The Effects of Local Business Taxes on Establishment Entry and Exit*

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1 Introduction

Theoretically and empirically, at the national and at the local level, firm entry and exit are important determinants of economic growth. In theories of endogenous growth based on expanding varieties (Romer, 1990), new firms increase aggregate productivity by expanding the variety of ideas in the economy. At the local level, this process can start a virtuous cycle whereby a new firm increases productivity and wages, which increases the number of workers through in-migration, which increases the demand for local firms' output, which further increases firm entry (Krugman, 1991 and Walsh, 2019). In theories of creative destruction, new firms improve upon the products of incumbents who subsequently exit, freeing up resources for more productive uses (Aghion et al., 2015). Empirically, new firms are an essential source of employment growth both at the national (Decker et al., 2014) and local level (Glaeser et al., 2015 and Walsh, 2019). Given the economic significance ascribed to business entry and exit, understanding the effects of business taxation on entry and exit is an important step towards a complete assessment of the efficiency costs of business taxation.

This paper combines rich variation in German local business tax rates with administrative microdata from the business register in a difference-in-differences approach to

*Email: pmkind@umich.edu. I thank James Hines, Joel Slemrod and Ashley Craig for helpful comments and suggestions. This research uses administrative data provided by the RDC of the Federal Statistical Office and Statistical Offices of the Laender accessed via on-site as well as controlled remote data processing. The results have been reviewed to ensure compliance with disclosure restrictions. I am very grateful for the assistance provided by the RDC teams of the Statistical Offices in Niedersachsen, Berlin and Thueringen in accessing the data.

study the effect of local business taxes on the entry and exit of establishments within a municipality.

Each of the approximately 11k municipalities in Germany sets its own business tax rate and there is considerable variation in business tax rates within municipalities over time. While tax rates vary across municipalities, the base for taxation, business profits, does not. Municipalities each year determine the tax rate that will apply the following. Between 1998-2016, there were on average 1,008 local business tax changes per year. Approximately 95% of tax changes were tax increases, with an average tax increase of 0.81 percentage points and a 75th percentile of 1 percentage point.

Although almost all business must remit local business taxes, the importance of local business taxes to a firm's overall tax liability vary between corporate and unincorporated firms. The profits of unincorporated businesses are passed through to the owner where they are subject to the personal income tax. Importantly, the owner of the businesses can credit the local taxes they remit against their personal income tax liability. Corporate firms pay additional national corporate taxes on profits and cannot credit the local business taxes they pay against their national tax liability. As a consequence, local business taxes constitute a much larger share of the total tax liability for corporate than for unincorporated firms.

This research uses 11 years (2002-2012) of administrative microdata from the German business register to construct municipality-level counts of the number of entrants and exits. The business register is a list of the population of firms and establishments operating in Germany in a given year that is constructed mainly by combining administrative data on establishments and their employees from the Federal Employment Agency and data on firms and their taxable sales from the tax authorities. I focus on employer establishments and identify entry and exit by comparing establishment lists in consecutive years. The entry and exit definitions attribute economic entry and exit to the appearance and disappearance of id numbers in the business register. Note that although the continuity rules of the business register for id numbers provide a justification for this linkage, in practice the continuity rules could not always be applied so that changes in firm ownership, for example, will in certain cases trigger an establishment exit and entry. A prudent interpretation of the entry and exit definitions therefore is that they are noisy measures of true economic entry and exit.

This paper exploits local business tax changes in a difference-in-differences approach to study the effects of local business taxes on establishment entry and exit. The identification assumption required for attributing differential growth rates of entry or exit following a local business tax change to the tax change is that in the absence a change their

would have been no such differential growth (parallel-trends assumption). I perform two tests of the identification assumption. The first test examines whether the parallel-trends assumption was satisfied in the periods before the local tax change. The estimates indicate that for the number of entrants, exits and establishments the parallel-trends assumption was indeed satisfied in the pre-reform period. The second test examines whether unincorporated businesses were similarly affected by the corporate tax change. The estimates indicate that local business tax increases have no effect on unincorporated establishments. Combined, the two tests suggest that any response of corporate establishments to a tax increase do not reflect the continuation of a pre-existing trend are not the result of changes in economic conditions that are correlated with tax changes.

