level, which represents the level of the identifying variation in our model. This generalized model allows us to estimate the dynamic treatment effects of LBT changes across a variety of outcome types within a unified empirical framework.

We set $\underline{j}$ = 4 and $\overline{j}$ = 5, allowing us to cover ten years around a tax reform occurring in period $t = 0$. Including four years in the pre-treatment period should be sufficient to detect indications for potential violations of the parallel trends assumption, while a post-reform period of five years allows investigating both the short- and medium-run effects of tax changes. Following Schmidheiny and Siegloch (2023), ΔLBT_{mt}^{t-j} (and ΔLPT_{mt}^{t-j}) are binned treatment indicators so that at the end points the coefficients deliver an estimate for all past and future tax changes, respectively, that precede or follow our chosen effect window. In this setup, the observation window of the tax change has to be set longer than the observation window of the dependent variable to account for the correct leads. Therefore, we track tax changes between 2004 and 2023. Staggered treatment timing leads to an unbalanced panel in event time (even though the municipality panel is perfectly balanced from 2004 to 2023). We therefore drop the binned endpoints from our event study graphs following Fuest et al. (2018). The event study indicator for the pre-reform year is omitted from the regression, such that all coefficients have to be interpreted relative to the pre-reform year.

While Equation 9 identifies the semi-elasticity of the effect of LBT increases on commercial and residential property prices, wages, and firm profits, most studies in the corporate tax incidence literature also report elasticities with respect to the net-of-tax rate (e.g. Suárez Serrato and Zidar, 2016; Fuest et al., 2018). To be able to compare the magnitudes of our estimates to previous findings on the effects of corporate taxes on other production factors, we substitute the treatment indicators in Equation 9 with the change in the log net-of-tax rate in each lag and lead ($\Delta ln(1 - LBT_{mt}^{t-j})$). We then average the treatment effects over the post-treatment period to obtain a measure of the elasticity of each outcome with respect to the LBT burden. The regressions include the same controls and fixed effects as our event study specification in Equation 9. We denote point estimates for the elasticities as γ.

4.2 Identification

The baseline event study regression in Equation 9 includes "state $\times$ year" fixed effects. This specification accounts for state-level shocks such as municipal election years, which have been shown to affect LBT rates (Foremny and Riedel, 2014). Thus, we identify the effect of tax changes on factor prices within municipalities and the 16 German states over time. The identification of causal effects requires that there is neither reverse causality nor omitted variable bias, and is based on several additional assumptions.

The first identifying assumption is the parallel trends assumption. In our model, we assume that untreated (and not-yet-treated) municipalities allow us to infer the counterfactual trend in factor prices that we would have observed in treated municipalities if they had not been treated. This implies that our estimates are solely driven by tax changes rather than other shocks affecting the observed municipalities. This assumption would be violated in case of any biasing trends or systematic shocks at the municipality level that influence property prices, wages, firm profits, or tax rates. While the event study setup allows for a visual test of parallel pre-trends – i.e., if the lead-coefficients are close to zero – we check for differential local shocks between treatment and control group in two ways similar to Fuest et al. (2018). First, we estimate the model in Equation 9 with municipal unemployment and district GDP as outcome variables. The results are presented in Figure B.18 in the Appendix. We find flat pre-trends suggesting that the taxes were not changed in response to worsening economic circumstances.[32] Moreover, we control for local shocks at the level of 258 commuting zones. We do so by including more granular "CZ $\times$ year" fixed effects instead of "state $\times$ year" fixed effects. This specification accounts for any annual (labor-market) shock not reflected in state-level outcomes. In addition, we assume no anticipation effects, i.e., landlords are assumed to not adjust offering prices after the announcement of a tax change, and before it comes into effect. LBT changes are usually announced in December and become effective in January of the following year, that is, usually only one month after they are announced (see Link et al., 2024, for a discussion on this). Therefore, anticipation effects can only affect a small fraction of observations in our sample where the final date of advertisement falls into that narrow time window. Finally, we assume that the Stable Unit Treatment Value Assumption (SUTVA) holds. This assumption requires that the effect on property prices, wages, and firm profits following a tax change in a municipality does not depend on whether neighboring municipalities also experienced tax changes (Imbens and Rubin, 2015). While it is not trivial to show that SUTVA is fulfilled, we construct a spillover measure and demonstrate that tax increases in close-by municipalities have only a very small negative effect on sales prices (see Figure B.11 in the Appendix). If anything, this should bias our estimates downwards, since the spillovers are negative. In Figure B.10 in the Appendix, we also show that controlling for spillovers leaves our estimates essentially unchanged. This is unsurprising as most municipalities are small. As described in Section 3.1, municipalities set the scaling factor individually each year, which implies that tax changes occur at different times and with different intensities. At the same

[32] This is in line with Foremny and Riedel (2014), Fuest et al. (2018) and Link et al. (2024) who show that changes in the LBT are typically not triggered by shocks to economic variables. As in the US (Robinson and Tazhitdinova, 2022), regional variation in corporate tax rates seems to be to a large extent idiosyncratic and not readily explained by standard theories of tax setting. Overall, we are therefore confident that omitted variables do not threaten identification in our setting.

time, some municipalities change their taxes frequently. In general, our event study design in Equation 9 allows for all the above-mentioned features so that both municipalities that are never treated and those that are not-yet treated function as control groups while they can receive treatment several times during our sample period, but it relies on the assumption of homogeneous treatment effects.

Heterogeneous Treatment Effects. An implicit assumption in the baseline estimation is that treatment effects scale proportionally with treatment intensity – i.e., that the impact on factor prices increases in direct proportion to the size of the tax change, while there is no variation in the treatment effect between municipalities or for different years of treatment. However, treatments may be heterogeneous between different (groups of) municipalities. Our model in Equation 9 cannot account for such heterogeneity. In addition, while some municipalities experience only one tax change during our observation window, others are treated more frequently. Potentially, the price effect of a single tax increase differs from the effect of multiple tax increases. For instance, the treatment effect may vary between the first and the subsequent tax increases within a municipality. Finally, given the differences in treatment timing, some municipalities increase taxes at the beginning of the observation period, while others do so later. Dynamic effects of tax increases may depend on the year of their implementation. To account for potentially heterogeneous treatment effects in our model, we implement the estimator proposed by De Chaisemartin and d'Haultfoeuille (2024), i.e. the only two-way fixed effect robust estimator that can account for the effects of multiple treatments in the complex setting of the German LBT. It accounts for heterogeneous treatment and measures both immediate and dynamic treatment effects. Applied to our context, the estimator allows that municipalities may be exposed to multiple treatments (tax changes), with the treatment timing defined as the year when a municipality first experiences a change in treatment. The treatment intensity is measured as the cumulative sum of the tax changes. The control group consists of both not-yet-treated and never-treated municipalities.

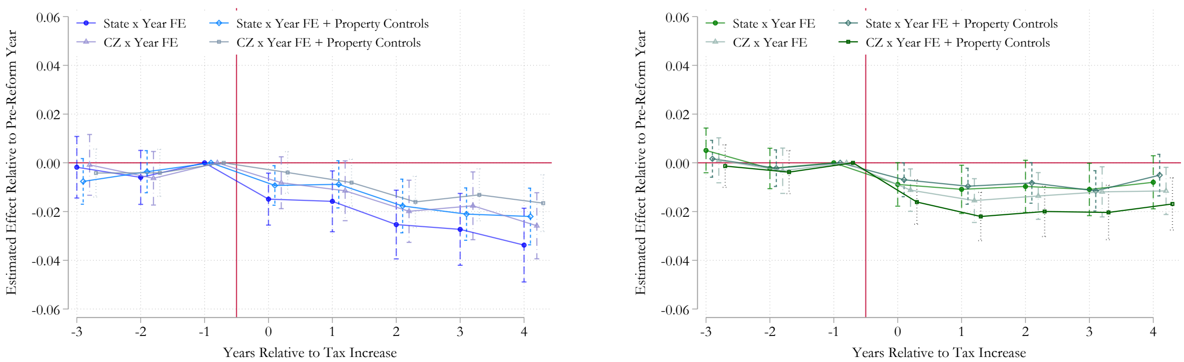
5 Empirical Results

5.1 Baseline Specification

We start our analysis by plotting the event study estimates from Equation 9 in Figure 2 for commercial sales prices (Panel 2a) and commercial rents (Panel 2b) as dependent variables, along with corresponding 95% confidence intervals. The figure reports results from four specifications of Equation 9: (i) including only "state $\times$ year" fixed effects, (ii) adding property-level controls to "state $\times$ year" fixed effects, (iii) replacing them with "CZ $\times$ year" fixed effects and (iv) adding the property-level controls to "CZ $\times$ year" fixed effects.

For all specifications, we find a significant, negative effect of LBT increases on commercial property prices and rents. Panel 2a shows that, following a tax hike, the sales prices of commercial properties decline significantly by approximately two to three percent after four years, relative to the year prior to the reform. While the effect is small and only marginally statistically significant in the year of the tax increase, it becomes more pronounced over time, such that after four years, the estimated effect is highly significant across all specifications. The estimated effect represents an approximately 2-3 percent fall in prices. Furthermore, pre-treatment trends are very flat across all four specifications, suggesting that treatment and control municipalities were evolving similarly prior to the tax change, supporting the validity of the parallel trends assumption.

Figure 2: Effects on Commercial Properties



(a) Commercial Sales Prices

(b) Commercial Rents

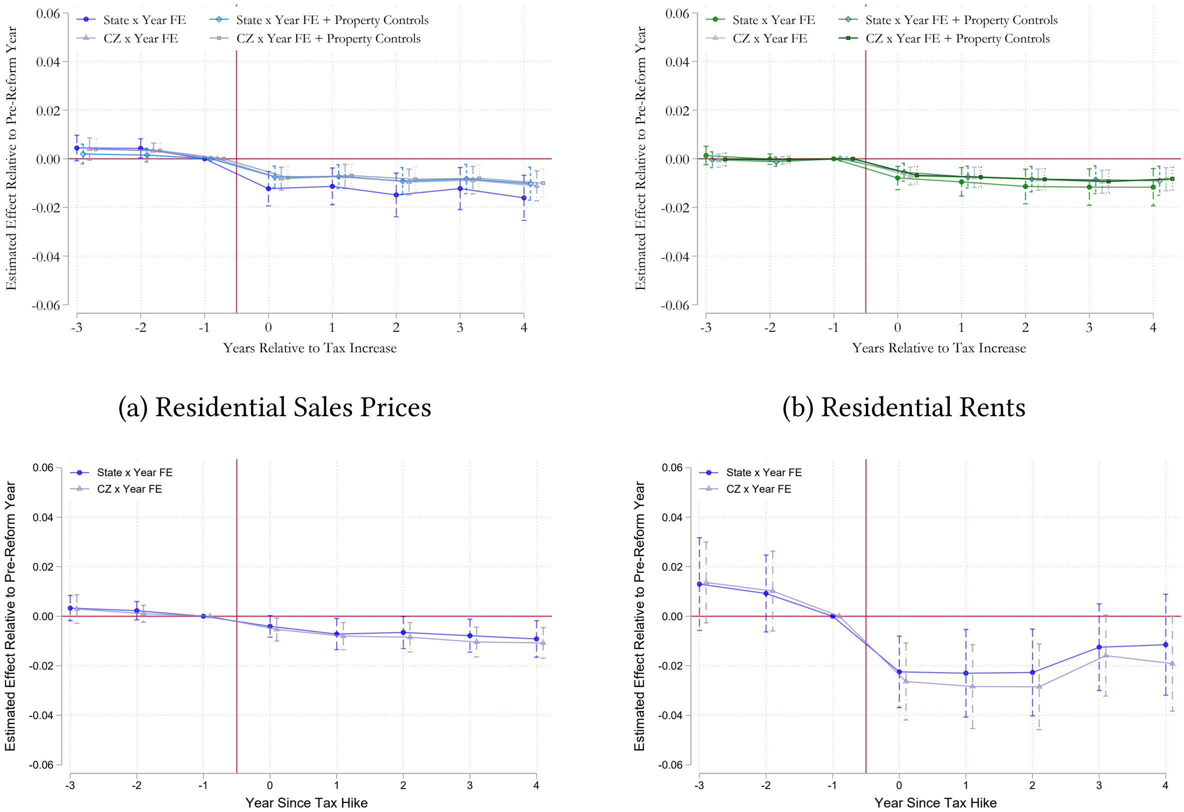
Notes: This graph plots the event study estimates ($\hat{\beta}_j, j \in [-3, 4]$) and associated 95% confidence intervals of the event study model from Equation 9. The dependent variables are the log sales price per sqm (Panel 2a) and the log rental price per sqm (Panel 2b). Treatment variables are event study indicators scaled by the LBT change. We require at least one ad per municipality-year cell such that we have 3,250 (2,574) municipalities and 7,512 (5,874) tax changes out of which 7,101 (5,481) are tax hikes for the sales (rental) price sample. All regressions include municipal fixed effects and the scaled leads and lags of changes in the municipal property tax rate as control. They also include the controls described in the figure. Standard errors are clustered at the municipal level.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

The effects on rents in Panel 2b are also negative and significant, but smaller in magnitude. All specifications yield very similar results, suggesting that commercial property rents fall by about one percent. The smaller effect of LBT hikes on commercial rental prices compared to sales prices could be due to two reasons. First, rents are almost fully deductible from the tax base, while financing costs for a real estate purchase are not, which implies that tax changes affect buyers of properties more than renters.[33] Second, there is some theoretical research and empirical evidence that rents are downward rigid while sales prices are not (Genesove, 2003; Gallin and Verbrugge, 2019). Hence, rents might remain stable after a tax hike, but vacancies might increase, leading to lower expected cash-flows and sales prices. For these reasons, we

[33]We show the theoretical implications of different deductibility assumptions in Section C.9 in the Appendix. Assuming full deductibility of rents and no deductibility of financing costs for purchases, we would expect a wedge of approximately 1 between the elasticities of rental and sales prices.

consider the sales price effects the more reliable estimates of the economic incidence of the LBT. We also analyze the sensitivity of the incidence results when taking the effects on rental prices. Finally, the results for the heterogeneity-robust estimators in Panels B.9a and B.9b of Figure B.9 in the Appendix are very similar to the TWFE results. This validates that the effects are not driven by heterogeneous treatment effects.

Figure 3: Effects on Residential Properties, Wages and Net Profits



(a) Residential Sales Prices

(b) Residential Rents

(c) Wages

(d) Net Profits

Notes: This graph plots the event study estimates ($\hat{\beta}_j, j \in [-3, 4]$) and associated 95% confidence intervals of the event study model from Equation 9. The dependent variables are the log residential sales price per sqm (Panel 3a), the log residential rental price per sqm (Panel 3b), the log wage (Panel 3c) and the log net profits (Panel 3d). Treatment variables are event study indicators scaled by the LBT change. We require at least one ad per municipality-year cell such that we have 8,430 (6,129) municipalities and 18,221 (13,164) tax changes for the sales (rental) price sample. We have 1,832 municipalities with 3,418 tax changes out of which 3,151 are tax hikes in the wage sample, and 8,441 municipalities with 16,736 tax changes out of which 16,212 are tax hikes in the profit sample. All regressions include municipal fixed effects and the scaled leads and lags of the municipal property tax rate as control. They also include the controls described in the figure. Standard errors are clustered at the municipal level.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

We now turn to the effects of the LBT on the other outcome variables pinning down the welfare effects for the other agents in our analysis: residential property owners, workers, and firm owners. Figure 3 presents these results. The effects on residential properties are shown in Panels 3a and 3b. We find that the reduction in property prices extends to residential properties. Both rents and sales prices decline following a tax hike. Four years after the tax hike, the prices are about one percent lower than in the counterfactual. This suggests that residential prices respond less than commercial property prices, but the effects are still substantial. The pre-trends are once again close to zero and insignificant, suggesting similar developments on the rental markets in treated and untreated municipalities before the tax change. Again, the results are very similar when using the heterogeneity-robust estimators (see Panels B.9c and B.9d of Figure B.9 in the Appendix).

The results for the effect of tax changes on wages are shown in Panel 3c.[34] We find that wages decline significantly after a tax hike. The effect of a one percentage point tax hike grows from about 0.4 percent in the year after the tax hike to about 0.9 percent after four years. This effect is similar to the one estimated by Fuest et al. (2018).[35] Finally, the effect of tax changes on net profits is shown in Panel 3d. Net profits decline immediately following a tax hike, which is partly driven by the mechanical effect of the tax hike. The effect becomes smaller over time, suggesting that the burden of the tax hike may be shifted from the firm – which bears the statutory incidence – to the other agents. Heterogeneity robust estimates for wages and profits are in a similar order of magnitude, though less precise and more volatile, and are presented in Panels B.9e and B.9f of Figure B.9 in the Appendix.

To estimate price elasticities for sales prices and rents, we run the same regressions but replace the tax rate changes by changes in the log net-of-tax rate as explained in Section 4.1. Panel A of Table 1 shows the corresponding elasticity estimates for commercial properties. The estimate of the sales price elasticity for our baseline specification (with no controls except for leads and lags of property tax changes and "state $\times$ year" fixed effects) reveals an elasticity of 2.4 and decreases slightly when adding controls and using "CZ $\times$ year" fixed effects. For the most demanding specification, we estimate an elasticity of about 1.7. That is, following a one percent increase in the net-of-tax rate, sales prices of commercial properties increase by 1.7 percent. The estimated elasticities for rents are smaller in magnitude, marginally statistically significant, and lie between 0.7 and 1. Panel B of Table 1 shows the estimated elasticities for residential properties. The elasticities are generally smaller than for commercial properties. For sales prices, it ranges from 1 (only "state $\times$ year" fixed effects) to 0.66 (full controls). For rents, the elasticity stays relatively constant when including more demanding sets of control variables (between 0.7 and 0.93). According to our estimates, residential properties are less affected by corporate tax changes than commercial properties. Panel C displays the estimated elasticities for net profits. The elasticity ranges from 1.5 to 1.9 depending on the exact specification. These estimates are within the range of point estimates obtained by Suárez Serrato and Zidar (2024) for their specifications relying on productivity and intensive margin labor

[34] Since wages and profits are measured on the municipality level, we only plot the specifications with "state $\times$ year" and "CZ $\times$ year" FE.

[35] There are some important differences between our paper and Fuest et al. (2018) as they study a different time period (1999-2008 vs 2008-2019) and use linked employer-employee data from about 15,000 plants. In contrast, we use municipal level data covering wages in the manufacturing sector.

demand to quantify effects on firm profits. We also show the elasticities for the calibration of net profits that we described in Appendix C.10. The elasticities are quite similar to our reduced form estimates. Panel C also displays the wage elasticities. They lie between 0.51 and 0.58, which is again similar to the comparable estimate in Fuest et al. (2018).

Table 1: Elasticity Estimation

Panel A:	Commercial Properties					
	Ln Sales Price sqm			Ln Rent Price sqm		
Δ Ln Net-of-Tax Rate	2.390***	1.634***	1.737**	0.707	0.751*	1.045*
	(0.574)	(0.441)	(0.549)	(0.439)	(0.356)	(0.411)
Property Controls		✓			✓	
State x Year FE	✓	✓		✓	✓	
CZ x Year FE			✓			✓
Observations	1,033,264	1,033,264	1,033,264	1,526,310	1,526,310	1,526,310

Panel B:	Residential Properties					
	Ln Sales Price sqm			Ln Rent Price sqm		
Δ Ln Net-of-Tax Rate	1.004**	0.762**	0.655**	0.934**	0.772**	0.706***
	(0.366)	(0.251)	(0.247)	(0.311)	(0.240)	(0.212)
Property Controls		✓			✓	
State x Year FE	✓	✓		✓	✓	
CZ x Year FE			✓			✓
Observations	15,513,915	15,513,915	15,513,915	14,066,515	14,066,515	14,066,515

Panel C:	Ln Net Profit		Calibrate Net Profits		Ln Wages	
Δ Ln Net-of-Tax Rate	1.457*	1.893**	1.623***	1.595***	0.514*	0.578**
	(0.733)	(0.706)	(0.078)	(0.073)	(0.222)	(0.206)
State x Year FE	✓		✓		✓	
CZ x Year FE		✓		✓		✓
Observations	101,316	101,316	-	-	25,272	25,272

Notes: This table presents the DiD estimates, $\hat{\gamma}$, of the regression model in Equation 9. The coefficients measure the rental price elasticity with respect to the net-of-local business tax rate. Panel A displays the elasticities for commercial properties. Panel B displays the elasticities for residential properties. Panel C displays the net-profit and the wage elasticities. All regression models include municipal fixed effects and account for the LPT rate. Additional control variables and fixed effects (year, "state × year", or "commuting zone (CZ) × year") vary depending on the specification (as indicated at the bottom of each panel). The estimation sample is restricted to non-merged municipalities such that we have 3,250 municipalities with 7,512 tax changes out of which 7,101 are tax hikes in columns (1)-(3) of Panel A and 2,574 municipalities with 5,874 tax changes and 5,481 tax hikes in columns (4)-(6) of Panel A. In Panel B we have 8,430 municipalities with 18,221 tax changes (17,350 hikes) in columns (1)-(3) and 6,129 municipalities with 13,164 tax changes (12,476 tax hikes) in columns (4)-(6). In Panel C we have 8,441 municipalities with 16,736 tax changes (16,212 hikes) in columns (1)-(2) and 1,832 municipalities with 3,418 tax changes (3,151 tax hikes) in columns (5)-(6). Standard errors are clustered at the municipal level. Standard errors are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

5.2 Additional Results and Robustness Tests

To gain further insights and assess the robustness of our results, we modify our empirical specification and estimation strategy in several ways. First, we apply six sample restrictions to examine the sensitivity of our estimates to the type of variation of the LBT and the LPT. Second, we vary the set of control variables and fixed effects to capture and control for local shocks and local business cycles on different aggregation levels. Third, we run heterogeneity robust estimations following De Chaisemartin and d'Haultfoeuille (2024). Fourth, we analyze the effects separately for undeveloped land. Finally, we account for and measure potential spillover effects of LBT changes between municipalities.

Sample Restrictions In a first set of robustness tests, we restrict our estimation sample in different ways. The results for our robustness checks are shown in Figure B.8 in the Appendix. The graph plots the event study estimates and associated confidence intervals of the event study model from Equation 9 for our four main outcome variables and for six different sample restrictions.[36] First, we address the potential concerns about biased treatment effect estimates due to the fact that some municipalities were treated multiple times (and potentially in different directions). Therefore, we drop municipalities that experienced a tax drop from the sample. This leaves the estimates almost entirely unchanged. Second, we restrict the sample to municipalities that experienced only a single tax hike within the event window (2008-2019). The estimates are labeled as 'One Hike in Window' in Figure B.8 and are slightly less precise but the point estimates are very similar to our baseline estimates. Third, we restrict the sample to municipalities that only experienced one tax hike between 2004 and 2023, i.e., the time window for which we include leads and lags of LBT changes in our empirical model (marked as 'One Hike'). Again, we lose some precision but the coefficient estimates remain very similar. Fourth, we test the sensitivity of our baseline results to changes in the LPT. Since both LBT and LPT are set by municipal governments, there may be important interrelations between the two. To account for this, we estimate the model separately for municipalities that did not experience an LPT change between 2004 and 2023. Given that LPT is adjusted even more frequently than LBT (albeit with small tax changes), this specification again results in a loss of precision. Nevertheless, the point estimates remain similar to our baseline. Fifth, and relatedly, to address concerns that the leads and lags of LPT may represent 'bad controls', we also conduct the event study analysis without any property tax controls. Here, results are very close to the baseline, both in magnitude and precision. Finally, as explained in Section 3.4, the set of municipalities used in the estimations differs between estimation samples due to differences in posting numbers. To show that results are not driven by differences between municipality coverage between samples, we also report the results for the sample of 2,242 municipalities that we observe for all four property estimation samples with estimates remaining virtually unchanged. This is not surprising, as we mainly lose municipalities with few observations if we restrict the analysis to the balanced sample, retaining about 77% of price observations. The

[36] Additionally, to corroborate their robustness, we report event studies with the three different main specifications of fixed effects and controls in Appendix Figures B.12 to B.15. We also present event study graphs excluding the states of North-Rhine Westphalia and Rhineland Palatine from the analysis in the Appendix in Figures B.16 and B.17.

consistency of the results across these various checks provides strong evidence that the estimated treatment effects are not driven by sample selection, omitted variable bias, or particular modeling assumptions.

Local Controls and Fixed Effects The four specifications reported in Figures 2 and 3 include "state × year" or "CZ × year" fixed effects once with and once without property controls for the different real estate samples. We report three additional sensitivity tests. First, to account for shocks at an even finer level than commuting zones, levels we estimate specifications including more disaggregated "district × year" fixed effects. Second, we estimate specifications where we add (twice-lagged) local controls (GDP, unemployment, population) to control for the local business cycle.[37] Finally, for the real estate sample, we include building type controls capturing differences between property types within each real estate sample. We summarize the post-treatment elasticities with respect to the log net-of-LBT rate and report them in Tables B.5 to B.11 in the Appendix for the four real estate sample as well as the profits and wages samples. Estimates are similar to the baseline results.

Heterogeneity Robust Estimation Our event study model cannot fully account for potential heterogeneous treatment effects with regard to the timing, scale, and number of tax changes. To address this, we use the estimator of De Chaisemartin and d'Haultfoeuille (2024). Appendix Figure B.9 shows the results for all real estate estimation samples, collapsed to the municipality level and population-weighted. Point estimates are very similar to our baseline results. In particular, the estimates for commercial sales (Panel B.9a), residential sales (Panel B.9c), and residential rents (Panel B.9d) are negative and significant in the medium run and if anything larger in magnitude than the baseline results. The estimate for commercial rents, however, (Panel B.9b) is statistically indistinguishable from zero. Nevertheless, this does not change any of the main conclusions of our results, with the wedge likely being explained by the differential tax treatment between sales and rentals of commercial property. Panels B.9e and B.9f in Figure B.9 show that the results on profits and wages also remain similar to the baseline results when using the heterogeneity robust estimation.

Effects on Land Prices Our real estate data only covers developed properties. However, there is reason to believe that LBT changes affect the values of land and built structures differently (Zodrow and Mieszkowski, 1986). Importantly, developing land requires investments. These investments are not necessarily tied to the location, which is why they should be more sensitive to tax changes. In contrast, land is completely immobile, which is why it might bear a larger part of the tax burden. To study the effect of LBT changes on land prices, we utilize

[37] To reduce endogeneity concerns local control variables are lagged by two periods; the results are similar when using contemporaneous variables. All control variables are in logs.

two types of administrative data. The first data set covers land price indices for Germany as a whole at the county level.[38] The second data set includes municipal level land price indices for the state of Bavaria. Both data sets include price indices for two types of land: total land and buildable land. However, the indices are based on prices of both residential and commercial land and allow no differentiation between the two. The results are shown in Figure B.19 in the Appendix. Panels B.19a and B.19b show the effects of LBT rate changes on overall land prices, panels B.19c and B.19d for buildable land. Our findings suggest that land prices decline sharply in response to LBT rate hikes. A one percentage point increase in the LBT rate is associated with a decline in land prices by up to four percent, which exceeds the semi-elasticties from our baseline specifications (2-3 percent for commercial properties, one percent for residential properties).[39] Arguably, this suggests that land values react more strongly to changes in LBT rates than the value of built structures, i.e. land bears a larger burden of the tax than buildings. In addition, this finding implies that the results from our baseline specifications are unlikely to be primarily driven by a reduction in investments into the development of land.

Spillover Effects To assess whether LBT changes in neighboring jurisdictions affect property markets beyond municipal boundaries, we construct a spillover variable at the municipality-year level that captures the average LBT increase in surrounding municipalities within a 50 kilometer radius. Each neighboring municipality's tax change is weighted by the inverse of its geographic distance, giving greater influence to closer jurisdictions. Furthermore, it is also weighted by the municipality's population. This spillover measure serves two main purposes: (i) to estimate the direction and magnitude of potential cross-border effects and (ii) to control for spatial confounding due to contemporaneous tax reforms in nearby areas in our baseline estimation. Appendix Figure B.11 shows that spillover effects are negative and significant in the commercial and residential sales sample, but insignificant in the commercial and residential rents samples. That is, LBT increases in neighboring municipalities tend to depress property values in untreated areas. This finding is somewhat surprising, as it goes against the common presumption that higher taxes in one jurisdiction redirect land investment to nearby, lower-tax locations. Instead, the negative sign suggests that land investment decisions across municipalities may be complementary – potentially reflecting cross-location supply chain relations, shared demand conditions or regional business cycles. Importantly, while the estimated semi-elasticities of these spillovers in the sales samples are large in magnitude (approximately 0.1), their actual quantitative impact is minor due to the small average value of the spillover vari-

[38]There are 401 counties in Germany, meaning that the dependent variable is measured at a higher level of regional aggregation than our explanatory variable of main interest, the LBT rate. Additional information about the data and our estimations is provided in Appendix Section B.2.

[39]If we use our baseline estimates to compute an average effect for commercial and residential properties and take into account that residential land makes up around 50-70% of all land, we obtain an estimate of around 2 percent for developed land, which is only half the size of the effect we find for undeveloped land.

able itself (mean = 0.078, median = 0.058 , std. dev. = 0.076).[40] Crucially, when we re-estimate our main regressions while controlling for this spillover measure (Appendix Figure B.10), our core estimates remain virtually unchanged. This confirms that our baseline results are not driven by unaccounted spatial dependencies.

6 Incidence Analysis

6.1 Baseline Scenario

In this Section, we interpret the estimated reduced-form elasticities from the previous Section through the spatial equilibrium model described in Section 2. Table 2 summarizes how the reduced-form estimates of the elasticities of wages (γ^W), residential housing costs (γ^{RH}), costs for commercial properties (γ^{RG}) and after-tax profits (γ^{Π}) map into welfare changes for workers, landowners, and firm owners. As these estimable parameters map directly into the incidence formulae obtained from the model, it is possible to estimate the share of incidence borne by each of the four groups of economic agents.

Table 2: Incidence

Agent	Incidence	Identified by
Workers (disposable income)	$\dot{w} - \alpha\dot{r}^H$	$\gamma^W - \alpha\gamma^{RH}$
Residential Landowners (housing costs)	$\dot{r}^H$	γ^{RH}
Commercial Landowners (comm. property costs)	$\dot{r}^G$	γ^{RG}
Firm owners (after-tax profit)	$\dot{\pi}$	γ^{Π}

Notes: This table shows how estimable elasticities map into the incidence formulae obtained from a spatial equilibrium model in the style of Suárez Serrato and Zidar (2016). The parameter α refers to the housing expenditure share and has to be calibrated.

In addition to the reduced-form effects, we also need to calibrate four parameters to quantify the incidence of the LBTs. First, we need the housing expenditure share α. Housing expenditures make up between 26% and 31% of disposable income in the period from 2009 to 2019 (Statistisches Bundesamt, 2025a). Hence, in line with Suárez Serrato and Zidar (2016), we set $\alpha = 0.3$. We show how incidence shares change for values of $\alpha \in [0, 0.5]$. For the income share weighting, we also need the elasticity of product demand ε^{PD}, the output elasticity of capital δ, and the ratio of output elasticities of commercial property and labor η/γ. For ε^{PD} we adopt a baseline value of -2.5, again in line with Suárez Serrato and Zidar (2016). The trade literature usually tends to find values of ε^{PD} closer to -4 or -5 (Head and Mayer, 2014).

[40] For example, applying a semi-elasticity of 0.1 to the average spillover value yields an expected price effect of approximately $0.1 \times 0.078 = 0.78$ log points. Thus, even with relatively large spillover coefficients, the resulting change in property prices is economically modest.

Therefore, we assess how the incidence shares change for more elastic product demand. The parameters δ and η/γ can be calibrated by taking the cost shares of capital, properties, and labor from Statistisches Bundesamt (2025b). As a baseline, we set $\delta = 0.2$ and $\eta/\gamma = 0.24$. Table 3 summarizes the baseline calibrated parameter values, their sources, and the ranges used in the robustness checks in Section 6.2.

Table 3: Parameters

Parameter	Values	Robustness	Source
Housing expenditure share: α	**0.3**	[0, 0.5]	Statistisches Bundesamt (2025a)
Elasticity of Product Demand: ε^{PD}	**-2.5**	[-2.0, -5.0]	Head and Mayer (2014)
Output elasticity of capital: δ	**0.2**	[0.15, 0.25]	Statistisches Bundesamt (2025b)
Ratio output elasticity of property to output elasticity of labor: η/γ	**0.24**	[0.15, 0.35]	Statistisches Bundesamt (2025b)

With the necessary parameters calibrated, we are now equipped to calculate incidence shares. Using the point estimates from the previous sections, we estimate the incidence of the LBT on landowners (both residential and commercial), workers, and firm owners. As discussed in Section 5.1, we view the effects on prices as the most reliable indicator of the economic incidence of the tax on landowners. Accordingly, the following analysis focuses on the estimates obtained from the sales price regressions. Panel A of Table 4 reports the incidence estimates for each factor of production, while Panel B displays the weighted incidence shares borne by each type of agent.[41]

According to our estimates, firm owners bear the largest portions of the LBT burden, with an average incidence share of about 72 percent over the full post period. Commercial landowners bear about 12 percent of the burden, workers about 11 percent and residential landowners about 6 percent. These incidence shares evolve dynamically after a tax change. In the first two periods, almost the entire burden falls on firm owners due to the mechanical effect of the tax increase. Over time, the burden shifts towards the other factors of production. For commercial landowners, the incidence share increases from 1.5 percent in the two years after the tax change to 19.6 percent four to five years after the tax change. Similarly, the incidence share for residential landowners increases from 2.1 percent to 11.5 percent. The incidence on workers stays relatively constant, because the wage changes from the short to the medium run are almost entirely counterbalanced by the price changes for residential properties.[42]

[41] We follow Suárez Serrato and Zidar (2024) in presenting weighted incidence shares. The alternative approach uses unweighted shares. This highlights which type of agent is most affected by the tax change, without adjusting for differences in income shares across groups. We report unweighted estimates in Table B.14 in the Appendix.

[42] The estimates for the specification with State x Year FE are displayed in Table B.15. In the medium run the incidence on firm owners is lower (approximately 41%) and the incidence on residential (approximately 19.5%) and commercial landowners (approximately 35%) is higher than for the CZ x Year specification.

Table 4: Incidence Estimates

A. Incidence	Average	Short-Run	Medium-Run
Workers	0.381*	0.422**	0.292
	(0.217)	(0.175)	(0.254)
Firm Owners	1.893***	2.706***	1.106
	(0.706)	(0.626)	(0.802)
Landowners (Residential)	0.655***	0.287*	0.984***
	(0.247)	(0.171)	(0.302)
Landowners (Commercial)	1.737***	0.269	2.137***
	(0.549)	(0.472)	(0.657)
B. Share of Incidence			
Workers	0.108	0.101**	0.114
	(0.072)	(0.046)	(0.102)
Firm Owners	0.720***	0.864***	0.576***
	(0.103)	(0.054)	(0.154)
Landowners (Residential)	0.056*	0.021	0.115**
	(0.030)	(0.014)	(0.050)
Landowners (Commercial)	0.116**	0.015	0.196**
	(0.052)	(0.028)	(0.081)
Rent or Sales	Sales	Sales	Sales
CZ x Year FE	✓	✓	✓

Notes: This table presents the incidence estimates for landowners, workers and firm owners. Panel A displays the welfare-relevant elasticities described in Table 2. For workers it shows the incidence on disposable income $\dot{w} - \alpha\dot{r}^H$. Panel B displays the share of incidence borne by economic agent. Each column displays a different specification for estimating the elasticities. All regression models include municipal fixed effects, account for the LPT rate and include "commuting zone (CZ) $\times$ year" fixed effects. The second column shows incidence estimates for the first two years after the tax change. The third column shows the incidence estimates for the medium-run (four and five years after the tax change). The estimation sample is restricted to non-merged municipalities such that we have 3,250 municipalities with 7,512 tax changes out of which 7,101 are tax hikes in the commercial sales sample, and 2,574 municipalities with 5,874 tax changes and 5,481 tax hikes in the residential sales sample. We have 1,832 municipalities with 3,418 tax changes(3,151 tax hikes) in the wage sample, and 8,557 municipalities with 17,272 tax changes (16,478 tax hikes) in the profit sample. Standard errors are clustered at the municipal level. Standard errors are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

Our medium-run incidence estimates for firm owners are quite similar to the updated estimates reported by Suárez Serrato and Zidar (2024). However, our estimates for residential property owners and workers are slightly lower. These discrepancies are in part due to adding commercial real estate to the analysis. They are potentially also due to institutional differences. The German LBT is set on the municipal level, while Suárez Serrato and Zidar (2024) rely on variation at the US state level. Workers are likely more mobile between municipalities than they are between US states. This could explain the smaller incidence falling on workers in our setting. Through the lens of the model, this translates into a larger effective labor supply elasticity ε^{LS}, reducing the incidence on workers, but increasing the incidence on commercial and residential landowners.

Comparing our results to Fuest et al. (2018), we obtain a smaller incidence share for workers, although our reduced form wage elasticities are very similar. This is mainly due to modeling differences. While in Fuest et al. (2018) the distribution of the tax burden between firm owners and workers is a result of rent sharing, we consider broader economic effects including firms adjusting their input factor demand, firm entry and exit, and worker mobility.[43]

6.2 Sensitivity Analysis

To assess the robustness of our baseline incidence estimates, we examine how the distribution of the tax burden responds to variations in the calibrated model parameters presented in Table 3 as well as other modeling decisions. This sensitivity analysis provides insight into the extent to which our results depend on specific features of the model.

In Appendix Figure B.20, we analyze how the incidence shares of the four agents change when the parameters are set at different values. We always keep the other parameters at the baseline value and vary one of the parameters to check the sensitivity of the incidence shares to the calibration. In Panel B.20a we show how the incidence shares vary for different values of the housing cost share α. This parameter plays an important role in distributing the tax burden between workers and owners of residential real estate. If $\alpha = 0$, the residential real estate market essentially drops out of the model and the full burden of lower wages is borne by workers. With higher α, workers are less negatively impacted, because they also benefit from lower real estate prices. By construction, the shares for firm owners and owners of commercial properties are unaffected.

In Panel B.20b we show how the incidence shares vary for different values of the product demand elasticity ε^{PD}. This parameter mainly impacts how large corporate profits are. A more negative ε^{PD} implies lower profits as market power declines. Therefore, the parameter determines how the incidence is distributed between firm owners and all other agents. The figure shows that firm owner shares are always clearly the largest for all plausible values of ε^{PD}. In Panel B.20c we show how the incidence shares vary for different values of the output elasticity of capital δ. Together with ε^{PD}, this parameter has an important impact on the size of factor demand responses to tax changes. Hence, it also impacts the income share of firm owners. The incidence shares are relatively insensitive to plausible changes of δ.

Finally, in Panel B.20d we show how the incidence shares vary for different values of the ratio between commercial property and labor costs η/γ. This parameter has an impact on the income share of owners of commercial real estate. As such, their income share is the most

[43] In Figure B.21 we adjust our model to more closely match the modeling approach in Fuest et al. (2018). We set α and η to zero (essentially shutting off the real estate markets) and show how the incidence shares change when moving ε^{PD} closer to perfect competition on the output market. The Figure shows that for sufficiently negative ε^{PD} we find incidence shares that are very close to the findings in Fuest et al. (2018).

sensitive to varying η/γ. In the sensitivity tests, it varies from about 15 percent to 25 percent.

In Appendix Figure B.21 we conduct an exercise that makes our estimates more comparable to the previous literature. The figure shows the incidence for workers and firm owners when disregarding property markets ($\alpha = \eta = 0$) and varying ε^{PD}. With this set-up and elastic product demand, workers and firm owners share about 50% of the burden each. Once product demand becomes sufficiently elastic ($\varepsilon^{PD} < -5$) workers even bear the majority of the burden. This set-up is more comparable to some parts of the literature (e.g. Fuest et al., 2018), who do not model property markets and monopolistically competitive product markets. Under these assumptions, our results are very similar to the common finding of approximately 50% incidence on workers.

Table B.13 in the Appendix displays the incidence shares for a variety of alternative approaches. The first column displays the baseline medium-run effect from Table 4. The second column shows incidence estimates when using the rental price elasticities instead of the sales price elasticities. The main difference is a reduction of the incidence share borne by owners of commercial real estate because of the smaller rental elasticities. Next, we focus on an alternative approach to quantify the incidence on firm owners. We can take the expression for the incidence on firm owners from Equation 8 and calibrate the parameters to obtain an alternative estimate for the incidence on firm owners.[44] The incidence shares from that approach are displayed in column 3 of Table B.13. Even though the approach is quite different, the incidence share for firm owners is remarkably similar to the baseline. Figure B.22 in the Appendix also shows the sensitivity of our findings to parameter assumptions for that approach. Finally, the fourth column adjusts the assumptions about deductibility of costs from the tax base. Instead of capital being non-deductible and property fully deductible, both production factors are partially (50%) deductible. This leads to slightly lower incidence shares for firm owners and higher shares for the other agents, but the differences are quite small. This exercise shows that the incidence estimates are not very sensitive to parameter calibration and modeling choices.

7 Conclusion

This paper provides a comprehensive analysis of the incidence of corporate income taxes. Combining theoretical modeling with empirical analyses, we assess the distribution of the economic burden of the German LBT on four groups: firm owners, workers, commercial real estate owners, and residential real estate owners. For identification, we exploit the German institutional setting of local business taxation, in which we observe more than 17,000 business

[44]Since the taxable profit we use for the reduced form effects might not fully capture economic profits, we use this alternative approach to check the sensitivity of the incidence estimates. More details are provided in Appendix C.10.

tax reforms between 2008 and 2019. We combine administrative data on tax rates, firm profits, and wages with real estate micro data that is unique in two dimensions. First, it allows us to assess the cost of commercial land as a production factor, as it specifically covers only commercially used properties. Second, the dataset covers information from 140 different sources on over 1.5 million commercial properties offered for rent and 1 million properties offered for sale. The number of residential properties in our data listed for sale is about 15.5 million, the number of residential properties listed for rent about 14 million.

We adopt an event study design and find that business tax increases capitalize into lower commercial and residential property prices. Following a one percentage point LBT increase, the sales prices of commercial buildings decrease by about two percent after four years. For residential properties, we observe a price drop of about one percent. Wages decrease by roughly one percent, firm profits by close to two percent. Extensive robustness checks show the stability of our findings to modifications to our empirical specification and estimation strategy.

Expanding the model developed by Suárez Serrato and Zidar (2016), we derive a direct link between our reduced form elasticities and welfare changes for commercial landowners, workers, residential landowners, and firm owners. Commercial landowners bear a substantial part of the burden with about 20 percent. About 12 percent of the incidence falls on residential landowners, while workers also bear approximately 11 percent. Finally, about 58 percent of the incidence falls on firm owners. Our analysis shows that it is crucial to account for both commercial and residential landowners when analyzing the incidence of corporate taxation. We also show that there is a dynamic response to tax changes. While firm owners bear most of the burden immediately after the tax change, the adjustment of real estate and labor markets leads to a shift towards the other agents over time.

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Appendix for
"*Capitalists, Workers and Landlords: A Comprehensive Analysis of Corporate Tax Incidence*"
(for online publication only)

David Gstrein, Florian Neumeier, Andreas Peichl and Pascal Zamorski

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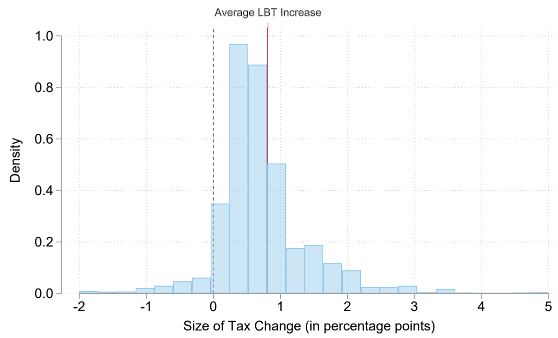
A Descriptive Statistics

Table A.1: Sample Selection

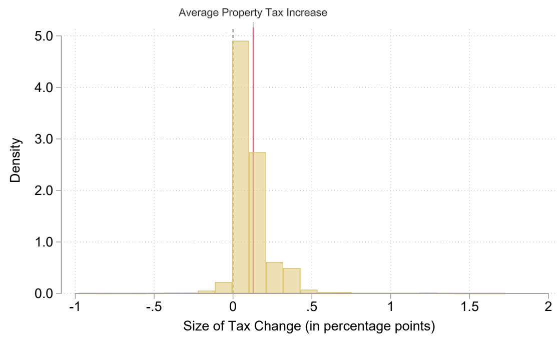
	# Municipalities	# Tax Changes	# Tax Hikes	# Properties
Municipality Data (2003–23)	10,724	24,793	22,916	-
Dropped mergers	10,091	22,013	20,686	-
Panel A: Real Estate Data				
I. Merge with Real Estate Data	8,560	18,448	17,568	32,140,006
I.i Commercial Sales Data	3,250	7,512	7,101	1,033,264
I.ii Commercial Rent Data	2,574	5,874	5,481	1,526,310
I.iii Residential Sales Data	8,430	18,221	17,350	15,513,916
I.iv Residential Rent Data	6,129	13,164	12,476	14,066,516
Balanced Real Estate Data	2,186	5,198	4,855	27,674,326
Panel B: Profit Data				
II. Merge with Profit Data	8,441	16,736	16,212	-
Panel C: Wage Data				
III. Merge with Wage Data	1,832	3,418	3,151	-
Panel D: Balanced Data				
Balanced Data	1,216	2,503	2,296	-

Notes: The table shows the number of municipalities, tax changes, tax hikes, and property price observations per sample selection step for the property price samples used in the analysis in Panel A, the profit sample in Panel B, the wage sample in Panel C, and a sample that is balanced over all six dimensions (four real estate dataset together with profits and wages) in Panel D where we require each variable to be non-missing for every municipality and year combination per sample.
Source: Statistical State Offices.