An increase in the local business tax rate has a statistically and economically significant adverse impact on the entry of corporate establishments in a municipality. The decrease builds over the course of three years and remains constant thereafter. Five years after a 1% increase in the local business tax rate, the number of corporate entrants in the municipality is 0.86% lower (se: 0.34). The -0.86 elasticity of corporate entry with respect to the tax rate translates into an elasticity with respect to the net-of-tax rate of approximately 5 and a semi-elasticity of approximately -5.9. The decrease in the number of corporate entrants combined with a constant number of unincorporated imply that the total number of entrants in a municipality decreases following a business tax increase. The decrease in total entry is evidence in support of the hypothesis that the decrease in corporate entry is not simply the result of entering establishments choosing to not incorporate. Although corporate entrants are larger than non-corporate entrants and more likely to survive at least one year, the decrease in the number of corporate entrants has no measurable effect on the overall composition of entrants in a municipality.

An increase in the local business tax has no statistically significant impact on the number of corporate exits over the medium term, however it does appear to trigger a one-off increase in exit one year before the reform. The estimates suggest that the spike in corporate exits in the pre-reform period is driven by an increase in the exit of establishments in the non-tradable sector.

The decrease in the entry of corporate establishments, combined with a constant number of exits, triggers a decrease in the total number of corporate establishments in a municipality that grows over time. Five years after a 1% increase in the local business tax rate, the number of corporate establishments in a municipality is 0.17% (se: 0.058). The -0.17% elasticity of the number of corporate establishments with respect to the business tax rate translates into a elasticity with respect to the net-of-tax rate of approximately 1 and a semi-elasticity with respect to the tax rate of approximately -1.2. The decrease in the

number of corporate combined with a constant number of unincorporated establishments imply that the total number of entrants in a municipality decreases following a business tax increase.

The decrease in the number of corporate entrants in a municipality that raises its local business tax rate does not appear to be offset by higher entry in neighboring municipalities. Understanding whether the tax-induced decrease in corporate entry following a business tax increase is offset by an increase in entry elsewhere matters for assessing the external validity of the results and for a welfare assessment of local business taxes from a national perspective. Given that for any given municipality there is arguably a set of alternative municipalities with similar economic conditions and institutions, it is plausible that a potential entrepreneur, rather than deciding to not open a business following a local tax increase, decides to instead open the business in a municipality within the alternative set. The approach of this paper to measuring spillovers is to classify sets of similar municipalities based on geographic proximity. The results do not indicate that a local business tax increase has a measurable effect on the number of corporate entrants in municipalities that are within the same county as the municipality that increases its tax rate.

Caution must be applied when interpreting the magnitude of the entry response. An entrant is defined based on the appearance of an id number in the business register. Because other firm-level events such as ownership or legal form changes can trigger the issuance of new ID numbers, not every entrant corresponds to the creation of new production resources or the implementation of a new business idea. As a consequence, the magnitude of the entry response documented in this paper doe not necessarily correspond to the magnitude of the true entry response to local business taxes.[1] However, the fact that the total number of establishments decreases following a tax increase while exit remains constant is evidence in support of the hypothesis that the entry response is not driven primarily by spurious id changes that trigger firm entry.

The remainder of this paper is structured as follows. Following a discussion of the related literature, Section 2 describes the institutional setting, data as well as the empirical approach. Section 3 presents the results and Section 4 concludes.

Related Literature This research relates to a number of existing studies that examine the effects of business taxes on the stock as well as the entry and exit of establishments.

[1] Because changes are measured as percentage changes, entry due to changes of id numbers can either attenuate or accentuate the entry response compared to the true entry response. Attenuate because they increases the base against which changes are measured and accentuate because the potentially increase the measured change.

Suarez Serrato and Zidar (2016) document that the number of establishments in a state decreases following state business tax increase but do not examine to whether the change is driven by reduced entry or increased exit. Giroud and Rauh (2019) study the effect of state taxes on the number of establishments of multi-establishment firm and document that such firms decrease the number of establishments in a state following a tax increase. Many establishments, in particular establishment entrants, however, are single-establishment firms and these are not captured by the analysis. Curtis and Decker (2018) find that the number of workers employed by startups decreases following a state business tax increase. Their results suggest an adverse impact of state taxes on the number of entrants, however in response to higher state taxes startups may also decide to hire fewer workers. Brosy (2021) examines the effect of state business taxes on the entry and exit rate of establishments and finds that business tax increases lower the number amount of establishment entry and to a lesser extent also establishment exit. The previous papers all exploit variation in US State business tax rates over time. One issue with US State business tax variation is that states not only determine the tax rate, but also the tax base, which complicates interpreting the estimates. Riedel et al. (2020) also exploit the German local business tax and find that local business taxes have an adverse impact on entry.[2] This paper adds to the literature by providing additional evidence on the relation between local business taxes and the entry and exit of employer establishments, exploiting tax variation that is entirely driven by rate changes and examining the extent to which the characteristics of entrants and exits responds to taxation.