Figure A.1: Histogram of Tax Changes



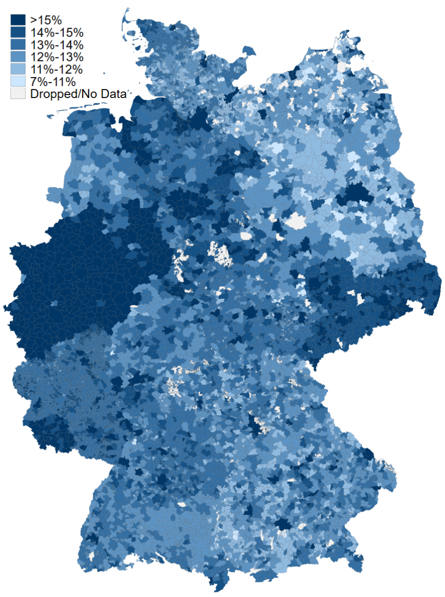
(a) Local Business Tax Changes



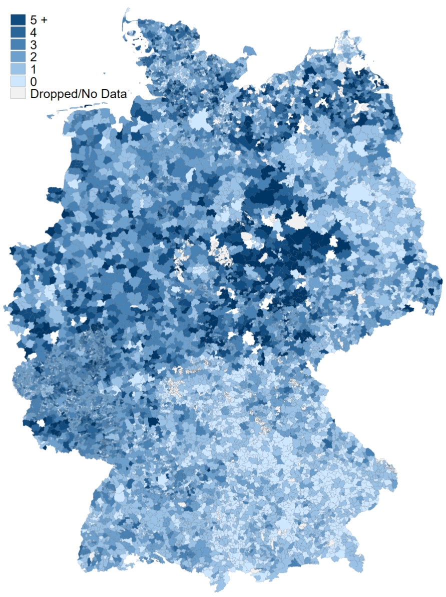
(b) Local Property Tax Changes

Notes: The histogram displays changes in the LBT rate, induced by municipal scaling factor changes between 2004 and 2023 for the 10,091 municipalities that were not subject to merger reforms. The average increase in the LBT (excluding tax drops) is 0.806 percentage points, the 75th percentile increase is at 1.5 percentage points. The average increase in the property tax (excluding tax drops) is 0.127 percentage points, the 75th percentile increase is at 0.157 percentage points. The number total tax changes between 2003 and 2023 amounts to 22,013 (out of which 20,686 are tax hikes). For illustrative reasons, around 0.1 percent of observations with increases greater than 5 (2) or smaller than -2 (-1) percentage points for the LBT (LPT) are omitted in the figure.
Source: Own calculation based on data from the Statistical State Offices.

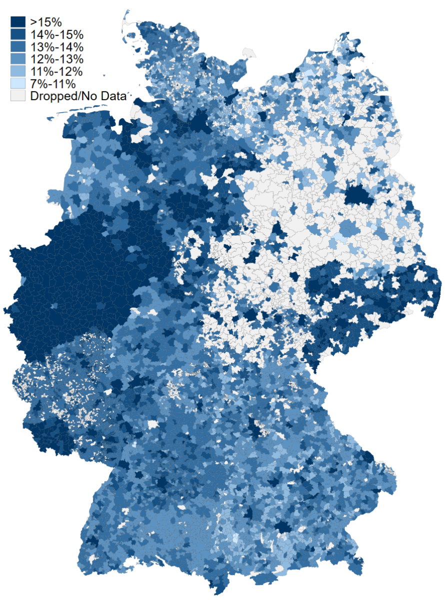
Figure A.2: Tax Variation - All municipalities vs. Estimation Sample



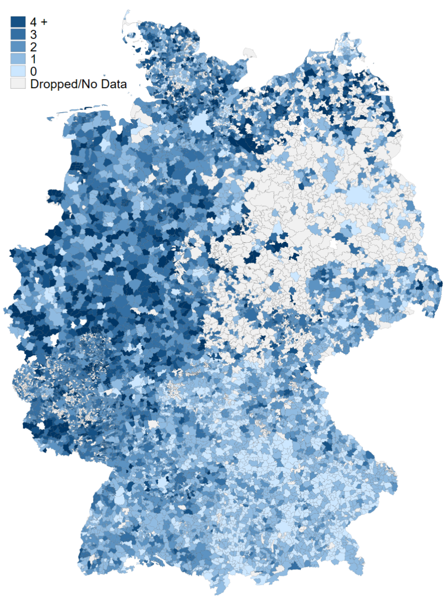
(a) Average LBT Rates – All Municipalities



(b) Number of Tax Hikes – All Municipalities



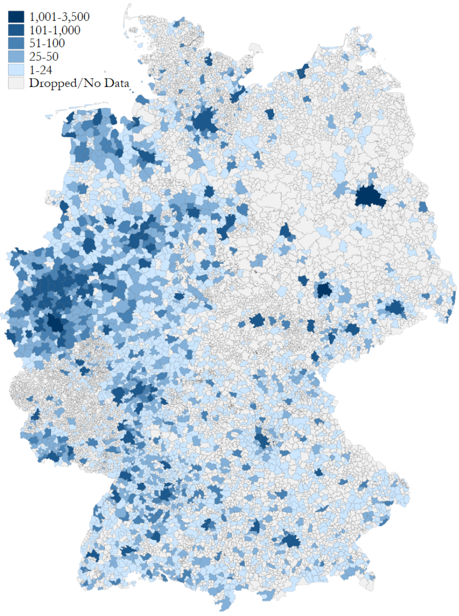
(c) Average LBT Rates – Estimation Sample



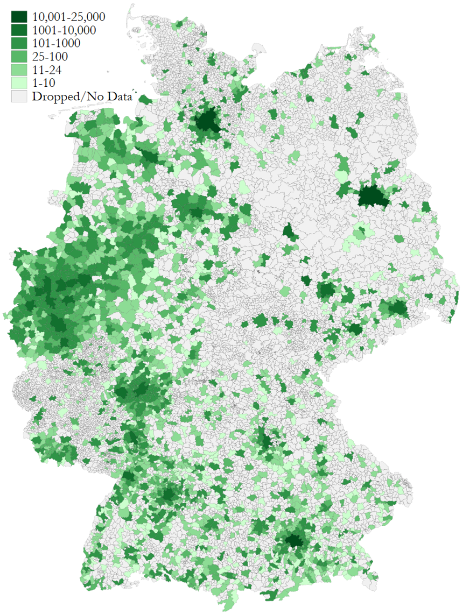
(d) Number of Tax Hikes – Estimation Sample

Notes: The figure shows the average LBT rates and the number of municipal LBT increases in Germany for a sample of 10,724 municipalities between 2008 and 2019 in Panels A.2a and A.2b, respectively. Panels A.2c and A.2d show the same statistics for the subsample of 8,560 municipalities for which we observe property prices between 2008 and 2019. Grey areas indicate municipalities for which we do not observe at least one posting per sample year or that we drop as they experienced municipal merger reforms during the sample period (2008-2019).
Source: Own calculation based on data from the Statistical State Offices.

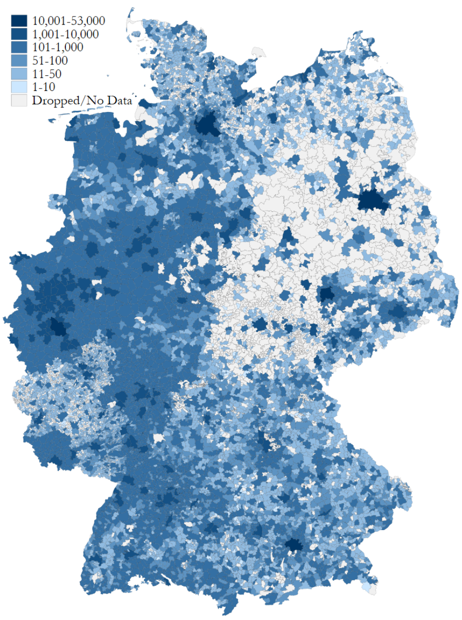
Figure A.3: Average Number of Postings per Year (2008-2019)



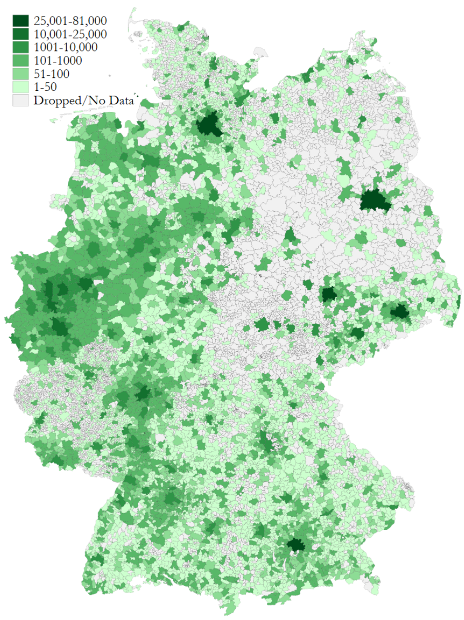
(a) Commercial Sales Sample



(b) Commercial Rents Sample



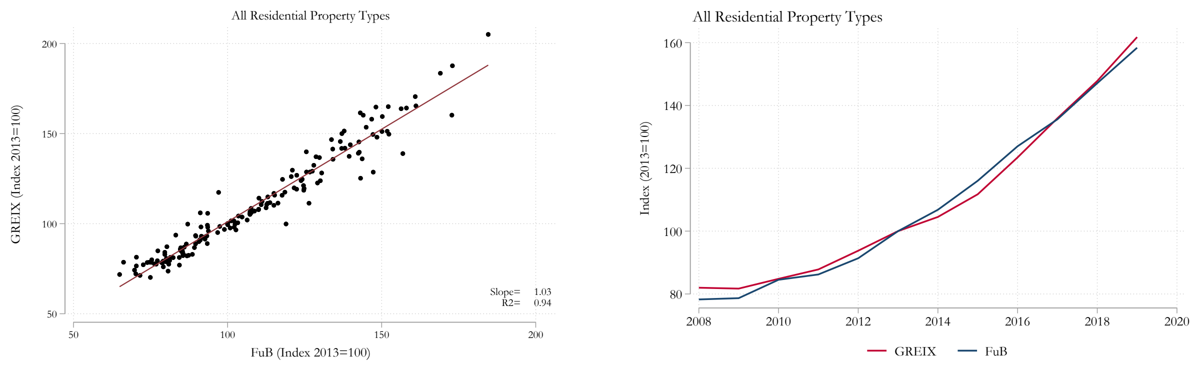
(c) Residential Sales Sample



(d) Residential Rents Sample

Notes: The figure shows spatial variation in the average number of advertising postings in Germany for a sample of 3,250 municipalities in the commercial sales sample (Panel A.3a) and 2,574 municipalities in the commercial rents sample (Panel A.3b), 8,430 municipalities in the residential sales sample (Panel A.3c) and 6,129 municipalities in the residential rents sample (Panel A.3d) between 2008 and 2019. Grey areas indicate municipalities for which we do not observe at least one posting per sample year or that we drop as they experienced a municipal merger reform during the sample period. *Source*: Own calculation based on data from *F+B* and the Statistical State Offices.

Figure A.4: Data Validation of Property Offering Prices: Evolution of *F+B* Property Offerings Price Index and German Real Estate Index (*GREIX*) 2008-2019

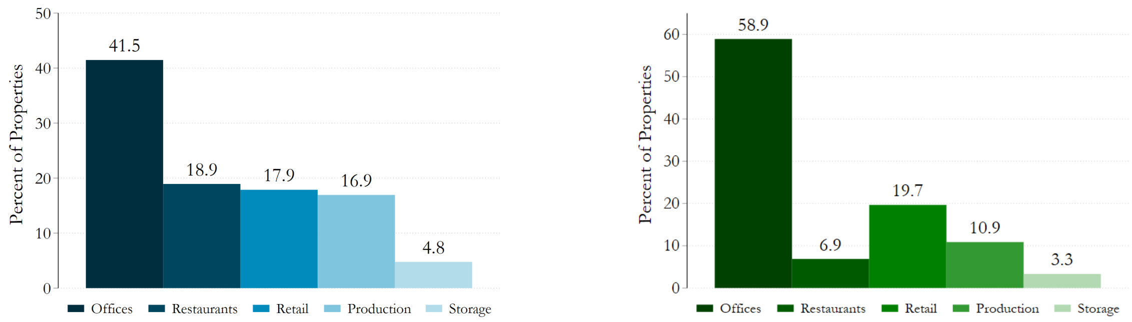


(a) Scatter Plot

(b) Line Plot

Notes: This figure illustrates the evolution of residential real estate price indices in 19 of Germany's largest counties/cities (Berlin, Hamburg, Munich, Cologne, Frankfurt, Stuttgart, Düsseldorf, Bonn, Chemnitz, Dortmund, Dresden, Duisburg, Erfurt, Karlsruhe, Leipzig, Lübeck, Münster, Potsdam and Wiesbaden which together represent roughly 16% of the German population) from 2008 to 2019. Panel A.4a illustrates the correlation between the *F+B* property offering price indices, which are used in the analyses of this paper (on the X-axis). The y-axis depicts the *GREIX*, an administratively compiled index based on actual transaction prices reported by municipal property valuation committees (Gutachterausschüsse). Both indices track prices of residential sales of apartments, single- and multi-family houses and are normalized to an index value of 100 in 2013. Panel A.4b shows a corresponding line plot over time where the blue line represents the *F+B* property offering price indices, while red lines depicts the *GREIX* index.
Source: Own calculation based on data from *F+B* and *GREIX*.

Figure A.5: Distribution of Commercial Property Types

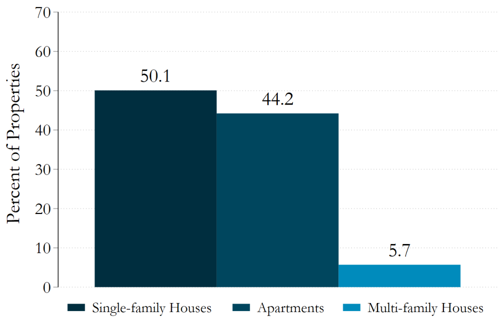


(a) Sales Sample

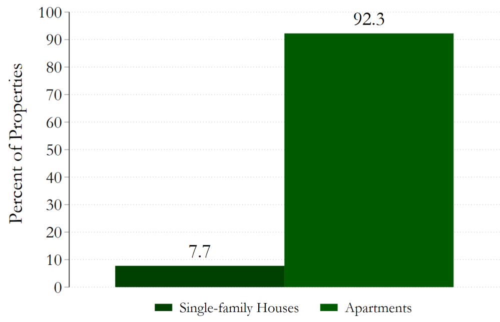
(b) Rents Sample

Notes: The figure shows the distribution of property types for both the commercial sales sample (Panel A.5a) and the commercial rents sample (Panel A.5b) between 2008 and 2019. Every commercial property in the data comes with one of the five property type labels listed in the figure such that there are no missing values. The number of properties in the sales sample is 1,033,264, the number of properties in the rents sample is 1,526,310. *Source*: Own calculation based on data from *F+B*.

Figure A.6: Distribution of Residential Property Types



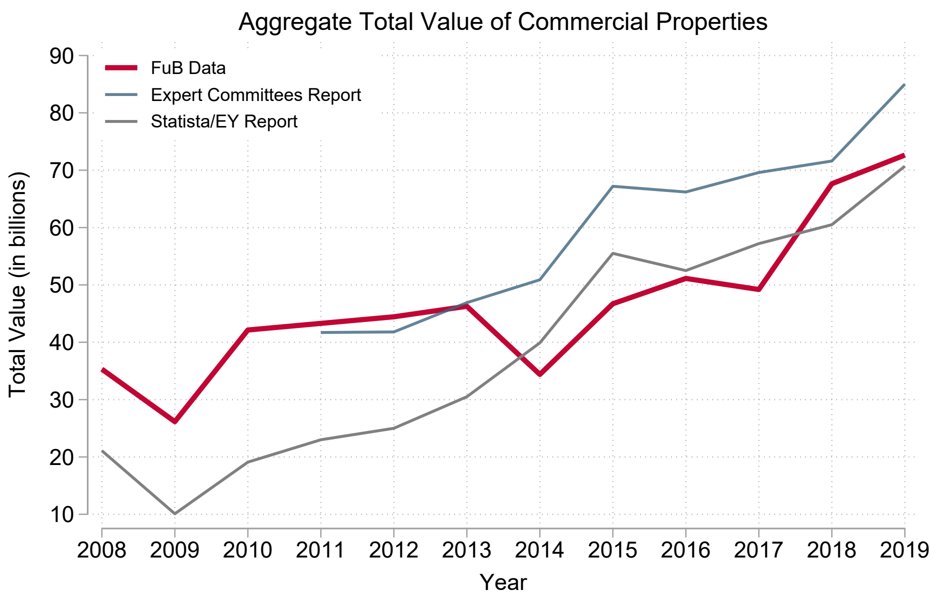
(a) Sales Sample



(b) Rents Sample

Notes: The figure shows the distribution of property types for both the residential sales sample (Panel A.6a) the residential rents sample (Panel A.6b) between 2008 and 2019. Every property in the data comes with a property type label as listed in the figure such that there are no missing values. The number of properties in the sales sample is 15,513,916, the number of properties in the rents sample is 14,066,516. *Source*: Own calculation based on data from *F+B*.

Figure A.7: Aggregate Value of Commercial Properties offered for Sale



Notes: This figure shows the development of the aggregate value of commercial properties offered for sale in our data along with two external data sources on the estimated actual transaction value from the local expert committees as well as from Statista/EY. *Source*: Own calculation based on data from *F+B*, *Statista*, and the *Expert Committees*.

Table A.2: Summary Statistics: Real Estate Samples

	Mean	Std. Dev.	Min	Max	N	Years
Panel A – Commercial Sales						
Price (in €/m^2)	1,535	1,132	59.50	6,000	1,033,264	2008-19
First price (in €/m^2)	1,519	1,061	88	5,296	1,012,605	2008-19
Construction year	1961	53.85	1500	2022	848,499	2008-19
Floor size (in m^2)	577.2	1,602	1	99,329	1,033,264	2008-19
# Rooms	3.432	5.689	0	99	1,033,264	2008-19
Basement dummy	0.256	0.436	0	1	1,033,264	2008-19
Parking spots dummy	0.496	0.500	0	1	1,033,264	2008-19
Renovation status	3.813	0.582	2	4	1,033,264	2008-19
Luxury property dummy	0.087	0.282	0	1	1,033,264	2008-19
Bright rooms dummy	0.037	0.189	0	1	1,033,264	2008-19
Public transport nearby	0.044	0.205	0	1	1,033,264	2008-19
Web portal dummy	0.742	0.437	0	1	1,033,264	2008-19
Panel B – Residential Sales						
Price (in €/m^2)	1,966	1,274	100	18,657	15,513,915	2008-19
First price (in €/m^2)	1,926	1,085	273.6	6,944	15,203,931	2008-19
Estimated transaction price (in €/m^2)	1,879	1,237	93.92	17,559	15,513,915	2008-19
Construction year	1980	39.31	1500	2022	13,440,972	2008-19
Floor size (in m^2)	137.3	107.0	12	12,000	15,513,915	2008-19
# Rooms	4.381	2.829	0	95	15,513,915	2008-19
Basement dummy	0.427	0.495	0	1	15,513,915	2008-19
Parking spots dummy	0.619	0.486	0	1	15,513,915	2008-19
Renovation status	3.462	1.167	1	5	15,513,915	2008-19
Luxury property dummy	0.0476	0.213	0	1	15,513,915	2008-19
Bright rooms dummy	0.218	0.412	0	1	15,513,915	2008-19
Web portal dummy	0.797	0.402	0	1	15,513,915	2008-19
Panel C – Commercial Rents						
Price (in €/m^2)	10.96	14.35	0.264	597.3	1,526,310	2008-19
First price (in €/m^2)	9.615	6.100	2	57.47	1,497,222	2008-19
Estimated transaction price (in €/m^2)	10.56	13.78	0.250	597.3	1,526,310	2008-19
Construction year	1969	45.16	1500	2021	885,418	2008-19
Floor size (in m^2)	407.7	1,496	1	99,999	1,526,310	2008-19
# Rooms	0.698	1.579	0	15	1,526,310	2008-19
Basement dummy	0.206	0.404	0	1	1,526,310	2008-19
Parking spots dummy	0.370	0.482	0	1	1,526,310	2008-19
Renovation status	3.813	0.582	2	4	1,526,310	2008-19
Luxury property dummy	0.0793	0.270	0	1	1,526,310	2008-19
Bright rooms dummy	0.0547	0.227	0	1	1,526,310	2008-19
Public transport nearby	0.106	0.308	0	1	1,526,310	2008-19
Web portal dummy	0.817	0.386	0	1	1,526,310	2008-19
Panel D – Residential Rents						
Price (in €/m^2)	7.364	3.155	2	55.56	14,066,515	2008-19
First price (in €/m^2)	7.258	2.659	3.534	20	13,785,261	2008-19
Construction year	1974	38.55	1500	2021	8,522,411	2008-19
Floor size (in m^2)	78.37	36.63	12	972	14,066,515	2008-19
# Rooms	2.665	1.245	0	15	14,066,515	2008-19
Basement dummy	0.458	0.498	0	1	14,066,515	2008-19
Parking spots dummy	0.470	0.499	0	1	14,066,515	2008-19
Renovation status	3.508	0.989	1	5	14,066,515	2008-19
Luxury property dummy	0.0272	0.163	0	1	14,066,515	2008-19
Bright rooms dummy	0.263	0.440	0	1	14,066,515	2008-19
Web portal dummy	0.801	0.399	0	1	14,066,515	2008-19

Notes: This table provides descriptive statistics for the four property price estimation samples after merging the municipality data with property price data. Observations in municipalities that are subject to merger reforms or for which we do not observe one observation per municipality and year during the sample period (2008-2019) are excluded (see Table A.1 for more context on the number of municipalities).
Source: Statistical State Offices and *F+B*.

Table A.3: Summary Statistics: Municipal Variables (Real Estate Samples)

	Mean	Std. Dev.	Min	Max	N	Years
Panel A – Commercial Sales						
LBT rate (in %)	13.95	1.828	7	20.30	1,033,264	2008-19
LBT change (in %p)	0.0643	0.404	-8.680	5.250	1,033,264	2008-19
LBT hike dummy	0.124	0.330	0	1	1,033,264	2008-19
LBT drop dummy	0.00683	0.0823	0	1	1,033,264	2008-19
# total tax changes	2.294	1.836	0	18	1,033,264	2008-19
Property tax rate (in %)	1.546	0.447	0.700	3.675	1,033,264	2008-19
Muni. Population	260,751	703,166	191	3,669,491	1,033,264	2008-19
Dist. GDP per capita (in €)	35,009	13,962	12,141	195,809	1,033,264	2008-19
Dist. Unemployment	4,640	9,580	0	54,898	1,033,264	2008-19
Panel B – Residential Sales						
LBT rate (in %)	13.70	1.879	7	26.25	15,513,915	2008-19
LBT change (in %p)	0.0496	0.455	-14.70	15.05	15,513,915	2008-19
LBT hike dummy	0.110	0.312	0	1	15,513,915	2008-19
LBT drop dummy	0.00673	0.0818	0	1	15,513,915	2008-19
# total tax changes	2.166	1.791	0	18	15,513,915	2008-19
Property tax rate (in %)	1.495	0.447	0.700	3.675	15,513,915	2008-19
Muni. Population	278,422	731,720	34	3,669,491	15,513,915	2008-19
Dist. GDP per capita (in €)	34,808	15,089	12,141	195,809	15,513,915	2008-19
Dist. Unemployment	4,554	9,837	0	54,898	15,513,915	2008-19
Panel C – Commercial Rents						
LBT rate (in %)	14.86	1.777	7	20.30	1,526,310	2008-19
LBT change (in %p)	0.043	0.311	-8.680	4.445	1,526,310	2008-19
LBT hike dummy	0.0779	0.268	0	1	1,526,310	2008-19
LBT drop dummy	0.00723	0.0847	0	1	1,526,310	2008-19
# total tax changes	1.676	1.695	0	18	1,526,310	2008-19
Property tax rate (in %)	1.772	0.497	0.700	3.675	1,526,310	2008-19
Muni. Population	693,976	1,028,792	179	3,669,491	1,526,310	2008-19
Dist. GDP per capita (in €)	44,483	19,641	13,397	195,809	1,526,310	2008-19
Dist. Unemployment	10,429	13,875	0	54,898	1,526,310	2008-19
Panel D – Residential Rents						
LBT rate (in %)	14.66	1.856	7	26.25	14,066,515	2008-19
LBT change (in %p)	0.0708	0.332	-14.70	15.05	14,066,515	2008-19
LBT hike dummy	0.118	0.322	0	1	14,066,515	2008-19
LBT drop dummy	0.00716	0.0843	0	1	14,066,515	2008-19
# total tax changes	2.242	1.745	0	18	14,066,515	2008-19
Property tax rate (in %)	1.634	0.396	0.700	3.675	14,066,515	2008-19
Muni. Population	234,907	305,403	47	3,669,491	14,066,515	2008-19
Dist. GDP per capita (in €)	37,727	16,401	12,141	195,809	14,066,515	2008-19
Dist. Unemployment	8,960	12,667	0	54,898	14,066,515	2008-19

Notes: This table provides descriptive statistics on municipal variables for the four property price estimation samples after merging the municipality data with property price data. Observations in municipalities that are subject to merger reforms or for which we do not observe one observation per municipality and year during the sample period (2008-2019) are excluded (see Table A.1 for more context on the number of municipalities).
Source: Statistical State Offices and *F+B*.

Table A.4: Summary Statistics: Municipal Profits and Wages

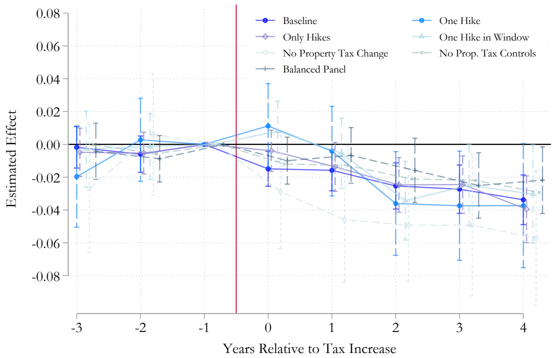
	Mean	Std. Dev.	Min	Max	N	Years
Panel A – Municipal Profits						
Gross Firm Profits	31,854	262,405	0.036	15,769,181	101,328	2008-19
Net Firm Profits	27,373	219,898	0.031	13,064,767	101,328	2008-19
LBT rate (in %)	12.315	1.304	7.000	20.300	101,328	2008-19
LBT change (in %p)	0.066	0.409	-9.000	6.300	101,328	2008-19
LBT hike dummy	0.102	0.303	0	1	101,328	2008-19
LBT drop dummy	0.003	0.052	0	1	101,328	2008-19
# total tax changes	1.982	1.479	0	13	101,328	2008-19
Property tax rate (in %)	1.238	0.224	0	3.675	101,328	2008-19
Dist. GDP per capita (in €)	28,071	8,633	12,141	195,809	101,328	2008-19
Muni. Population	8,124	38,217	31	1847253	101,328	2008-19
Dist. Unemployment	256	1,444	0	54,898	101,328	2008-19
Panel B – Municipal Wages						
Muni. Wages	37,404	9,481	9,400	100,900	25,272	2009-19
LBT rate (in %)	12.879	1.567	8.400	20.300	25,272	2009-19
LBT change (in %p)	0.042	0.410	-8.680	3.500	25,272	2009-19
LBT hike dummy	0.098	0.297	0	1	25,272	2009-19
LBT drop dummy	0.007	0.083	0	1	25,272	2009-19
# total tax changes	1.866	1.613	0	12	25,272	2009-19
Property tax rate (in %)	1.312	0.271	0.700	3.483	25,272	2009-19
Muni. Population	28,742	114,370	375	3,669,491	25,272	2009-19
Dist. GDP per capita (in €)	31,458	10,700	14,957	116,466	25,272	2009-19
Dist. Unemployment	935	3,066	0	54,898	25,272	2008-19

Notes: This table provides descriptive statistics on the municipal profits (Panel A) and municipal wages (Panel B) estimation samples. Observations in municipalities that are subject to merger reforms during the sample period (2008-2019) are excluded (see Table A.1 for more context on the number of municipalities).
Source: Statistical State Offices and *F+B*.

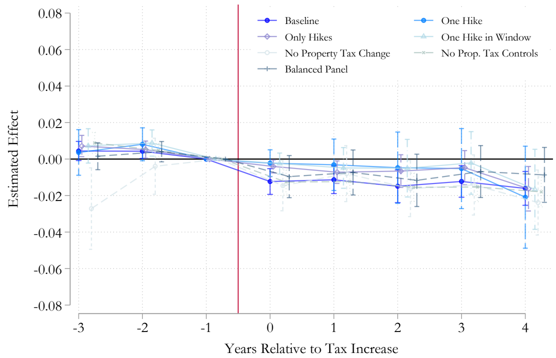
B Additional Results

B.1 Robustness

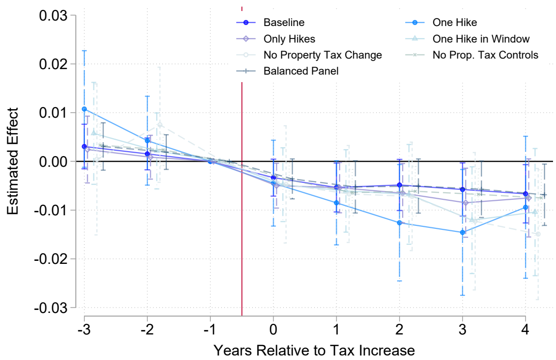
Figure B.8: Robustness Analysis – Event Studies



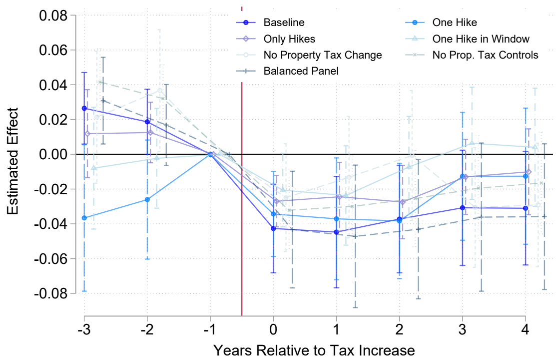
(a) Commercial Sales Price



(b) Residential Sales Price



(c) Municipal Wages



(d) Net Profits

Notes: This figure presents the results of six robustness tests imposing restrictions on our sample of municipalities. The figure shows estimated treatment effects of a one percentage point increase in the LBT rate on commercial sales prices in Panel (a), residential sales prices in Panel (b), municipal wages in Panel (c), and net profits in Panel (d). We present the baseline event study estimates and six additional robustness tests: (i) dropping municipalities that experience tax drops, (ii) keeping only municipalities that experienced no more than one single tax increase between 2004 and 2023, (iii) or one tax increase within the (shorter) event window, (iv) keeping only the subsample of municipalities that did not experience a LPT change during the sample period, (v) estimates from regressions excluding property tax controls, (vi) or results for the subset of 1,216 municipalities included in all four estimation samples. Unless stated otherwise, all regressions control for the scaled leads and lags of the LPT rate. Horizontal bars indicate 95% confidence intervals. All specifications include municipal and "state × year" fixed effects, with no additional controls. Standard errors are clustered at the municipality level.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

Table B.5: Robustness Event Study Elasticity Estimates – Commercial Sales

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δ Ln Net-of-Tax Rate	2.390***	1.634***	1.737**	1.198**	2.532***	1.903***	2.069***
	(0.574)	(0.441)	(0.549)	(0.443)	(0.563)	(0.552)	(0.556)
State x year FE	✓	✓			✓	✓	✓
Property Controls		✓		✓			
CZ x year FE			✓	✓			
Building Type Controls					✓		
District Type x year FE						✓	
Local Controls $t-2$							✓
N	1,033,264	1,033,264	1,033,264	1,033,264	1,033,264	1,033,264	1,033,264

Notes: This table presents the summarized post-reform estimates of regression model 9 with the log commercial sales price as dependent variable. Coefficients measure the price elasticity with respect to the net-of-local-business-tax rate. All regression models include municipal fixed effects. Additional control variables and fixed effects ("state x year" or "CZ × year" "District type × year"), property controls, building type controls, or twice lagged municipality controls vary depending on the specification (as indicated at the bottom of the table). The sample includes 3,250 municipalities. Standard errors are clustered at the municipal level. Standard errors are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

Table B.6: Robustness Event Study Elasticity Estimates – Residential Sales

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δ Ln Net-of-Tax Rate	1.004**	0.762**	0.655**	0.615**	1.037**	0.610*	0.705*
	(0.366)	(0.251)	(0.247)	(0.236)	(0.359)	(0.284)	(0.295)
State x year FE	✓	✓			✓	✓	✓
Property Controls		✓		✓			
CZ x year FE			✓	✓			
Building Type Controls					✓		
District Type x year FE						✓	
Local Controls $t-2$							✓
N	15,513,915	15,513,915	15,513,915	15,513,915	15,513,915	15,513,915	15,513,915

Notes: This table presents the summarized post-reform estimates of regression model 9 with the log residential sales price as dependent variable. Coefficients measure the price elasticity with respect to the net-of-local-business-tax rate. All regression models include municipal fixed effects. Additional control variables and fixed effects ("state x year" or "CZ × year" "District type × year"), property controls, building type controls, or twice lagged municipality controls vary depending on the specification (as indicated at the bottom of the table). The sample includes 8,430 municipalities. Standard errors are clustered at the municipal level. Standard errors are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

Table B.7: Robustness Event Study Elasticity Estimates – Commercial Rents

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δ Ln Net-of-Tax Rate	0.707	0.751*	1.045*	1.659***	0.634	0.415	0.436
	(0.439)	(0.356)	(0.411)	(0.455)	(0.394)	(0.386)	(0.391)
State x year FE	✓	✓			✓	✓	✓
Property Controls		✓		✓			
CZ x year FE			✓	✓			
Building Type Controls					✓		
District Type x year FE						✓	
Local Controls $t-2$							✓
N	1,526,310	1,526,310	1,526,310	1,526,310	1,526,310	1,526,310	1,526,310

Notes: This table presents the summarized post-reform estimates of regression model 9 with the log commercial rent price as dependent variable. Coefficients measure the price elasticity with respect to the net-of-local-business-tax rate. All regression models include municipal fixed effects. Additional control variables and fixed effects ("state x year" or "CZ × year" "District type × year"), property controls, building type controls, or twice lagged municipality controls vary depending on the specification (as indicated at the bottom of the table). The sample includes 2,574 municipalities. Standard errors are clustered at the municipal level. Standard errors are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

Table B.8: Robustness Event Study Elasticity Estimates – Residential Rents

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δ Ln Net-of-Tax Rate	0.934**	0.772**	0.706***	0.693**	0.925**	0.611*	0.577**
	(0.311)	(0.240)	(0.212)	(0.213)	(0.309)	(0.243)	(0.210)
State x year FE	✓	✓			✓	✓	✓
Property Controls		✓		✓			
CZ x year FE			✓	✓			
Building Type Controls					✓		
District Type x year FE						✓	
Local Controls $t-2$							✓
N	14,066,515	14,066,515	14,066,515	14,066,515	14,066,515	14,066,515	14,066,515

Notes: This table presents the summarized post-reform estimates of regression model 9 with the log residential rent price as dependent variable. Coefficients measure the price elasticity with respect to the net-of-local-business-tax rate. All regression models include municipal fixed effects. Additional control variables and fixed effects ("state x year" or "CZ × year" "District type × year"), property controls, building type controls, or twice lagged municipality controls vary depending on the specification (as indicated at the bottom of the table). The sample includes 6,129 municipalities. Standard errors are clustered at the municipal level. Standard errors are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

Table B.9: Robustness Event Study Elasticity Estimates - Alternative 2008 Specification

Commercial Sales	(1)	(2)	(3)	(4)
Δ Ln Net-of-Tax Rate	2.390***	1.737**	2.510***	1.862**
	(0.574)	(0.549)	(0.606)	(0.581)
State x year FE	✓		✓	
CZ x year FE		✓		✓
Alternative 2008 specification			✓	✓
N	1,033,264	1,033,264	1,033,264	1,033,264
Residential Sales	**(1)**	**(2)**	**(3)**	**(4)**
Δ Ln Net-of-Tax Rate	1.004**	0.655**	0.910**	0.596**
	(0.366)	(0.247)	(0.358)	(0.238)
State x year FE	✓		✓	
CZ x year FE		✓		✓
Alternative 2008 specification			✓	✓
N	15,513,915	15,513,915	15,513,915	15,513,915
Commercial Rents	**(1)**	**(2)**	**(3)**	**(4)**
Δ Ln Net-of-Tax Rate	0.707	1.045*	0.869	1.144**
	(0.439)	(0.411)	(0.468)	(0.417)
State x year FE	✓		✓	
CZ x year FE		✓		✓
Alternative 2008 specification			✓	✓
N	1,526,310	1,526,310	1,526,310	1,526,310
Residential Rents	**(1)**	**(2)**	**(3)**	**(4)**
Δ Ln Net-of-Tax Rate	0.934**	0.706***	1.014***	0.795***
	(0.311)	(0.212)	(0.271)	(0.161)
State x year FE	✓		✓	
CZ x year FE		✓		✓
Alternative 2008 specification			✓	✓
N	14,066,515	14,066,515	14,066,515	14,066,515
Net Profits	**(1)**	**(2)**	**(3)**	**(4)**
Δ Ln Net-of-Tax Rate	1.457*	1.893**	1.578*	1.811**
	(0.733)	(0.706)	(0.763)	(0.700)
State x year FE	✓		✓	
CZ x year FE		✓		✓
Alternative 2008 specification			✓	✓
N	101,316	101,316	101,316	101,316
Wages	**(1)**	**(2)**	**(3)**	**(4)**
Δ Ln Net-of-Tax Rate	0.511*	0.580**	0.638**	0.661**
	(0.219)	(0.204)	(0.240)	(0.222)
State x year FE	✓		✓	
CZ x year FE		✓		✓
Alternative 2008 specification			✓	✓
N	25,272	25,272	25,272	25,272

Notes: This table presents the summarized post-reform estimates of regression model 9. Coefficients measure the price elasticity with respect to the net-of-local-business-tax rate. All regression models include municipal fixed effects. Additional control variables and fixed effects ("state x year" or "CZ × year") vary depending on the specification (as indicated at the bottom of the table). Columns (3) and (4) use different set-up for the leads and lags of the tax changes. The changes are calculated to only depend on the changes of the local scaling factor, not taking into account any variation driven by the 2008 federal reform. Standard errors are clustered at the municipal level. Standard errors are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

Table B.10: Robustness Event Study Elasticity Estimates – Net Profits

	(1)	(2)	(3)	(4)
Δ Ln Net-of-Tax Rate	1.457*	1.893**	1.673*	1.308
	(0.733)	(0.706)	(0.712)	(0.774)
State x year FE	✓			
CZ x year FE		✓		
District Type x year FE			✓	
Local Controls $t-2$				✓
N	101,316	101,328	101,316	84,373

Notes: This table presents the summarized post-reform estimates of regression model 9 with log municipal net profits as dependent variable. Coefficients measure the price elasticity with respect to the net-of-local-business-tax rate. All regression models include municipal fixed effects. Additional control variables and fixed effects ("state x year" or "CZ × year" "District type × year") or twice lagged municipality controls vary depending on the specification (as indicated at the bottom of the table). The sample includes 8,441 municipalities with 16,736 tax changes (16,212 hikes). Standard errors are clustered at the municipal level. Standard errors are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculation based on data from Statistical State Offices.

Table B.11: Robustness Event Study Elasticity Estimates – Wages

	(1)	(2)	(3)	(4)
Δ Ln Net-of-Tax Rate	0.511*	0.580**	0.419	0.498*
	(0.219)	(0.204)	(0.227)	(0.215)
State x year FE	✓			
CZ x year FE		✓		
District Type x year FE			✓	
Local Controls $t-2$				✓
N	25,272	25,272	25,272	25,272

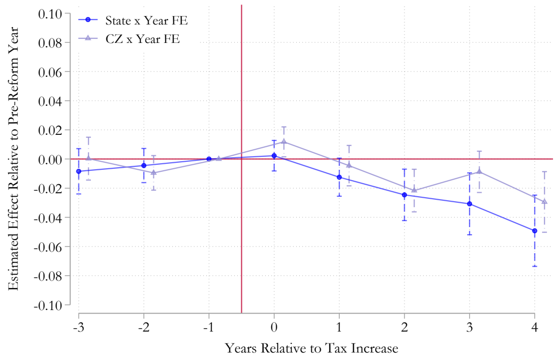
Notes: This table presents the summarized post-reform estimates of regression model 9 with log municipal manufacturing wages as dependent variable. Coefficients measure the price elasticity with respect to the net-of-business-tax rate. All regression models include municipal fixed effects. Additional control variables and fixed effects ("state x year" or "CZ × year" "District type × year") or twice lagged municipality controls vary depending on the specification (as indicated at the bottom of the table). The sample includes 1,832 municipalities with 3,418 tax changes out of which 3,151 are tax hikes. Standard errors are clustered at the municipal level. Standard errors are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculation based on data from Statistical State Offices.

Table B.12: Additional Robustness Event Study Elasticity Estimates – Net Profits

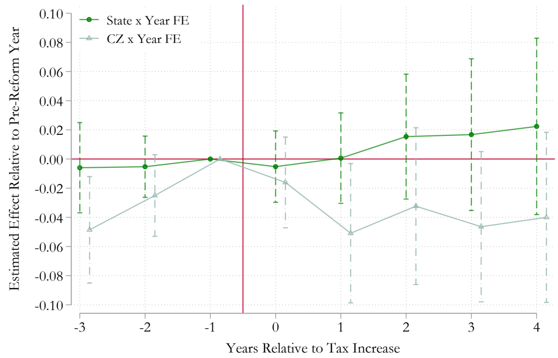
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Ln Net-of-Tax Rate	1.893***	0.831	2.230***	1.855***	3.459**	1.720**
	(0.706)	(0.648)	(0.684)	(0.702)	(1.607)	(0.723)
CZ x year FE	✓	✓	✓	✓	✓	✓
No LPT Controls		✓				
Only LPT Hike Controls			✓			
Unbalanced Panel				✓		
All Tax Changes					✓	
No Tax Drops						✓
N	101,328	101,328	101,328	116,544	102,612	95,016

Notes: This table presents the summarized post-reform estimates of regression model 9 with log municipal net profits as dependent variable. Coefficients measure the price elasticity with respect to the net-of-local-business-tax rate. All regression models include municipal fixed effects. Standard errors are clustered at the municipal level. Standard errors are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculation based on data from Statistical State Offices.