2 Empirical Setting and Strategy

This paper combines rich variation in German local business tax rates with administrative microdata from the business register in a difference-in-differences approach to study the effect of local business taxes on the entry and exit of establishments within a municipality.

2.1 Institutional Environment

This subsection provides an overview of the German local business tax. The subsection describes how the local tax rate is determined as well as the base for taxation, describes the cross-sectional and longitudinal variation in local business tax rates, the importance of local business taxes to a firm's overall tax liability, the importance of local business taxes

[2]Compared to Riedel et al. (2020), this paper uses a different dataset and a different econometric approach, focusses on corporate employer establishments and considers additional outcomes.

to a municipality's total revenue as well as municipalities expenditure responsibilities and discusses research on the reasons for local business tax changes.

Each of the approximately 11k municipalities in Germany sets its own business tax rate and, apart from a few exceptions, all businesses are subject to local business taxes.[3,4] The tax rate in municipality i, τ_i, is the product of a federal base rate, τ^{base}, and a local scaling factor, θ_i: $\tau_i = \tau^{\text{base}} * \theta_i$. The base for taxation is determined at the national level and consists of business profits.[5] Variation across municipalities in business taxes is therefore restricted to variation in the tax rate, which is determined by variation in the local scaling factors. The scaling factor is determined each year by the municipal council.[6] For multi-establishment firms with establishments in multiple municipalities, taxable profits are allocated across municipalities based on payroll shares.

There is considerable cross-sectional variation in local business tax rates. Between 2002-2008 the average scaling factor was 3.3 and the interquartile range (iqr) was 2.9-3.7 which, given a federal base rate of $\tau^{\text{base}} = 5\%$ and taking into account the deductibility of the local business tax from the tax base, translate into an average local business tax rate of 14.2% and an iqr of 12.7-15.6%. In 2008, the federal base rate decreased to $\tau^{\text{base}} = 3.5\%$ and the deductibility of the business tax was eliminated. Between 2008-2012 the average scaling factor was 3.4 and the iqr was 3-3.8 translating into an average local business tax rate of 11.9% and an iqr of 10.5-13.3%.

In addition to the variation across municipalities in any given year, and more importantly for the empirical strategy of this research, there is ample variation in local business tax rates within municipalities over time. Between 1998-2016, among the 9,859 municipalities that were not part of a municipal merger, there were on average 1,008 local business tax changes induced by scaling factor changes per year.[7] Over this time period, 13.6% of municipalities had zero tax changes, 28.8% had exactly 1 tax change, 45% had 2 or 3 tax changes and 12.6% had more than 3 changes. Approximately 95% of tax changes were tax increases, with an average tax increase of 0.81 percentage points and a 75th percentile

[3]The average municipality has a population of roughly 7.5k a surface area of 12mi^2. Note that most municipalities are small: only roughly 1.6k municipalities have a population of more than 10k.

[4]Freelancers (Freiberufler) are exempt. The most common professions among freelancers are doctors and lawyers; other eligible professions are engineers, journalists and artists. Note though that if a freelancer decides to incorporate, they are subject to the local business tax.

[5]Interest costs are partly tax deductible. Prior to 2008, 50% of long-term debt interest was tax deductible. Since 2008, 25% of interest costs above EUR100k are added back to profits. Note that prior to 2008, the local business tax was deductible from the business tax base.

[6]The scaling factor for year t is typically determined towards the end of year $t-1$ but can be determined up to 06.30 of $t+1$. Since 2004 a minimum scaling factor of 2 applies.