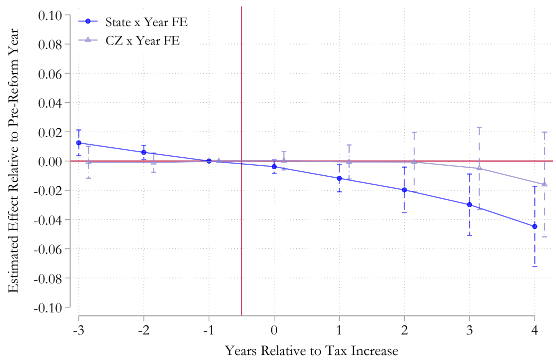
Figure B.9: Heterogeneity Robust Estimates



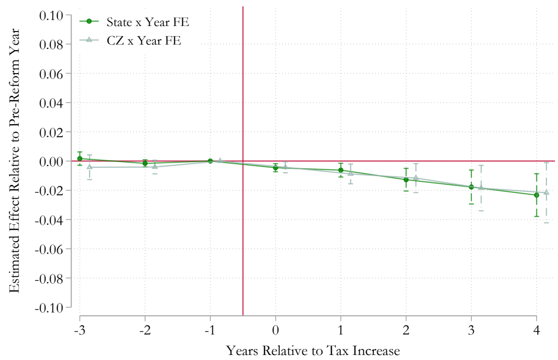
(a) Commercial Properties: Sales Prices



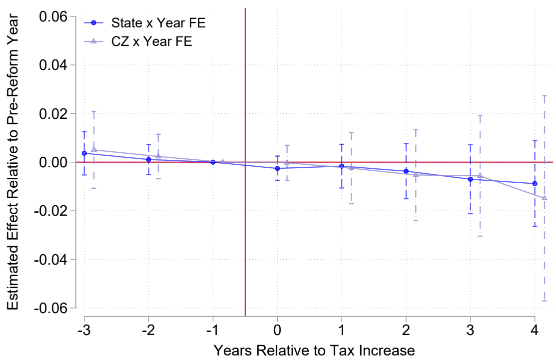
(b) Commercial Properties: Rents



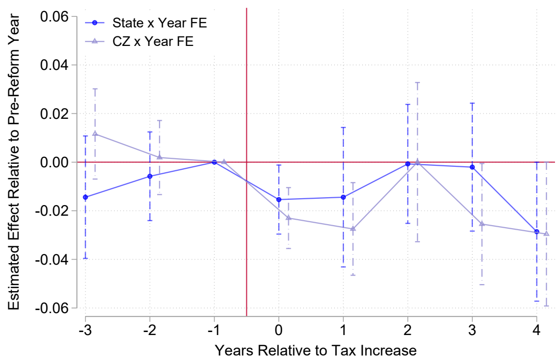
(c) Residential Properties: Sales Prices



(d) Residential Properties: Rents



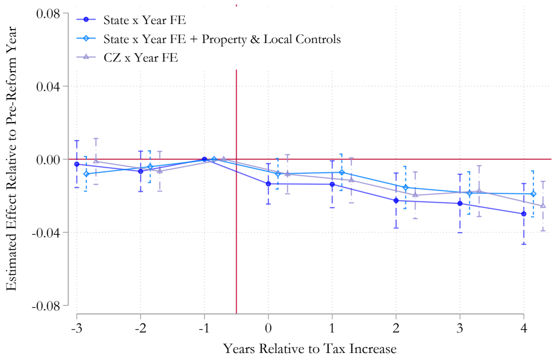
(e) Municipal Wages



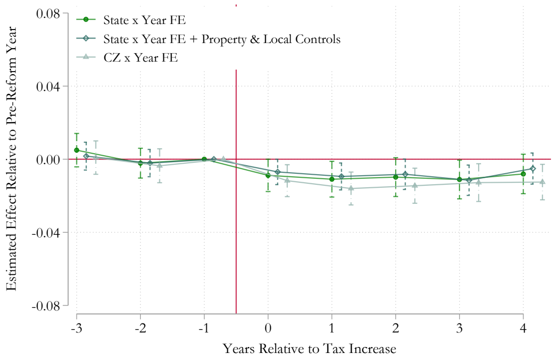
(f) Net Profits

Notes: The graphs show the implementation of the estimator proposed by De Chaisemartin and d'Haultfoeuille (2024). Treatment there is defined as the cumulative sum of tax changes with the first tax change happening in period 0. The dependent variables are the log sales price per sqm and the log rental price per sqm. We require at least one ad per municipality-year cell. All regressions include municipal fixed effects and the scaled leads and lags of the LPT rate as control. They also include the controls described in the figure. Standard errors are clustered at the municipal level.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

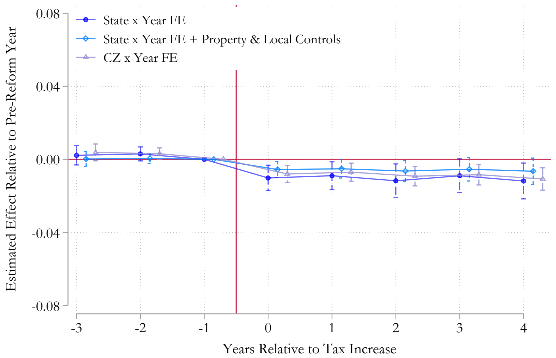
Figure B.10: Baseline Effects: Controlling for Spillovers



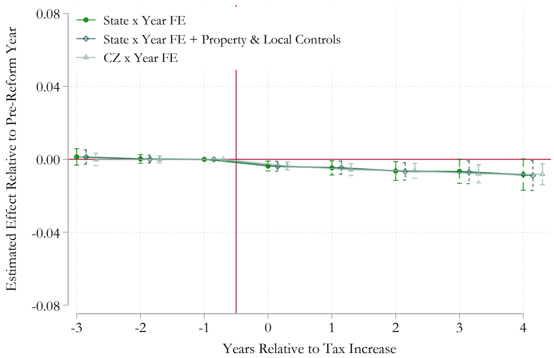
(a) Commercial: Sales Prices



(b) Commercial: Rents



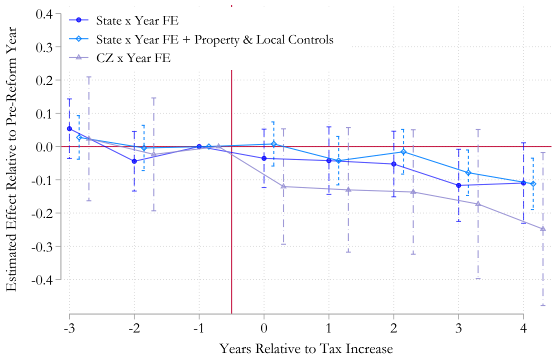
(c) Residential: Sales Prices



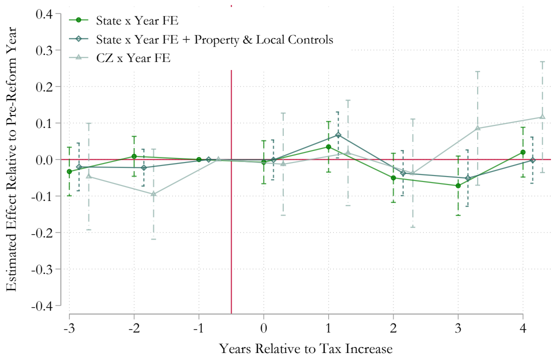
(d) Residential: Rents

Notes: This graph plots the event study estimates ($\hat{\beta}_j, j \in [-3, 4]$) and associated 95% confidence intervals of the event study model from Equation 9. In this specification, we control for weighted average leads and lags of tax changes in municipalities in surrounding areas. The dependent variables are the log sales price per sqm (Panel B.10a and B.10c) and the log rental price per sqm (Panel B.10b and B.10d). Treatment variables are event study indicators scaled by the LBT change. All regressions include municipal and "state $\times$ year" fixed effects and the LPT rate as control. They also include the controls described in the figure. Standard errors are clustered at the municipal level.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

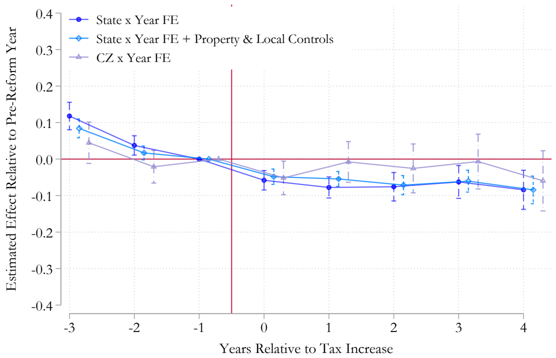
Figure B.11: Effect of Tax Changes in Surrounding Municipalities



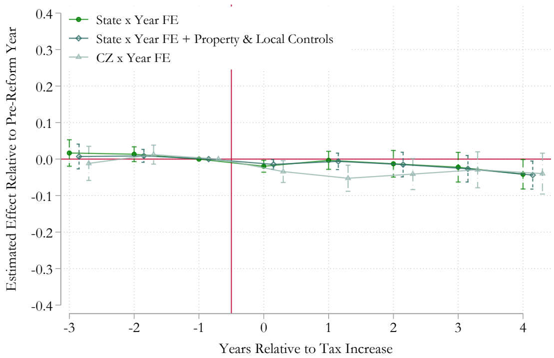
(a) Commercial: Sales Prices



(b) Commercial: Rents



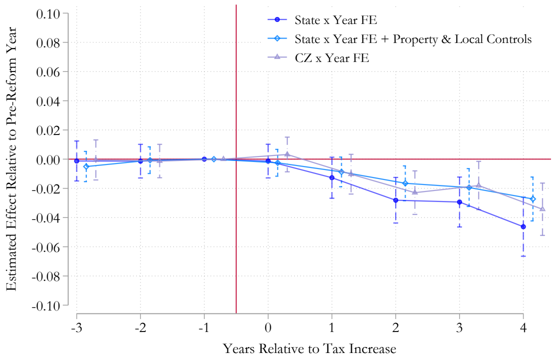
(c) Residential: Sales Prices



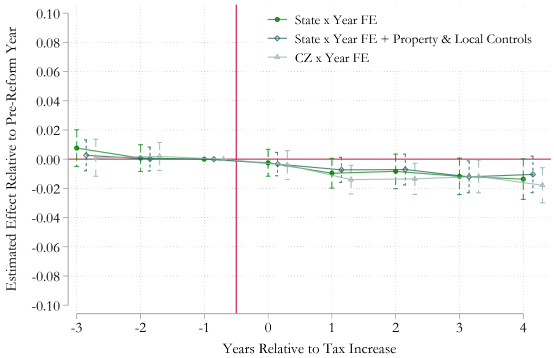
(d) Residential: Rents

Notes: This graph plots the event study estimates ($\hat{\beta}_j, j \in [-3, 4]$) and associated 95% confidence intervals for an event study model from Equation 9 that includes also weighted average leads and lags of tax changes in surrounding municipalities. The Figures plot the coefficient estimates for these weighted average leads and lags of the tax changes to analyze spillover effects of tax changes on other municipalities. The dependent variables are the log sales price per sqm (Panel B.11a and B.11c) and the log rental price per sqm (Panel B.11b and B.11d). Treatment variables are event study indicators scaled by the LBT change. All regressions include municipal and "state $\times$ year" fixed effects and the LPT rate as control. They also include the controls described in the figure. Standard errors are clustered at the municipal level.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

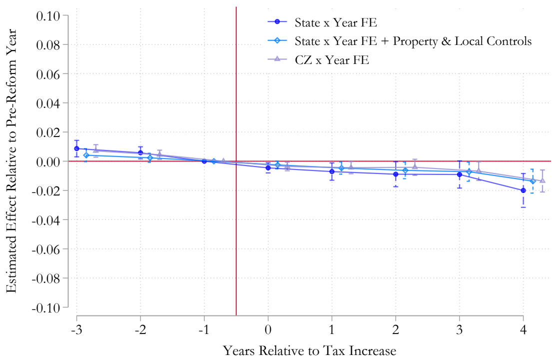
Figure B.12: Baseline Effects: Only Tax Hikes - No Drops



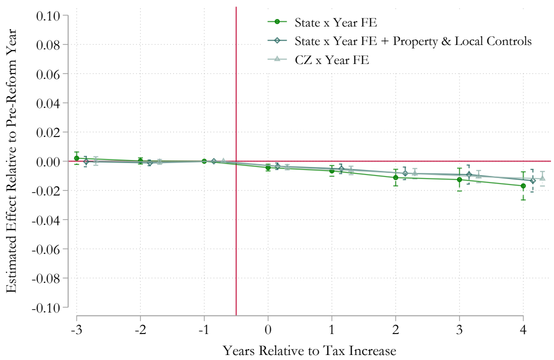
(a) Commercial: Sales Prices



(b) Commercial: Rents



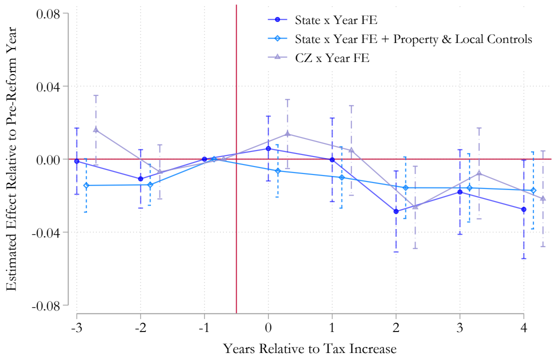
(c) Residential: Sales Prices



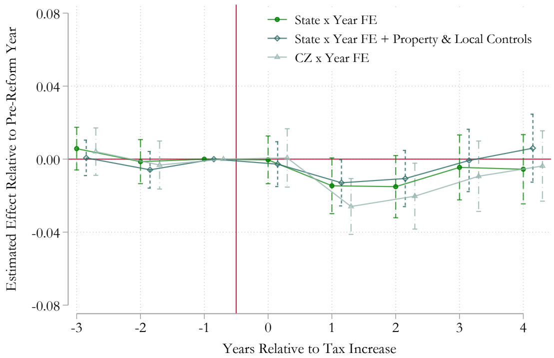
(d) Residential: Rents

Notes: This graph plots the event study estimates ($\hat{\beta}_j, j \in [-3, 4]$) and associated 95% confidence intervals of the event study model from Equation 9. In this specification, we only keep municipalities that experience no tax drops in the sample period. The dependent variables are the log sales price per sqm (Panel B.12a and B.12c) and the log rental price per sqm (Panel B.12b and B.12d). Treatment variables are event study indicators scaled by the LBT change. All regressions include municipal and "state $\times$ year" fixed effects and the LPT rate as control. They also include the controls described in the figure. Standard errors are clustered at the municipal level.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

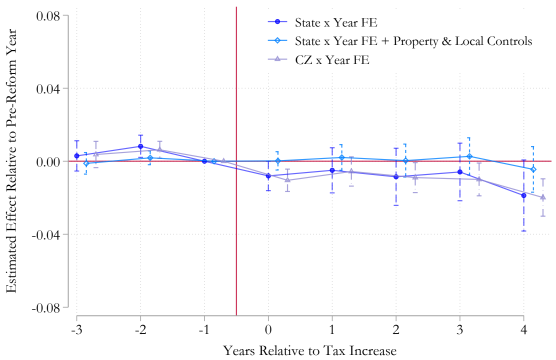
Figure B.13: Baseline Effects: Only One Tax Hike in Event Window



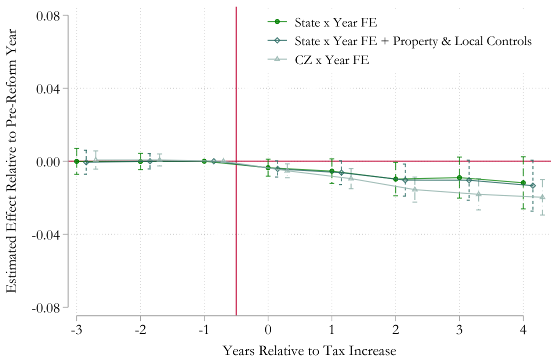
(a) Commercial: Sales Prices



(b) Commercial: Rents



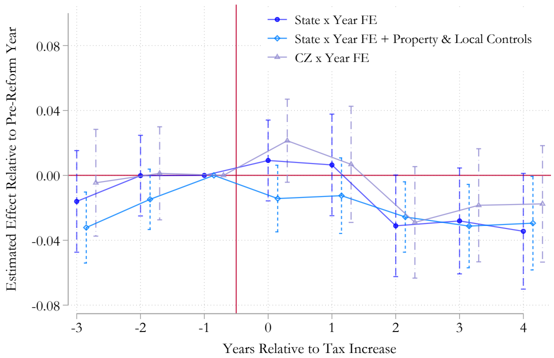
(c) Residential: Sales Prices



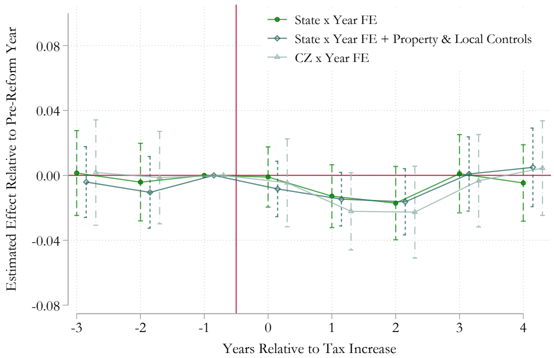
(d) Residential: Rents

Notes: This graph plots the event study estimates ($\hat{\beta}_j, j \in [-3, 4]$) and associated 95% confidence intervals of the event study model from Equation 9. In this specification, we only keep municipalities that experience no more than one tax hike during the sample period. The dependent variables are the log sales price per sqm (Panel B.13c and B.13a) and the log rental price per sqm (Panel B.13b and B.13d). Treatment variables are event study indicators scaled by the LBT change. All regressions include municipal and "state $\times$ year" fixed effects and the LPT rate as control. They also include the controls described in the figure. Standard errors are clustered at the municipal level.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

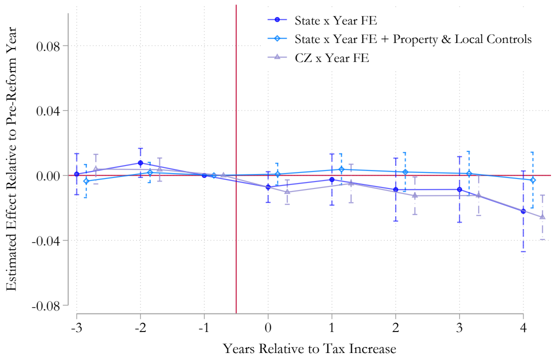
Figure B.14: Baseline Effects: Only One Tax Hike between 2004 and 2023



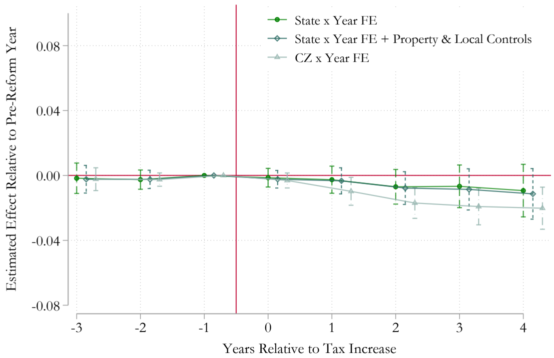
(a) Commercial: Sales Prices



(b) Commercial: Rents



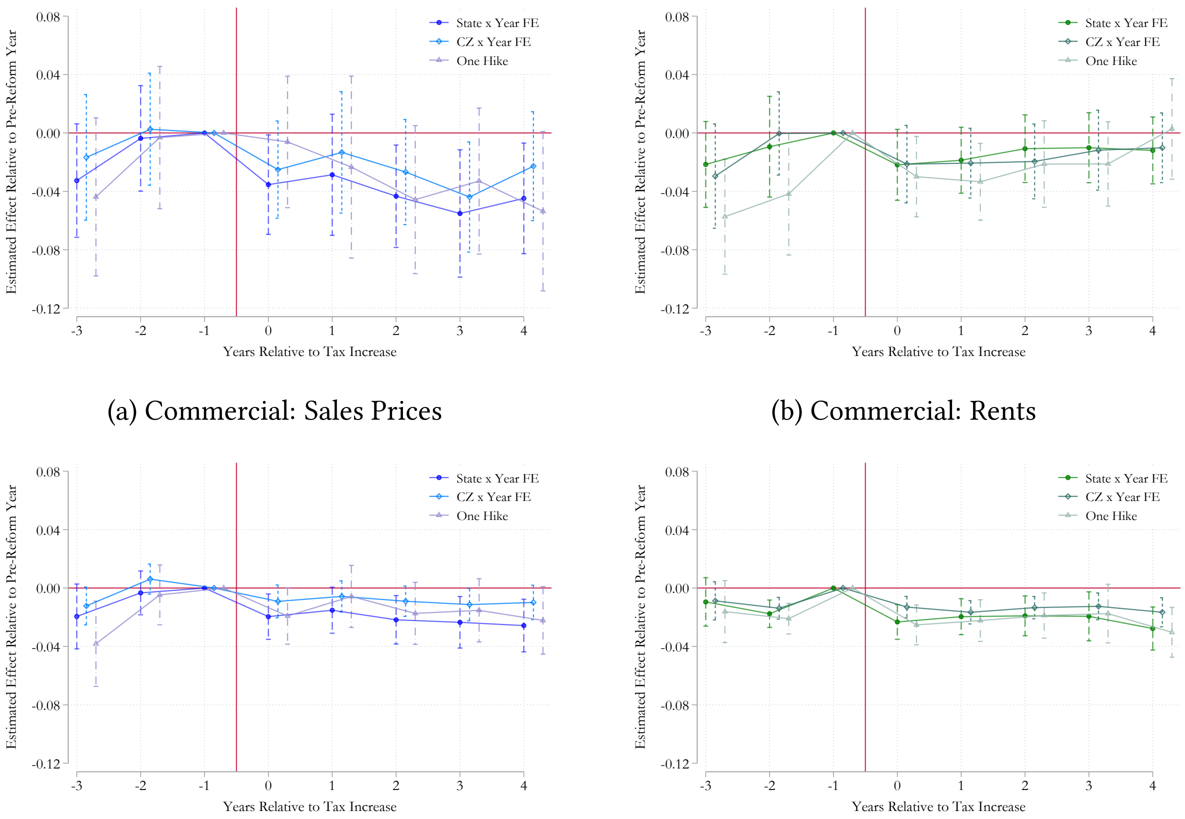
(c) Residential: Sales Prices



(d) Residential: Rents

Notes: This graph plots the event study estimates ($\hat{\beta}_j, j \in [-3, 4]$) and associated 95% confidence intervals of the event study model from Equation 9. In this specification, we only keep municipalities that experience no more than one tax hike during full sample period (2004-2023). The dependent variables are the log sales price per sqm (Panel B.14a and B.14c) and the log rental price per sqm (Panel B.14b and B.14d). Treatment variables are event study indicators scaled by the LBT change. All regressions include municipal and "state $\times$ year" fixed effects and the LPT rate as control. They also include the controls described in the figure. Standard errors are clustered at the municipal level.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