[7]I focus on non-merged municipalities as these are the starting point for the analysis sample (see Section [X] for a discussion). I focus on the years 1998-2016 because tax changes within this time window are used to identify the dynamic effects of local business tax changes in the regressions.

of 1 percentage point (see Figure 1 Panel (a) for a histogram). Moreover, these local business tax changes are persistent: 10 years after a 1 percentage point increase the tax rate approximately 80% of the increase persists (see Figure 1 Panel (b)).[8]

The importance of the local business taxes to the overall tax liability of a business varies substantially between corporate and unincorporated businesses. The profits of unincorporated businesses are passed through to the owner where they are subject to the personal income tax. The owner of the businesses can credit the local taxes they remit against their personal income tax liability. The maximum credit is based on the local tax liability that would have been due given a certain scaling factor. Moreover, unincorporated business benefit from a standard deduction of EUR24.5k. As a consequence, in approximately 90% of municipalities local business taxes do not affect the total business tax liability of unincorporated firms.[9] Corporate businesses do not benefit from the standard deduction and their local tax liability can not be used as a credit to offset another tax liability. Instead, corporate firms pay additional national corporate taxes on profits.[10] The national tax rate was 25% prior to 2008 and has been 15% since 2008. Local business taxes therefore accounted for approximately 40% of the total tax liability of corporate firms prior to 2008 and account for approximately 45% since 2008.[11] In summary, for unincorporated firms in the vast majority of municipalities the local business tax does not affect the overall business tax liability whereas for corporate firms it accounts for 40-45% of the overall tax liability.

Municipal governments in Germany have limited control over revenue and expenditure policies. On the revenue side, in addition to setting the local business tax rate, municipalities also set property tax rates. Local business taxes account for 75% of total

[8]The municipal tax data used in this research were collected from the Federal Statistical Office and the Statistical Offices of the Laender. I thank Sebastian Siegloch for providing the data for certain years and states where the data was not readily available at the statistical offices.

[9]The scaling factor used to determine the maximum credit was 1.8 prior to 2008, 3.8 from 2008 to 2020 and is 4 since 2020. Note that prior to 2008 the local business tax was also deductible from the personal income tax base. As a consequence, prior to 2008, at a top personal income tax rate of approximately 40%, the local business tax did not affect the overall tax liability of the owner up to a scaling factor of approximately 3.6. Since 2008 the local business tax is no longer deductible from the personal income tax base so that between 2008 and 2020 the local business tax did not affect the overall tax liability of the owner up to a scaling factor of 3.8. Note that between 2002-2007 the 90th percentile of the scaling factor was 370 and between 2008-2012 the 90th percentile of the scaling factor was 380.

[10]The base for taxation does not vary between the local business tax and the national corporate tax.

[11]From 2002-2008 the average scaling factor was 3.3. The average local business tax rate, taking into account the deductibility of the business tax from the business tax base, was therefore approximately 14%. The share of local business taxes in the total tax liability, taking into account that prior to 2008 the national corporate tax rate applied to the after-local-tax profits, was therefore $\frac{0.14}{0.25(1-0.14)+0.14} \approx 0.4$. From 2008-2012 the average scaling factor was 3.4. The average local business tax rate was therefore approximately 12%. The share of local business taxes in the total tax liability was therefore $\frac{0.12}{0.12+0.15} \approx 0.45$.

municipal tax revenues, but total municipal tax revenues account for only 20% of overall revenue. The other main sources of municipal revenue are shares of federal income and sales taxes as well as transfers from higher levels of government. Both the share of federal taxes and the transfers are determined in a way that redistributes from municipalities with a stronger budget to those with a weaker budget.[12] On the expenditure side, transfer policies as well as the provision of many public goods, such as most educational institutions and inter-municipality transportation infrastructure, are provided by state or national governments. Approximately 70% of a municipalities expenditures go towards public administration, maintaining local roads/parks/buildings (including schools), intra-municipality public transport, waste removal as well as they payment and provision of certain services for welfare recipients as mandated by federal law.[13] Municipalities are required by law to balance their budget.[14]

As documented by Foremny and Riedel (2014) and Fuest et al. (2018), the overall trend of local business tax increases is driven by expenditure shocks while the timing of the business tax increases is driven by the electoral cycle. Foremny and Riedel (2014) argue that the trend towards local business tax increases is a response of municipal governments to increased spending requirements due to increases in federally mandated expenditures such as the expansion of early childhood education as well as increases in social security payments to the elderly and unemployed. Moreover, they document that the timing of tax increases is driven by election cycles: the probability of a tax increase in an election year drops, whereas it increases in the post-election year. Fuest et al. (2018), in their study of the corporate tax incidence exploiting local business tax variation, provide evidence that local business tax increases are not correlated with business cycles.