Figure B.15: Baseline Effects: No Property Tax Change in Event Window



(a) Commercial: Sales Prices

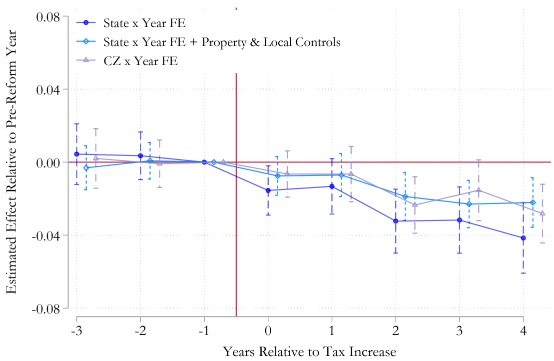
(b) Commercial: Rents

(c) Residential: Sales Prices

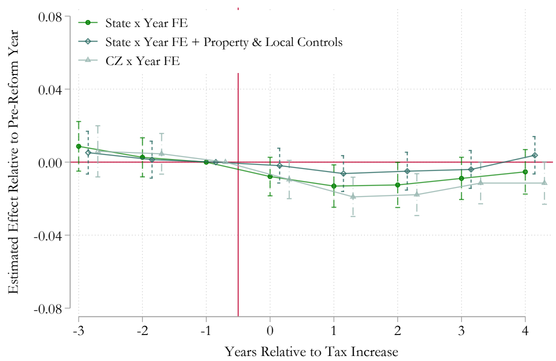
(d) Residential: Rents

Notes: This graph plots the event study estimates ($\hat{\beta}_j, j \in [-3, 4]$) and associated 95% confidence intervals of the event study model from Equation 9. In this specification, we only keep municipalities that experience no property tax changes during the event window. The dependent variables are the log sales price per sqm (Panel B.15a and B.15c) and the log rental price per sqm (Panel B.15b and B.15d). Treatment variables are event study indicators scaled by the LBT change. All regressions include municipal and "state × year" fixed effects and the LPT rate as control. They also include the controls described in the figure. Standard errors are clustered at the municipal level.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

Figure B.16: Baseline Effects: Removing North-Rhine Westphalia

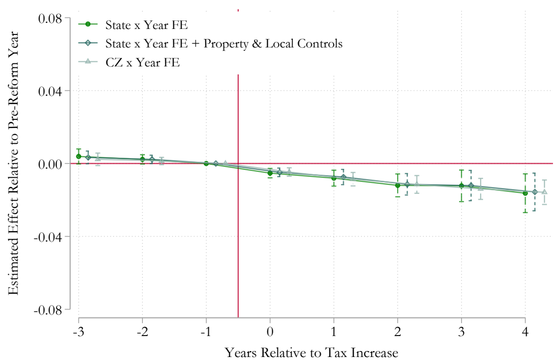


(a) Commercial: Sales Prices



(b) Commercial: Rents

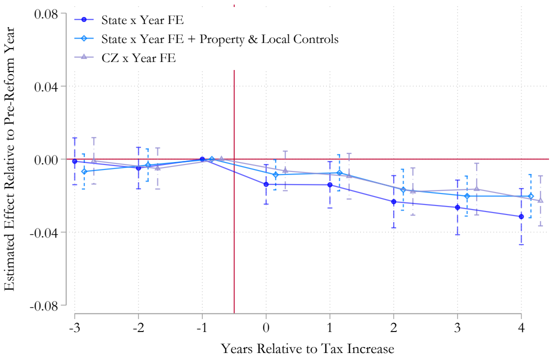
(c) Residential: Sales Prices



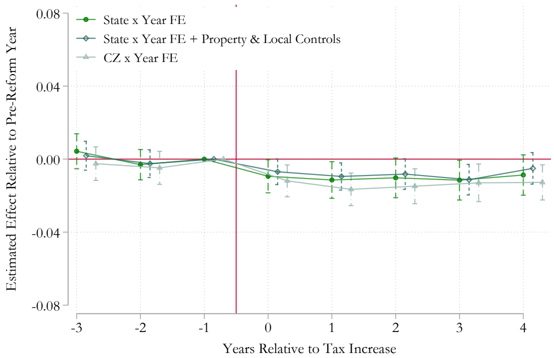
(d) Residential: Rents

Notes: This graph plots the event study estimates ($\hat{\beta}_j, j \in [-3, 4]$) and associated 95% confidence intervals of the event study model from Equation 9. In this specification, drop all municipalities in the state of North-Rhine Westphalia. The dependent variables are the log sales price per sqm (Panel B.16a and B.16c) and the log rental price per sqm (Panel B.16b and B.16d). Treatment variables are event study indicators scaled by the LBT change. All regressions include municipal and "state $\times$ year" fixed effects and the LPT rate as control. They also include the controls described in the figure. Standard errors are clustered at the municipal level.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

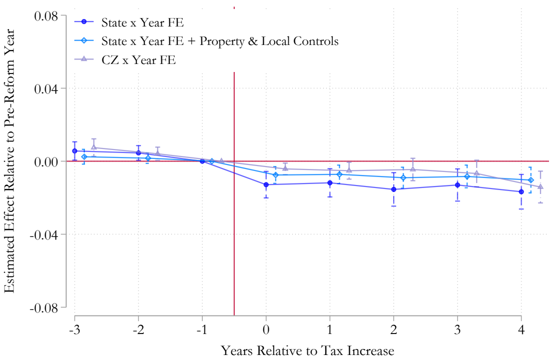
Figure B.17: Baseline Effects: Removing Rhineland Palatine



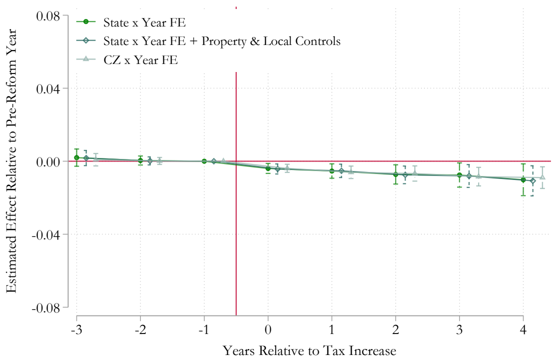
(a) Commercial: Sales Prices



(b) Commercial: Rents



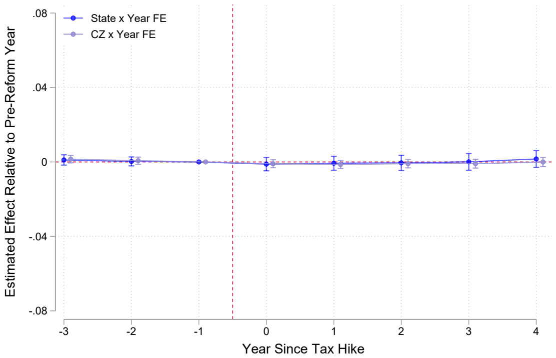
(c) Residential: Sales Prices



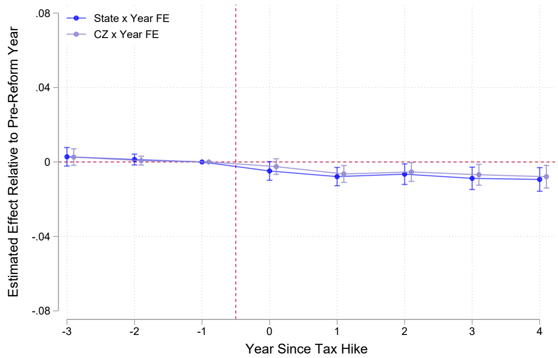
(d) Residential: Rents

Notes: This graph plots the event study estimates ($\hat{\beta}_j, j \in [-3, 4]$) and associated 95% confidence intervals of the event study model from Equation 9. In this specification, drop all municipalities in the state of Rhineland Palatine. The dependent variables are the log sales price per sqm (Panel B.17a and B.17c) and the log rental price per sqm (Panel B.17b and B.17d). Treatment variables are event study indicators scaled by the LBT change. All regressions include municipal and "state $\times$ year" fixed effects and the LPT rate as control. They also include the controls described in the figure. Standard errors are clustered at the municipal level.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

Figure B.18: Local Business Cycle Effects



(a) District GDP



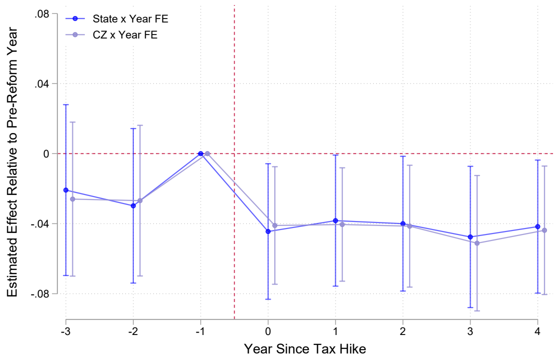
(b) Unemployment Rate

Notes: This graph plots the event study estimates ($\hat{\beta}_j, j \in [-3, 4]$) and associated 95% confidence intervals of the event study model from Equation 9. The dependent variables are the log unemployment rates and district GDP. Treatment variables are event study indicators scaled by the LBT change. We require at least one ad per municipality-year cell. All regressions include municipal fixed effects and the scaled leads and lags of the LPT rate as control. They also include the controls described in the figure. Standard errors are clustered at the municipal level. *Source:* Own calculation based on data from Statistical State Offices.

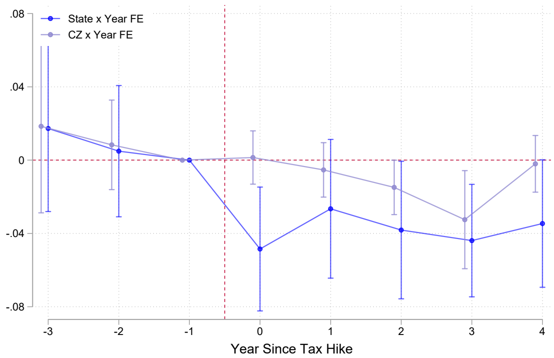
B.2 Effects on Land Prices

The analysis of land prices presented in Section 5.2 serves to assess whether the effects of LBT hikes are reflected not only in the value of developed properties (structures), but also in the value of land itself. A limitation of this analysis arises from data availability. In Bavaria, land price indices are reported at the municipality level, which aligns with the level at which LBT variation occurs. In the rest of Germany, however, land price data are only available at the county level. This creates a mismatch: outside Bavaria, the treatment (municipality-level LBT changes) is not directly aligned with the outcome variable (county-level land prices). To address this, we run the estimations on land values twice. First, we estimate the effects using German-wide transaction prices for both total and buildable land at the county level (Panels B.19a and B.19c of Figure B.19). Second, we restrict the sample to Bavarian municipalities, where land price data are available at the municipality level, and re-estimate the models using transaction prices for total and buildable land (Panels B.19b and B.19d of Figure B.19). In the German-wide, county-level estimations, land prices represent averages across treated and untreated municipalities within a county. This introduces classical measurement error in the outcome variable and may lead to attenuation bias. As a result, these coefficients should be interpreted as lower bounds on the true semi-elasticity of land values with respect to LBT hikes. The fact that we nonetheless observe statistically and economically significant effects – declines in land prices of 3–4 percent following a one percentage point tax increase – supports the interpretation that tax hikes are capitalized into land values, not just into structures. Standard errors in these regressions are clustered at the county level. To further address the potential measurement issue, we separately report results for Bavarian municipalities, where both the treatment and outcome variables are observed at the same level. For this subsample, we estimate fully saturated event study specifications, as described in Equation 9, which compare trends in treated and untreated municipalities over time. Standard errors are clustered at the municipality level. The resulting estimates are very similar to the county-level results, reinforcing the conclusion that local tax changes have a meaningful impact on land values and that these effects are not merely driven by investment in structures.

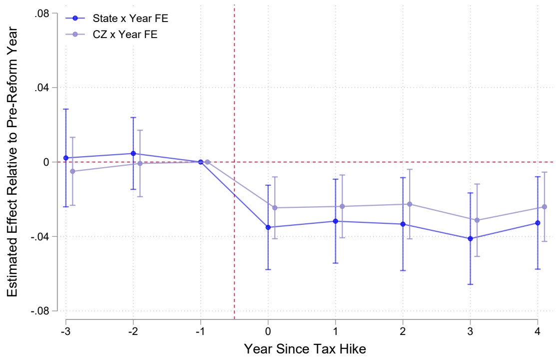
Figure B.19: Effects on Land Prices



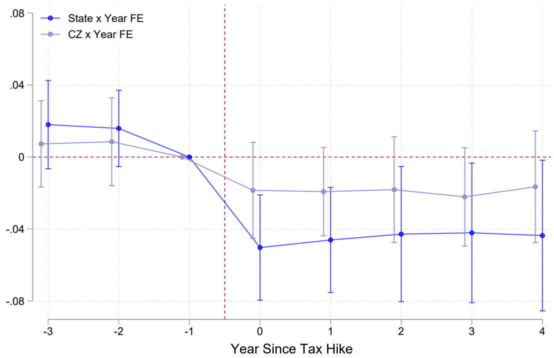
(a) County: Total Land



(b) Municipality (Bavaria Only): Total Land



(c) County: Buildable Land



(d) Municipality (Bavaria Only): Buildable Land

Notes: This graph plots the event study estimates ($\hat{\beta}_j, j \in [-3, 4]$) and associated 95% confidence intervals of the event study model from Equation 9. The dependent variables are the county-level log total land price per sqm (Panel B.19a), Bavarian municipality-level log total land price per sqm (Panel B.19b), the county-level ready-to-build/buildable land price per sqm (Panel B.19c) and the Bavarian municipality-level ready-to-build/buildable land price per sqm (Panel B.19d). Treatment variables are event study indicators scaled by the LBT change. All regressions include municipal and "state $\times$ year" or "CZ $\times$ year" fixed effects as indicated in the graph and the scaled leads and lags of the LPT rate as control. Standard errors are clustered at the municipal level.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

B.3 Incidence

Table B.13: Sensitivity of Incidence Shares

Share of Incidence				
	Medium-Run			
	Baseline	Rent elasticities	Calibrate $\dot{\pi}$	Deductibility
Workers	0.114	0.140	0.089	0.096
	(0.102)	(0.101)	(0.074)	(0.077)
Firm Owners	0.576***	0.647***	0.666***	0.640***
	(0.154)	(0.131)	(0.050)	(0.050)
Landowners (Residential)	0.115***	0.117***	0.090***	0.097***
	(0.050)	(0.033)	(0.031)	(0.033)
Landowners (Commercial)	0.196***	0.097***	0.154***	0.166***
	(0.081)	(0.027)	(0.041)	(0.044)
CZ x Year FE	✓	✓	✓	✓

Notes: This table presents the incidence estimates for landowners, workers and firm owners. Panel A displays the welfare-relevant elasticities described in Table 2. Panel B displays the share of incidence borne by economic agent. Each column displays a different specification for estimating the elasticities. All regression models include municipal fixed effects, account for the LPT rate and include "commuting zone (CZ) $\times$ year". The second column shows incidence estimates when using the rental price elasticities instead of the sales price elasticities. The third column shows the incidence estimates when calibrating the net-profit elasticity. The fourth column also shows incidence shares when calibrating the profit elasticity, but it test a different assumption for deductibility. Instead of capital being non-deductible and property fully deductible, both production factors are partially (50%) deductible. Standard errors are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

Table B.14: Incidence Estimates - Unweighted

A. Incidence	Average	Short-Run	Medium-Run
Workers	0.381*	0.422**	0.292
	(0.217)	(0.174)	(0.255)
Firm Owners	1.893***	2.706***	1.106
	(0.706)	(0.626)	(0.802)
Landowners (Residential)	0.655***	0.287*	0.984***
	(0.247)	(0.171)	(0.302)
Landowners (Commercial)	1.737***	0.269	2.137***
	(0.549)	(0.472)	(0.657)
B. Share of Incidence			
Workers	0.082	0.115**	0.065
	(0.052)	(0.056)	(0.065)
Firm Owners	0.406***	0.735***	0.245
	(0.113)	(0.124)	(0.173)
Landowners (Residential)	0.140**	0.078	0.218**
	(0.060)	(0.052)	(0.094)
Landowners (Commercial)	0.372***	0.073	0.473***
	(0.102)	(0.136)	(0.139)
Rent or Sales	Sales	Sales	Sales
CZ x Year FE	✓	✓	✓

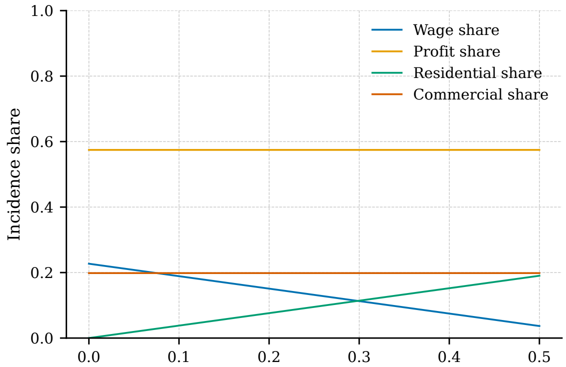
Notes: This table presents the incidence estimates for landowners, workers and firm owners. Panel A displays the welfare-relevant elasticities described in Table 2. Panel B displays the share of incidence borne by economic agent. Each column displays a different specification for estimating the elasticities. All regression models include municipal fixed effects, account for the LPT rate and include "commuting zone (CZ) × year". The second column shows incidence estimates for the first two years after the tax change. The third column shows the incidence estimates for the medium-run (four and five years after the tax change). The estimation sample is restricted to non-merged municipalities and municipalities that experience no tax cuts between 2008 and 2019. Standard errors are clustered at the municipal level. Standard errors are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

Table B.15: Incidence Estimates - Only State x Year FE

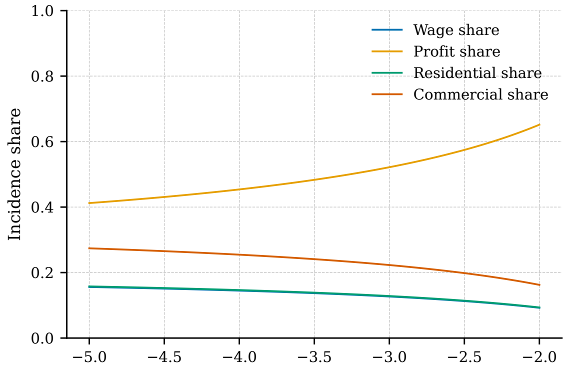
A. Incidence	Average	Short-Run	Medium-Run
Workers	0.213	0.346*	0.103
	(0.250)	(0.186)	(0.301)
Firm Owners	1.457**	2.415***	0.638
	(0.733)	(0.631)	(0.855)
Landowners (Residential)	1.004***	0.417**	1.358***
	(0.366)	(0.200)	(0.451)
Landowners (Commercial)	2.390***	0.536	3.070***
	(0.574)	(0.469)	(0.706)
B. Share of Incidence			
Workers	0.070	0.090*	0.049
	(0.089)	(0.054)	(0.124)
Firm Owners	0.644***	0.844***	0.409**
	(0.133)	(0.063)	(0.193)
Landowners (Residential)	0.100*	0.033*	0.195**
	(0.052)	(0.019)	(0.078)
Landowners (Commercial)	0.186**	0.033	0.346***
	(0.073)	(0.031)	(0.115)
Rent or Sales	Sales	Sales	Sales
State x Year FE	✓	✓	✓

Notes: This table presents the incidence estimates for landowners, workers and firm owners. Panel A displays the welfare-relevant elasticities described in Table 2. Panel B displays the share of incidence borne by economic agent. Each column displays a different specification for estimating the elasticities. All regression models include municipal fixed effects, account for the LPT rate and include "state × year" FE. The second column shows incidence estimates for the first two years after the tax change. The third column shows the incidence estimates for the medium-run (four and five years after the tax change). The estimation sample is restricted to non-merged municipalities and municipalities that experience no tax cuts between 2008 and 2019. Standard errors are clustered at the municipal level. Standard errors are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

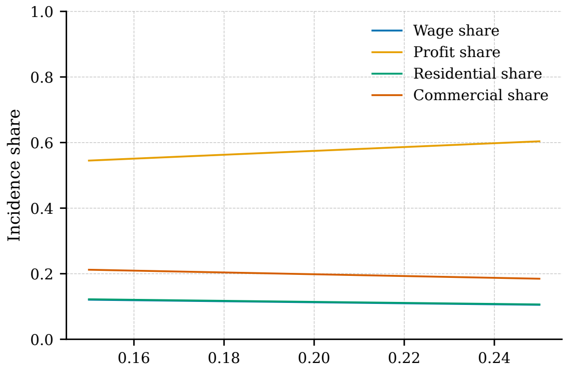
Figure B.20: Sensitivity of Incidence to Parameter Calibration



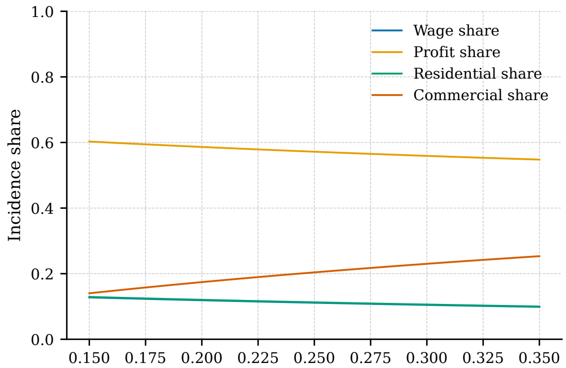
(a) α



(b) ε^{PD}



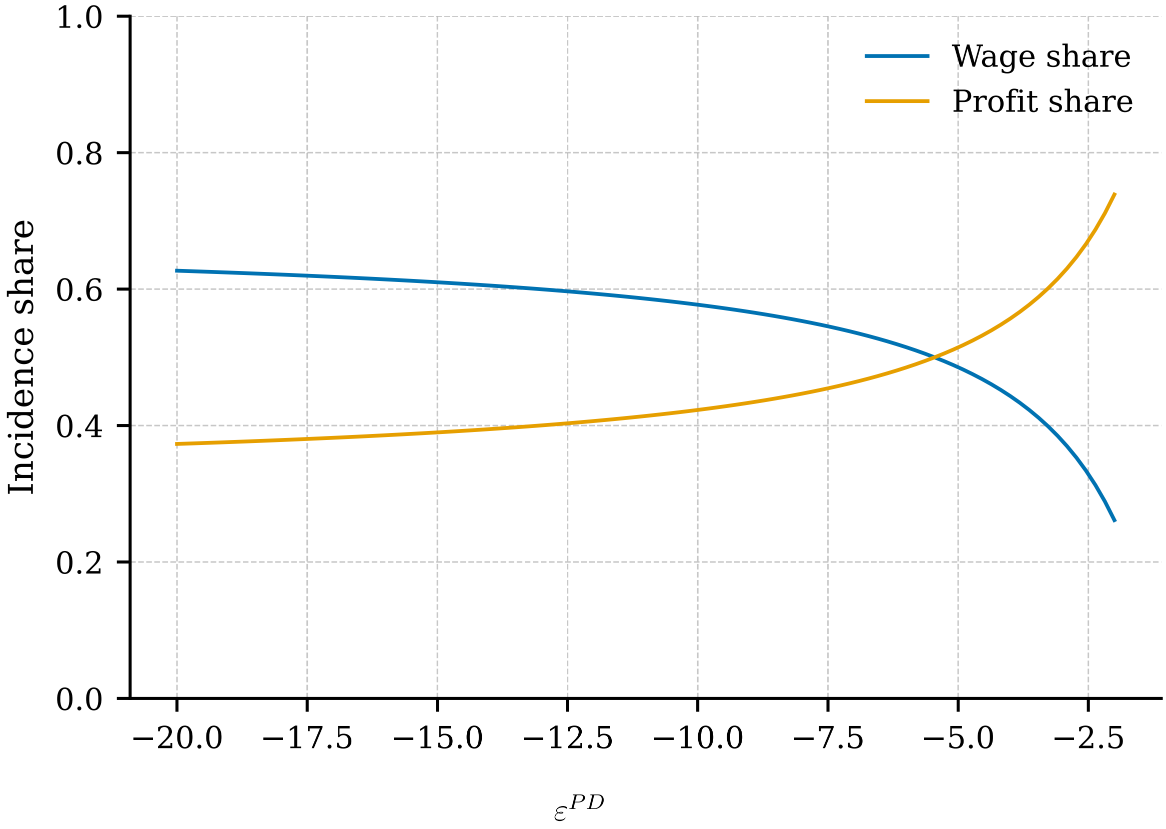
(c) δ



(d) η/γ

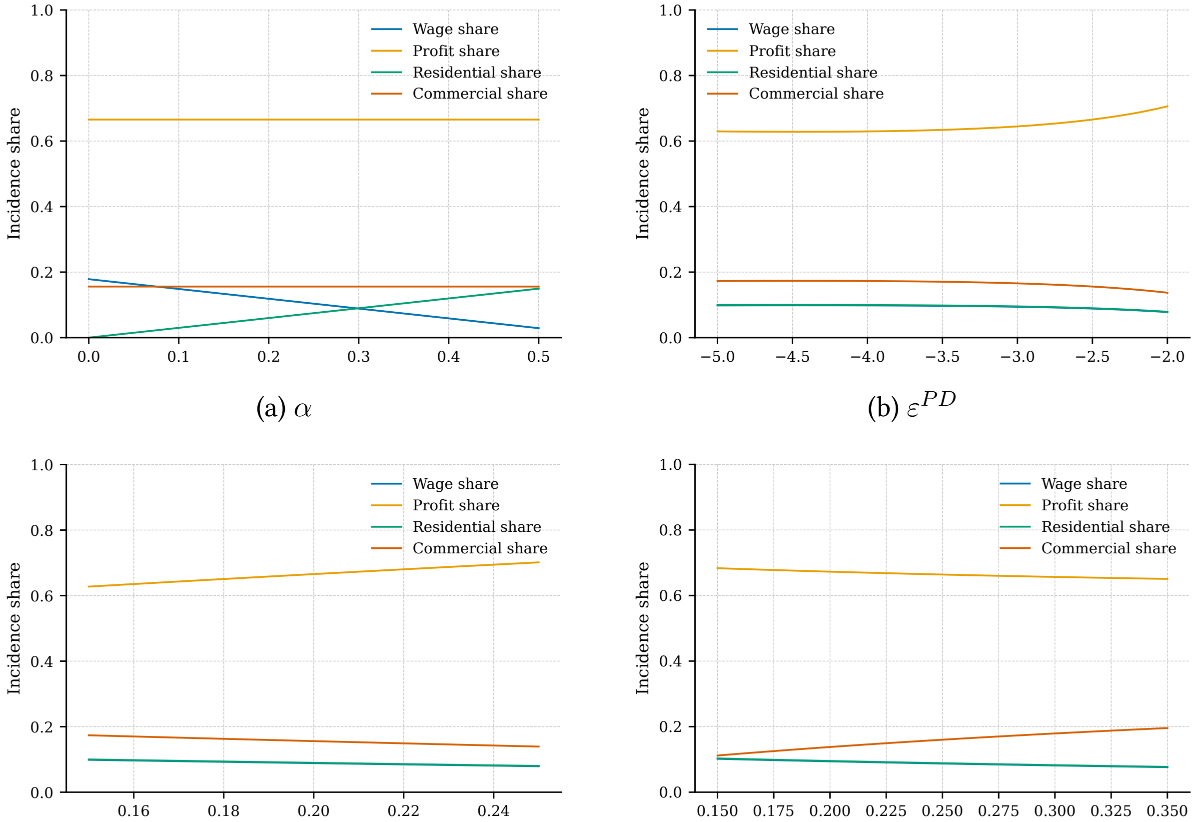
Notes: This graph plots the sensitivity of the incidence shares to parameter calibration. In each subfigure one of the parameters is varied while the others are fixed at their baseline values: $\alpha = 0.3, \varepsilon^{PD} = -2.5, \delta = 0.2, \eta/\gamma = 0.24$.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

Figure B.21: Sensitivity of Incidence to Parameter Calibration - FPS Comparison



Notes: This graph plots the sensitivity of the incidence shares to parameter calibration. We vary ε^{PD} while the others are fixed at the following values: $\alpha = 0, \delta = 0.2, \eta/\gamma = 0$.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

Figure B.22: Sensitivity of Incidence to Parameter Calibration - Calibrated $\dot{\pi}$



(a) α

(b) ε^{PD}

(c) δ

(d) η/γ

Notes: This graph plots the sensitivity of the incidence shares to parameter calibration. In each subfigure one of the parameters is varied while the others are fixed at their baseline values: $\alpha = 0.3, \varepsilon^P D = -2.5, \delta = 0.2, \eta/\gamma = 0.24, \gamma = 0.2$. The effect on profits is not taken from the reduce form effect but calibrated according to the method describe in Section C.10.
Source: Own calculation based on data from *F+B* and Statistical State Offices.

C Theoretical Model

To estimate the incidence of corporate taxation we extend the spatial equilibrium model developed in Suárez Serrato and Zidar (2016, 2024). We characterize the incidence of local corporate tax increases on workers, landowners and business owners as a function of estimable parameters adding commercial properties to the model.

C.1 Basic Outline

Both workers and plants are mobile across locations. We consider a small location c in an open economy with many locations. There are four types of agents workers, business owners and (commercial and residential) landowners. There is no population growth or establishment entry on a global level, but firms and workers can change their location. Workers choose the location that maximizes their utility, establishments choose the location that maximizes their profits and landowners choose the supply of residential and commercial real estate to maximize their profits. Capital and goods markets are global, while the labor and housing markets are local. These markets clear in each location. In equilibrium N_c households locate in location c and earn wage w_c and pay housing costs r_c^H. E_c establishments are active and they earn after-tax profits π_c. There is a representative commercial and residential landowner, earning rents r_c^G and r_c^H respectively. Many parts of the model carry over unchanged from Suárez Serrato and Zidar (2016) and Suárez Serrato and Zidar (2024). The derivations are reproduced for the ease of the reader.

C.2 Household Problem and Residential Real Estate Market

The solution to the household problem and the equilibrium in the residential real estate market are exactly equivalent to the derivations in Suárez Serrato and Zidar (2016). Households will locate in location c if their indirect utility there is higher than in any other location c'. Assuming $\xi'_{nc}s$ are i.i.d. type I extreme value, the share of households for whom that is true determines local population N_c :

$$N_c = P\left(V_{nc}^W = \max_{c'}\left\{V_{nc'}^W\right\}\right) = \frac{\exp\frac{u_c}{\sigma^W}}{\sum_{c'}\exp\frac{u'_c}{\sigma^W}}, \tag{C.1}$$

where σ^W is the dispersion of location-specific preferences and u_c is the indirect utility in location c.

The housing market clearing condition, $H_c^S = H_c^D$, determines the rents r_c in location c and is given in log-form by the following expression:

$$\ln r_c^H = \frac{1}{1+\eta_c^H}\ln N_c + \frac{1}{1+\eta_c^H}\ln w_c - \frac{\eta_c}{1+\eta_c^H}B_c^H + a_1 \tag{C.2}$$

where B_c^H is exogenous local housing productivity and a_1 is a constant. η_c^H is the local housing supply elasticity and governs the strength of the price response. We can then get an elasticity of labor supply that includes the effect of increased wages on residential housing market. This yields the first key elasticity: the effective elasticity of labor supply,

$$\frac{\partial \ln L_c^S}{\partial \ln w_c} = \left(\frac{1+\eta_c^H - \alpha}{\sigma^W\left(1+\eta_c^H\right)+\alpha}\right) \equiv \varepsilon^{LS} \tag{C.3}$$

where σ^W is the dispersion of location-specific preferences and α is the housing expenditure share.

C.3 Establishment Problem

Establishments j are monopolistically competitive and have productivity B_{jc} that varies across locations. Establishments combine labor l_{jc}, capital k_{jc}, commercial real estate g_{jc}, and a bundle of intermediate goods M_{jc} to produce output y_{jc} with the following technology:

$$y_{jc} = B_{jc} l_{jc}^{\gamma} k_{jc}^{\delta} g_{jc}^{\eta} M_{jc}^{1-\gamma-\delta-\eta}$$

where $M_{jc} \equiv \left(\int_{v\in J}\left(x_{v,jc}\right)^{\frac{\varepsilon^{PD}}{\varepsilon^{PD}}} dv\right)^{\frac{\varepsilon^{PD}}{\varepsilon^{PD}+1}}$ is establishment j 's bundle of goods of varieties v. Goods of all varieties can serve as either final goods for household consumption or as intermediate inputs for establishment production.

In a given location c, establishments maximize profits over inputs and prices p_{jc} while facing a local wage w_c, local rents for commercial real estate r_c^G, national interest rates ρ, national prices p_v of each variety v, local business taxes τ_c^b and deductibility shares κ_k and κ_g subject to the production technology in equation (3) :

$$\pi_{jc} = \max_{l_{jc},k_{jc},x_{v,jc},p_{jc}} \left(1-\tau_c^b\right)\left(p_{jc}y_{jc} - w_c l_{jc} - \int_{v\in J} p_v x_{v,jc} dv\right) - \left(1-\kappa_k\tau_c^b\right)\rho k_{jc} - \left(1-\kappa_g\tau_c^b\right) r_c^G g_{jc},$$

One can show that demand takes the following form:

$$y_{ijc} = I\left(\frac{p_{ijc}}{P}\right)^{\varepsilon^{PD}}$$

where I is the sum of national real income not spent on housing and intermediate good demand from establishments, and P is the price level. Using this expression and substituting it into the profit expression gives:

$$\pi_{ijc} = \left(1-\tau_c^b\right)\left(y_{ijc}^{\frac{1}{\mu}} I^{\left(\frac{1}{\varepsilon^{PD}}\right)} - w_c l_{ijc} - \int_{v\in J} p_v x_{v,ijc} dv\right) - \left(1-\kappa_k \tau_c^b\right)\rho k_{ijc} - \left(1-\kappa_g \tau_c^b\right) r_c^G g_{jc}$$

where the markup $\mu \equiv \left[\frac{1}{\varepsilon^{PD}}+1\right]^{-1}$ is constant due to CES demand.

C.3.1 Deriving FOCs for Capital, Labor and Commercial Real Estate

As in the main text, we abstract from formula apportionment. Suárez Serrato and Zidar (2016) outline how formula apportionment affects the derivations and also show that the impacts are relatively small.

Labor:

$$\frac{y_{ijc}^{\frac{1}{\mu}}}{\mu}\frac{\gamma}{l_{ijc}} I^{\left(\frac{1}{\varepsilon}PD\right)} = \underbrace{w_c}_{\tilde{w}_c} \tag{C.4}$$

Capital:

$$\frac{y_{ijc}^{\frac{1}{\mu}}}{\mu}\frac{\delta}{k_{ijc}} I^{\left(\frac{1}{\varepsilon}PD\right)} = \underbrace{\frac{(1-\kappa_k\tau_c)\rho}{1-\tau_c}}_{\equiv\tilde{\rho}_c}, \tag{C.5}$$

Commercial Real Estate:

$$\frac{y_{ijc}^{\frac{1}{\mu}}}{\mu}\frac{\eta}{g_{ijc}} I^{\left(\frac{1}{\varepsilon}PD\right)} = \underbrace{\frac{(1-\kappa_g\tau_c)r_c^G}{1-\tau_c}}_{\equiv\tilde{r}_c^G}, \tag{C.6}$$

C.3.2 Deriving Input Factor Demands

We take ratios of the FOCs, then plug them into the production function to obtain expressions for input demand that only depend on output and prices.

Ratios:

$$\frac{k_{ijc}}{l_{ijc}} = \frac{\tilde{w}_c}{\tilde{\rho}_c}\frac{\delta}{\gamma} \quad \frac{M_{ijc}}{l_{ijc}} = \frac{\tilde{w}_c}{1}\frac{1-\gamma-\delta-\eta}{\gamma}$$

$$\frac{k_{ijc}}{g_{ijc}} = \frac{\tilde{r}_c^G}{\tilde{\rho}_c}\frac{\delta}{\eta} \quad \frac{l_{ijc}}{g_{ijc}} = \frac{\tilde{r}_c^G}{\tilde{w}_c}\frac{\gamma}{\eta}$$

Derive input demand for Labor by substituting the ratios into the production function:

$$y_{ijc} = B_{ijc} l_{ijc}^{\gamma} \left(\frac{\tilde{w}_c}{\tilde{\rho}_c} \frac{\delta}{\gamma} l_{ijc} \right)^{\delta} \left(\frac{\tilde{w}_c}{\tilde{r}_c} \frac{\eta}{\gamma} l_{ijc} \right)^{\eta} \left(\frac{\tilde{w}_c}{1} \frac{1-\gamma-\delta-\eta}{\gamma} l_{ijc} \right)^{1-\gamma-\delta-\eta}$$

Rearrange:

$$l_{ijc} = \frac{y_{ijc}}{B_{ijc}} \left[\tilde{w}_c^{\gamma-1} \left(\tilde{\rho}_c\right)^{\delta} \tilde{r_c^G}^{\eta} \gamma^{1-\gamma} \delta^{-\delta} \eta^{-\eta} (1-\gamma-\delta-\eta)^{-(1-\gamma-\delta-\eta)} \right]$$

For capital:

$$k_{ijc} = \frac{y_{ijc}}{B_{ijc}} \left[\tilde{w}_c^{\gamma} \left(\tilde{\rho}_c\right)^{\delta-1} \tilde{r_c^G}^{\eta} \gamma^{-\gamma} \delta^{1-\delta} \eta^{-\eta} (1-\gamma-\delta-\eta)^{-(1-\gamma-\delta-\eta)} \right]$$

For commercial real estate:

$$g_{ijc} = \frac{y_{ijc}}{B_{ijc}} \left[\tilde{w}_c^{\gamma} \left(\tilde{\rho}_c\right)^{\delta} \tilde{r_c^G}^{\eta-1} \gamma^{-\gamma} \delta^{-\delta} \eta^{1-\eta} (1-\gamma-\delta-\eta)^{-(1-\gamma-\delta-\eta)} \right]$$

For intermediate goods:

$$m_{ijc} = \frac{y_{ijc}}{B_{ijc}} \left[\tilde{w}_c^{\gamma} \left(\tilde{\rho}_c\right)^{\delta} \tilde{r_c^G}^{\eta} \gamma^{-\gamma} \delta^{-\delta} \eta^{-\eta} (1-\gamma-\delta-\eta)^{(\gamma+\delta+\eta)} \right]$$

Substituting the expression for labor into C.4 yields the following equation:

$$y_{ijc}^{\frac{1}{\mu}} I^{\left(\frac{1}{\varepsilon PD}\right)} = y_{ijc} \mu \underbrace{\frac{1}{B_{ijc}} \left[\tilde{w}^{\gamma} \tilde{\rho}^{\delta} \tilde{r^G}^{\eta} \gamma^{-\gamma} \delta^{-\delta} \eta^{-\eta} (1-\gamma-\delta-\eta)^{-(1-\gamma-\delta-\eta)} \right]}_{\equiv c_{ijc}} \tag{C.7}$$

This equation shows that revenues are a markup μ over costs, i.e., $p_{ijc} y_{ijc} = \mu y_{ijc} c_{ijc}$, indicating that prices are a markup over marginal costs c_{ijc}.

C.3.3 Deriving an Expression for Profits

We now assume that capital costs are not deductible ($\kappa_k = 0$) and commercial property costs are fully deductible ($\kappa_g = 1$). We relax this assumption in Section C.9. We begin with the following expression for profits in terms of factors:

$$\pi_{ijc} = (1-\tau_c)\left(p_{ijc}y_{ijc} - w_c l_{ijc} - r_c^G g_{ijc} - \int_{v\in J} p_v x_{v,ijc} dv\right) - \rho k_{ijc}$$

Now we can use C.7 to simplify $p_{ijc}y_{ijc}$.

$$p_{ijc}y_{ijc} = \frac{\mu}{\gamma} l_{ijc}\tilde{w}_c$$

We can also use the input factor ratios derived above to re-arrange the profit equation to only depend on labor:

$$\pi_{ijc} = (1-\tau_c)\, l_{ijc}\tilde{w}_c \left(\frac{\mu}{\gamma} - 1 - \frac{\eta}{\gamma} - \frac{1-\gamma-\delta-\eta}{\gamma} - \frac{\delta}{\gamma}\right)$$

Substituting for labor and using the definition of product demand yields:

$$\pi_{ijc} = (1-\tau_c)\, I\mu^{\epsilon^{PD}} c_{ijc}^{\epsilon^{PD}+1}(\mu - 1)$$

This indicates that profits are a markup over costs where $\mu \geq 1$. Substituting for c_{ijc}, we can express profits as a function of local factor prices, local productivity, and taxes:

$$\pi_{ijc} = (1-\tau_c)\, \tilde{w}_c^{\gamma\left(\varepsilon^{PD}+1\right)} \tilde{\rho}_c^{\delta\left(\varepsilon^{PD}+1\right)} \tilde{r}_c^{G\,\eta\left(\varepsilon^{PD}+1\right)} B_c^{-\left(\varepsilon^{PD}+1\right)} \kappa$$

where κ is a constant term across locations. [45]

C.3.4 Establishment Location Choice

Establishments productivity $B_{jc} = \bar{B}_c + \zeta_{jc}$ consists of a common location specific productivity level $\bar{B}_c$ and an idiosyncratic establishment specific productivity level ζ_{jc}, which is i.i.d. type I extreme value. Taking the profit function derived above, the expected value of locating in c is

$$V_{jc}^F = v_c + \zeta_{jc} = \underbrace{\tfrac{\ln(1-\tau_c)}{-(\varepsilon^{PD}+1)} + \bar{B}_c - \gamma \ln w_c - \delta \ln \rho - \eta \ln r_c^G + \frac{\ln \kappa_1}{-\left(\varepsilon^{PD}+1\right)}}_{v_c} + \zeta_{jc}$$

The share of establishments that locates in c is given by:

[45] $\kappa = I\mu^{\epsilon^{PD}}\left(\gamma^{-\gamma}\delta^{-\delta}\eta^{-\eta}(1-\gamma-\delta-\eta)\right)^{-(1-\gamma-\delta-\eta)}$

$$E_c = \frac{\exp(v_c/\sigma^F)}{\sum_{c'} \exp(v_{c'}/\sigma^F)}.$$

where σ^F is the dispersion of the location specific idiosyncratic establishment productivity ζ_{jc} We can now show how firm entry is affected by wage changes:

$$\frac{\partial \ln E_c}{\partial \ln \tilde{w}} = \frac{\gamma}{\sigma^F}$$

and also the elasticity with respect to the net-of-tax-rate:

$$\frac{\partial \ln E_c}{\partial \ln(1-\tau_c)} = -\frac{1}{(\varepsilon^{PD}+1)\sigma^F} + \frac{\delta}{\sigma^F}$$

C.3.5 Local Labor Demand

Local labor demand depends on the share of establishments that choose to locate in location c (extensive margin) and the average employment of establishments in that location (intensive margin):

$$L_c^d = E_c \times E_\zeta \left[l_{jc}^*(\zeta_{jc}) | c = arg \max_{c'}(V_{jc'}) \right] \tag{C.8}$$

First, we will derive the intensive margin. Start with labor demand:

$$l_{ijc} = \frac{y_{ijc}}{B_{ijc}} \left[\tilde{w}_c^{\gamma-1} \left(\tilde{\rho}_c\right)^\delta \tilde{r_c^G}^\eta \gamma^{1-\gamma} \delta^{-\delta} \eta^{-\eta} (1-\gamma-\delta-\eta)^{-(1-\gamma-\delta-\eta)} \right]$$

Substitute in C.7 for y_{ijc}:

$$l_{ijc} = B_{ijc}^{-(\varepsilon^{PD}+1)} \tilde{w}_c^{\gamma\varepsilon^{PD}+\gamma-1} \tilde{\rho}_c^{(1+\varepsilon^{PD})\delta} \tilde{r_c^G}^{(1+\varepsilon^{PD})\eta} \kappa_0,$$

where $\kappa_0 = \frac{\mu}{I} \gamma^{-\gamma(\varepsilon^{PD}+1)+1} \delta^{-\delta(\varepsilon^{PD}+1)} \eta^{(-\eta(\varepsilon^{PD}+1))} (1-\gamma-\delta-\eta)^{-(1-\gamma-\delta-\eta)(\varepsilon^{PD}+1)}$. Taking into account the productivity draw the intensive margin can be expressed as follows:

$$l_{ijc} = \tilde{w}_c^{\gamma\varepsilon^{PD}+\gamma-1} \tilde{\rho}_c^{(1+\varepsilon^{PD})\delta} \tilde{r_c^G}^{(1+\varepsilon^{PD})\eta} \kappa_0 E_\zeta[B_{ijc}^{-(\varepsilon+1)}],$$

where $E_\zeta[B_{ijc}^{-(\varepsilon+1)}] = \exp\left(-\varepsilon^{PD}-1\right) \bar{B}_c \underbrace{E_\zeta[\exp(-\varepsilon^{PD}-1)\zeta_{ijc})|c]}_{z_c}$

Putting the intensive and extensive margin together we get labor demand:

$$L_c^D = E_c \times \tilde{w}_c^{\gamma\varepsilon^{PD}+\gamma-1}\tilde{\rho}_c^{(1+\varepsilon^{PD})\delta}\tilde{r}_c^{G^{(1+\varepsilon^{PD})\eta}}\kappa_0 e^{(-\varepsilon^{PD}-1)\bar{B}_c} z_c$$

Malgouyres et al. (2023) show that z_c is related to v_c. The relationship between the conditioning event of firm location in c and the conditional expectation z_c can be expressed as $\Gamma(1+(\varepsilon^{PD}+1)\sigma^F)E_c^{(1+\varepsilon^{PD})\sigma^F}$ where $\Gamma()$ is the gamma function. This implies that as more firms enter the conditional expectation z_c changes, i.e. the mean productivity of firms in c changes.

Taking logs and simplifying:

$$\ln L_c^D = \kappa_2 - \frac{\ln(1-\tau_c)}{(\varepsilon^{PD}+1)\sigma^F} - \ln\pi + (\gamma(\varepsilon^{PD}+1-\frac{1}{\sigma^F})-1)\ln\tilde{w}_c - \frac{\ln\mu_{ic}}{(\varepsilon^{PD}+1)\sigma^F} + \quad \text{(C.9)}$$

$$(\delta(\varepsilon^{PD}+1-\frac{1}{\sigma^F}))\ln\tilde{\rho}_c + (\eta(\varepsilon^{PD}+1-\frac{1}{\sigma^F}))\ln\tilde{r}_c^G + (-(\varepsilon^{PD}+1)+\frac{1}{\sigma^F})\bar{B}_c + \ln z_c \quad \text{(C.10)}$$

From this equation we can obtain the macro elasticity of labor demand:

$$\frac{\partial \ln L_c^D}{\partial \ln \tilde{w}_c} = \underbrace{-1}_{Substitution} + \underbrace{\gamma(\varepsilon^{PD}+1)}_{Scale} - \underbrace{\frac{\gamma}{\sigma^F}}_{Firm-Location} - \underbrace{\gamma\left(\varepsilon^{PD}+1\right)}_{Compositional-Margin} = -\left(1+\frac{\gamma}{\sigma^F}\right) = \varepsilon^{LD} \quad \text{(C.11)}$$

which takes into account that $\frac{\partial \ln z_c}{\partial \ln \tilde{w}_c} = \gamma\left(\varepsilon^{PD}+1\right)$. As noted by Malgouyres et al. (2023) the scale margin cancels out with the compositional margin. Hence the elasticity simplifies to $-\left(1+\frac{\gamma}{\sigma^F}\right)$.

This elasticity combines the average firm's elasticity and the effect of firm entry and exit on labor demand. We can also derive the effect of a business tax change on local labor demand:

$$\frac{\partial \ln L_c^D}{\partial \ln(1-\tau_c)} = \frac{\delta}{\sigma^F} + \frac{1}{-(\varepsilon^{PD}+1)\sigma^F} - 1 \quad \text{(C.12)}$$

which uses that $\frac{\partial \ln z_c}{\partial \ln(1-\tau_c)} = (1+\varepsilon^{PD})\sigma^F\frac{\partial \ln E_c}{\partial \ln(1-\tau_c)} = (1+\varepsilon^{PD})\sigma^F\left(\frac{\delta}{\sigma^F} - \frac{1}{(\varepsilon^{PD}+1)\sigma^F}\right) = (1+\varepsilon^{PD})\delta - 1$

C.4 Commercial Real Estate Market

Applying the same steps as in Section C.3.5, we obtain the demand for commercial real estate:

$$G_c^D = E_c \times \frac{y_{ijc}}{B_{ijc}} \left[\tilde{w}_c^{\gamma} \left(\tilde{\rho}_c\right)^{\delta} \tilde{r_c^G}^{\eta-1} \gamma^{-\gamma} \delta^{-\delta} \eta^{1-\eta} (1-\gamma-\delta-\eta)^{-(1-\gamma-\delta-\eta)} \right]$$

Substituting for y_{ijc}:

$$G_c^D = \left(\frac{1}{C\pi} \exp\left(\frac{\upsilon_c}{\sigma^F} \right) \right) \times \tilde{w}_c^{(1+\varepsilon^{PD})\gamma} \tilde{\rho}_c^{(1+\varepsilon^{PD})\delta} \tilde{r_c^G}^{(\eta\varepsilon^{PD}+\eta-1)} \omega_0 e^{(-\varepsilon^{PD}-1)\bar{B}_c} z_c$$

where $\omega_0 = \frac{\mu}{I} \gamma^{-\gamma(\varepsilon^{PD}+1)} \delta^{-\delta(\varepsilon^{PD}+1)} \eta^{(-\eta(\varepsilon^{PD}+1)+1)} (1-\gamma-\delta-\eta)^{-(1-\gamma-\delta-\eta)(\varepsilon^{PD}+1)}$.

Taking logs and simplifying yields the (log) demand curve for commercial real estate:

$$\ln G_c^D = \omega_2 - \frac{\ln(1-\tau_c)}{(\varepsilon^{PD}+1)\sigma^F} - \ln \pi + (\gamma(\varepsilon^{PD} + 1 - \frac{1}{\sigma^F})) \ln \tilde{w}_c - \frac{\ln \mu_{ic}}{(\varepsilon^{PD}+1)\sigma^F} +$$
$$(\delta(\varepsilon^{PD} + 1 - \frac{1}{\sigma^F})) \ln \tilde{\rho}_c + (\eta(\varepsilon^{PD} + 1 - \frac{1}{\sigma^F}) - 1) \ln \tilde{r}_c^G + (-(\varepsilon^{PD}+1) + \frac{1}{\sigma^F})\bar{B}_c + \ln z_c$$

Substituting $\ln N_c$ yields[46] :

$$\ln G_c^D = \ln N_c + \ln \tilde{w}_c - \ln \tilde{r}_c^G$$

The local supply of commercial real estate, $G_c^S = G\left(r_c^G; B_c^G\right)$, is upward-sloping in both the rental price r_c^G, which allows landowners to benefit from higher rental prices, and exogenous local real estate productivity B_c^G. The marginal landowner supplies real estate at cost $r_c = G^{-1}\left(G_c^S; B_c^G\right)$. For tractability, we assume $G\left(r_c^G; B_c^G\right) \equiv \left(B_c^G r_c^G\right)^{\eta_c^G}$, where the local commercial real estate supply elasticity $\eta_c^G > 0$ governs the strength of the price response to changes in demand and productivity. The commercial real estate market clearing condition, $G_c^S = G_c^D$, determines the rents r_c^G in location c and is given in log-form by the following expression:

$$-\eta_c^G \ln B_c^G = (1+\eta_c^G) \ln r_c^G - \ln N_c - \ln w_c \tag{C.13}$$

[46]In Equilibrium $\ln N_c = \ln L^D = \kappa_2 - \frac{\ln(1-\tau_c)}{(\varepsilon^{PD}+1)\sigma^F} - \ln \pi + (\gamma(\varepsilon^{PD} + 1 - \frac{1}{\sigma^F}) - 1) \ln w_c - \frac{\ln \mu}{(\varepsilon^{PD}+1)\sigma^F} + (\delta(\varepsilon^{PD} + 1 - \frac{1}{\sigma^F})) \ln \tilde{\rho}_c + (\eta(\varepsilon^{PD} + 1 - \frac{1}{\sigma^F})) \ln \tilde{r}_c^G + (-(\varepsilon^{PD}+1) + \frac{1}{\sigma^F})\bar{B}_c + \ln z_c$

C.5 Equilibrium

We characterize the incidence of corporate taxes on wages, rents, and profits and relate these effects to the welfare of workers, landowners, and firms. We focus on the welfare of local residents as the policies we study are determined by policymakers with the objective of maximizing local welfare. For now we focus on the case where capital costs are not deductible ($\kappa_k = 0$) and commercial real estate costs are fully deductible ($\kappa_g = 1$). We relax this assumption in Section C.9.

Assuming full labor force participation, i.e., $L_c^S = N_c$, spatial equilibrium c depends on market clearing in factor markets, housing markets, and output markets, and can be expressed in terms of the expressions for log labor supply (Equation C.1), the log of housing market clearing condition (Equation C.2), the log of the clearing condition for commercial real estate (Equation C.13) and log labor demand (Equation C.9).

C.6 Incidence

Let $\dot{w}_c = \frac{d \ln w_c}{d \ln\left(1-\tau_c^b\right)}$ and define $\dot{r}_c^H$, $\dot{r}_c^G$ and $\dot{\pi}_c$ analogously. The effects of a local corporate tax cut on local wages, rents, and after-tax profits are given by the following expressions:

$$\dot{w}_c = \frac{\frac{\partial \ln L_c^D}{\partial \ln(1-\tau_c)}}{\varepsilon^{LS} - \frac{\partial \ln L_c^D}{\partial w_c} - \frac{\partial \ln L_c^D}{\partial r_c^G}\frac{1+\varepsilon^{LS}}{1+\eta_g}} = \frac{\frac{1}{-(\varepsilon^{PD}+1)\sigma^F} - 1 + \frac{\delta}{\sigma^F}}{\varepsilon^{LS} - \varepsilon^{LD} - \varepsilon^{LC}\frac{1+\varepsilon^{LS}}{1+\eta_c^G}}, \text{ and}$$

$$\dot{r}_c^H = \left(\frac{1+\varepsilon^{LS}}{1+\eta_c^H}\right)\dot{w}_c$$

$$\dot{r}_c^G = \left(\frac{1+\varepsilon^{LS}}{1+\eta^G}\right)\dot{w}_c$$

$$\dot{\pi}_c = 1 \underbrace{-\delta\left(\varepsilon^{PD}+1\right)}_{\text{Reducing capital wedge}} + \underbrace{\gamma\left(\varepsilon^{PD}+1\right)\dot{w}_c}_{\text{Higher labor costs}} + \underbrace{\eta\left(\varepsilon^{PD}+1\right)\dot{r}_c^G}_{\text{Higher rental costs}},$$

where $\dot{\pi}_c$ is the percentage change in after-tax profits, δ is the output elasticity of capital, ε^{PD} is the product demand elasticity, γ is the output elasticity of labor, and $\dot{w}_c$ is the percentage change in wages following a corporate tax cut.

C.7 Local Incidence on Welfare

Effect of a tax cut on the welfare of a worker in location c:

$$\frac{d\mathcal{V}^W}{d\ln\left(1-\tau_c^c\right)} = \left(\dot{w}_c - \alpha \dot{r}_c^H\right)$$

This expression assumes that the tax change in location c has no effect on wages and rental costs in other locations.

The effect of a corporate tax cut on a firm owner is:

$$\frac{d\mathcal{V}^F}{d\ln(1-\tau_c^c)} = \dot{\pi}_c$$

Next, consider the effect on the welfare of residential landowners in location c. Landowner welfare in each location is the difference between housing expenditures and the costs of supplying that level of housing. This difference can be expressed as follows:

$$\mathcal{V}^{LR} = N_c\alpha w_c - \int_0^{N_c\alpha w_c/r_c} G^{-1}\left(q; Z_c^h\right) dq = \frac{1}{1+\eta_c^H} N_c\alpha w_c,$$

Importantly, landowner welfare is proportional to housing expenditure. The effect of a corporate tax cut on the welfare of the representative residential real estate owner can then be expressed as

$$\frac{d\mathcal{V}^{LR}}{d\ln(1-\tau_c^c)} = \frac{1}{\alpha w_c N_c}\frac{\alpha}{1+\eta_c^H}\left(w_c \frac{dN_c}{d\ln(1-\tau_c^c)} + N_c \frac{dw_c}{d\ln(1-\tau_c^c)}\right) = \frac{\dot{N}_c + \dot{w}_c}{1+\eta_c^H} = \dot{r}_c^H$$

The total expenditure on commercial real estate is given by:

$$\ln\left(G_c^D \tilde{r}_c^G\right) = \ln(\frac{\eta}{\gamma} N_c w_c)$$

By the same logic as above the effect of a corporate tax change on the welfare of the representative commercial real estate owner is given by:

$$\frac{d\mathcal{V}^{LC}}{d\ln(1-\tau_c^c)} = \frac{\dot{N}_c + \dot{w}_c}{1+\eta_c^G} = \dot{r}_c^G$$

These equations show how welfare changes for workers, landowners and firm owners are related to reduced form estimates. This is shown in Table 2 in the main text.

C.8 Incidence weighted by Income Share

In the model workers have income wN, residential landowners have income αwN and commercial landowners have income $r^G G$. Capital owners obtain firm profits π and the return to capital $-(\varepsilon^{PD}+1)\pi\delta$.

Assuming all agents spend their income in the product market, total expenditure is given by:

$$(1-\alpha)wN + \alpha wN + r^G G + \pi - \left(\varepsilon^{PD}+1\right)\pi\delta = wN + r^G G + \pi\left(1-\left(\varepsilon^{PD}+1\right)\delta\right)$$

Since total expenditure is $-\varepsilon^{PD}\pi$ we can rewrite profits as:

$$\pi = \frac{wN + r^G G}{-(\varepsilon^{PD}+1)(1-\delta)}$$

We can then express total income as:

$$wN + \alpha wN + r^G G + \frac{wN + r^G G}{-(\varepsilon^{PD}+1)(1-\delta)}(1-\left(\varepsilon^{PD}+1\right)\delta)$$

Since $r^G G = \eta/\gamma wN$, we can rewrite total income as:

$$wN\left[1+\alpha+\eta/\gamma+(1+\eta/\gamma)\frac{(1-\left(\varepsilon^{PD}+1\right)\delta)}{-(\varepsilon^{PD}+1)(1-\delta)}\right] = wNI$$

Then we obtain the following income shares:

$$\underbrace{\frac{1}{I}}_{\text{Workers}},\ \underbrace{\frac{\alpha}{I}}_{\text{Residential Land}},\ \underbrace{\frac{\eta/\gamma}{I}}_{\text{Commercial Land}},\ \underbrace{\frac{(1+\eta/\gamma)\frac{(1-\left(\varepsilon^{PD}+1\right)\delta)}{-(\varepsilon^{PD}+1)(1-\delta)}}{I}}_{\text{Firm Owners}}$$

The shares depend on α, δ, η/γ and ε^{PD}. As before we parameterize $\alpha = 0.3$. We take a range of values for all parameters As a baseline we set $\varepsilon^{PD} = -2.5$. We set the output elasticity of capital $\delta = 0.2$, based on cost shares from the statistical offices. Similarly we also set the ratio between commercial real estate and wage expenditures $\eta/\gamma = 0.24$.

C.9 Deductibility

For now we assumed that costs for commercial real estate are fully deductible and costs for capital are not deductible at all. We now relax these assumptions. This shows up in the FOCs for capital and commercial real estate:

$$\frac{y_{ijc}^{\frac{1}{\mu}}}{\mu}\frac{\delta}{k_{ijc}}I^{\left(\frac{1}{\varepsilon}PD\right)} = \underbrace{\frac{(1-\kappa_k\tau_c)\rho}{1-\tau_c}}_{\equiv\tilde{\rho}_c}, \tag{C.14}$$

$$\frac{y_{ijc}^{\frac{1}{\mu}}}{\mu}\frac{\eta}{g_{ijc}}I^{\left(\frac{1}{\varepsilon}PD\right)} = \underbrace{\frac{(1-\kappa_g\tau_c)r_c}{1-\tau_c}}_{\equiv\tilde{r}_c}, \tag{C.15}$$

$$\frac{y_{ijc}^{\frac{1}{\mu}}}{\mu}\frac{\gamma}{l_{ijc}}I^{\left(\frac{1}{\varepsilon}PD\right)} = \underbrace{w_c}_{\equiv\tilde{w}_c} \tag{C.16}$$

where $\kappa = 1$ implies full deductibility and $\kappa = 0$ implies no deductibility. This yields the profit expression as above but with different $\tilde{r}_c$ and $\tilde{\rho}_c$:

$$\pi_{ijc} = (1-\tau_c)\,\tilde{w}_c^{\gamma\left(\varepsilon^{PD}+1\right)}\tilde{\rho}_c^{\delta\left(\varepsilon^{PD}+1\right)}\tilde{r}_c^{\eta\left(\varepsilon^{PD}+1\right)}B_c^{-\left(\varepsilon^{PD}+1\right)}\kappa$$

Taking the derivative of log profit with respect to the log net of tax rate yields:

$$\dot{\pi}_c = 1\underbrace{-\delta\left(\varepsilon^{PD}+1\right)\left(\frac{1-\kappa_k}{1-\kappa_k\tau_c^b}-\dot{\rho}_c\right)}_{\text{Reducing capital wedge}}+\underbrace{\gamma\left(\varepsilon^{PD}+1\right)\dot{w}_c}_{\text{Higher labor costs}}+\underbrace{\eta\left(\varepsilon^{PD}+1\right)\left(\dot{r}_c^G-\frac{1-\kappa_g}{1-\kappa_g\tau_c^b}\right)}_{\text{Higher rental costs}},$$

As before we assume that the tax change has no effect on the interest rate ρ, so we get:

$$\dot{\pi}_c = 1\underbrace{-\delta\left(\varepsilon^{PD}+1\right)\frac{1-\kappa_k}{1-\kappa_k\tau_c^b}}_{\text{Reducing capital wedge}}+\underbrace{\gamma\left(\varepsilon^{PD}+1\right)\dot{w}_c}_{\text{Higher labor costs}}+\underbrace{\eta\left(\varepsilon^{PD}+1\right)\left(\dot{r}_c^G-\frac{1-\kappa_g}{1-\kappa_g\tau_c^b}\right)}_{\text{Higher rental costs}},$$

This implies that if capital was fully deductible, the benefits from a tax cut are smaller. If it is not at all deductible the benefits are the largest. For commercial real estate costs the effects are the opposite. If they are fully deductible, the increased rental costs after a tax cut have their full effects on profits. Otherwise they have a reduced effect.

For now we have assumed that we can observe the actual economic profit π, but in the empirical application we can only observe the tax base T. This is exactly the same if everything was fully deductible and then $(1-\tau)T = \pi$. In reality, not everything is deductible and $(1-\tau)T > \pi$ in most cases (maybe in some cases more than the actual cost is deductible). This implies that our empirical estimates underestimate the effect on profits. We can show this in the following way. The net profit is:

$$(1-\tau)T = \pi + \underbrace{(1-\kappa_k)\,\rho k_{ijc} + (1-\kappa_g)\, r g_{ijc}}_{\text{non-deductible wedge}}.$$

Now we can substitute for π, $k_{ijc]}$ and g_{ijc} and obtain the following relation between the tax base and profits:

$$(1-\tau)T = \pi\left(1 + \frac{1-\kappa_k}{1-\kappa_k\tau} + \frac{1-\kappa_g}{1-\kappa_g\tau}\right)$$

$\kappa_g \backslash \kappa_k$	0	0.25	0.50	0.75	1
0	0.000	0.062	0.098	0.089	0.000
0.25	0.062	0.134	0.181	0.182	0.097
0.50	0.098	0.181	0.239	0.247	0.161
0.75	0.089	0.182	0.247	0.259	0.158
1	0.000	0.097	0.161	0.158	0.000

Table C.16: Size of the bias of estimates

Now if we take the derivative of this with respect to $\ln(1-\tau)$, we get:

$$1 + \dot{T} = \dot{\pi} + (1-\tau)\,\frac{\dfrac{\kappa_k(1-\kappa_k)}{(1-\kappa_k\tau)^2} + \dfrac{\kappa_g(1-\kappa_g)}{(1-\kappa_g\tau)^2}}{1 + \dfrac{1-\kappa_k}{1-\kappa_k\tau} + \dfrac{1-\kappa_g}{1-\kappa_g\tau}}$$

If both of the κ equal 0 or 1, the term drops out and there is no bias to the estimate. If both are in the interval (0,1) we overestimate the effect on profit by our method. Table C.16 shows the size of the bias. The bias varies between 0 and 0.26. For $\kappa_k = \kappa_g = 0.5$ the mismatch is about 0.24. We use an alternative approach to estimate the effect on profits taking this into account in Section C.10.

Partial Deductibility and Incidence on Landowners of commercial real estate: If commercial real estate costs are not fully deductible the commercial real estate market clearing condition is:

$$-\eta_g \ln B_c^G + \ln N_c + \ln w_c - \ln(1-\kappa_g\tau_c) + \ln(1-\tau_c) = (1+\eta_g)\ln r_c^G$$

If $\kappa_g = 1$ (full deductibility) this drops out. Otherwise it leads to a larger effect of the tax on commercial real estate prices. The less deductible it is the larger the expected effect should be. The effect is:

$$\dot{r}_c^G = \left(\frac{1+\varepsilon^{LS}}{1+\eta^G}\right)\dot{w}_c + \frac{1-\kappa_g}{1-\kappa_g\tau}$$

This does not impact the incidence calculation because this effect is included in our empirical estimates. If we assume that rental payments are fully deductible ($\kappa_g = 1$) and real estate purchases are not deductible ($\kappa_g = 0$), the wedge between the two effects should be 1, which is relatively close to our empirical findings. We find a wedge of about 0.7 between the sales and rental elasticities, which could be driven by the different deductibility rules.

C.10 Alternative ways to estimate the effect on profits

Suárez Serrato and Zidar (2024) characterizes the elasticity of net profits to local business taxes as follows:

$$\dot{\pi} = 1 + \left(1+\varepsilon^{PD}\right)(\gamma\dot{w} - \delta),$$

where γ and δ are the output elasticities of labor and capital, respectively, ε^{PD} is the product demand elasticity. We get the following equation for our model with commercial real estate and partial deductibility:

$$\dot{\pi}_c = 1 - \left(\varepsilon^{PD}+1\right)\left(\delta\frac{1-\kappa_k}{1-\kappa_k\tau_c^b} + \gamma\dot{w}_c + \eta\left(\dot{r}_c^G - \frac{1-\kappa_g}{1-\kappa_g\tau_c^b}\right)\right) \tag{C.17}$$

where η is the output elasticity of commercial real estate and everything else is defined as above. As for the income share weighting we parameterize $\delta = 0.2$, $\varepsilon^{PD} = -2.5$, $\gamma = 0.2$ and $\eta = 0.05$. For $\dot{r}_c^G$ we estimated 1.737, for $\dot{w}_c$ we estimated 0.58. As above we set $\tau_c^b = 0.15$. The table below shows how $\dot{\pi}_c$ varies for different values of κ_k and κ_g:

The elasticity varies from 1.2 to 1.7, which is quite close to our medium-run estimates from the reduced-form approach.

Table C.17: Elasticity of net profits $\dot{\pi}_c$ for different combinations of κ_k and κ_g

κ_g/κ_k	0	0.25	0.50	0.75	1
0	1.53	1.45	1.37	1.29	1.22
0.25	1.56	1.48	1.40	1.32	1.24
0.50	1.59	1.51	1.43	1.34	1.26
0.75	1.62	1.54	1.45	1.37	1.28
1	1.66	1.57	1.48	1.39	1.30