[12]The share of income taxes, for example, is based on the overall income of municipality residents, however the income is capped at a certain threshold (for example EUR35k for individual filers in 2015 in Baden-Württemberg). The transfer payments are based on the difference between a hypothetical expenditure and a hypothetical tax revenue. The hypothetical expenditure is a function of the municipal population. The hypothetical tax revenue is the sum of the share of income and sales taxes as well as hypothetical business and property tax revenues. The hypothetical business and property tax revenues are determined by dividing the actual business and property tax revenue in a municipality by the municipality's scaling factor and then multiplying them by fixed state-level scaling factors. For a given tax revenue, municipalities with a higher scaling factor are therefore attributed a lower hypothetical tax revenue and therefore a larger transfer.

[13]Approximately 15% go towards daycare centers for kids, youth support and athletic facilities such as public pools. The remainder goes towards a combination of cultural institutions (e.g. theaters), education institutions (e.g. vocational training) and health care facilities.

[14]The data and information in this paragraph are based on Statistisches Bundesamt (2011) and Ministerium fuer Finanzen und Wirtschaft Baden-Wuerttemberg (2015).

2.2 Data and Analysis Sample

2.2.1 German Business Register

Overview This research uses 11 years (2002-2012) of administrative microdata from the German business register (Unternehmensregister - System 95), accessed via the Research Data Centres of the Federal Statistical Office and the Statistical Offices of the Federal States, to construct municipality-level outcome measures such as the number of entrants. The business register is a list of the population of firms and establishments operating in Germany in a given year that is constructed mainly by combining administrative data on establishments and their employees from the Federal Employment Agency and data on firms and their taxable sales from the tax authorities. The database is maintained by the statistical office of each state and is intended to serve both as a source for official economic statistics as well as a sampling frame for firm/establishment-level surveys.

The data contain information on the size and various other characteristics of establishments and firms. An observation in the data can be either an establishment or a firm and is described by both an establishment and firm id. Establishments can be either single-establishment firms or an establishment of a multi-establishment firm. For establishments the data contain information on the number of workers subject to social security contributions, the location (municipality) and a 4-digit industry code. Note that establishments can be assigned to firms via the firm id.[15] For firms the data contain information on the number of workers, the amount of taxable sales, the legal form, wether the firm is part of a tax group of firm group, the location (municipality) and a 4-digit industry code.[16]

Measuring Entry and Exit I focus on employer establishments and identify entry and exit by comparing establishment lists in consecutive years. Employer establishments hire at least one worker subject to social security contributions and are either single-establishment firms or establishments of multi-establishment firms. I define an establishment as entering in t if its establishment id is not found in the list of employer establishments in $t-1$ and $t-2$. Similarly, I define an establishment as exiting in t if its establishment id is not found in the list of employer establishments in $t+1$ and $t+2$. Note that entry is measured in each year between 2004-2012 whereas exit is measured each year from 2002-2010.

The entry and exit definitions attribute economic entry and exit to the appearance and

[15] In the case of single-establishment firms, the firm id and the establishment id are identical.

[16] In the case of multi-establishment firms, the number of workers corresponds to the sum of the number of workers at all establishments.

disappearance of id numbers in the business register.[17] The continuity rules of the business register for id numbers provide a justification for this linkage. They state that for an underlying economic unit the establishment id should change iff at least two out of the following three criteria are satisfied: the location (municipality) changes, the ownership changes, the economic activity (industry) changes.[18] Pure ownership, location or industry changes should therefore generally not trigger the exit and entry of an establishment due to changes in the id numbers. Indeed, ownership changes as well as location and industry changes are observed in the data. However, in practice these continuity rules could not always be followed so that a subset of establishment entries and exits are likely due to pure ownership changes.[19]A prudent interpretation of the entry and exit definitions therefore is that they are noisy measures of true economic entry and exit.

I construct a number of additional variables to classify and describe entering and exiting establishments. I use the legal form to classify single-establishment firms as incorporated or unincorporated and I classify establishments of multi-establishment firms as incorporated.[20,21] For entering and exiting establishments I construct size measures based on the number of workers at entry or exit and I determine whether they are operating in the tradable or non-tradable sector.[22] For entering establishments I also determine whether or not they survive to the next period and whether or not they grow as measured by the number of workers.

Descriptive Statistics There are approximately 22m establishment observations in the data from 2002-2012. Single-establishment firms account for 85.7% of these observations and account for 56.7% of all workers. Corporate establishments are larger than non-

[17]Economic entry here is understood as the creation of new production resources or the implementation of new idea. Similarly economic exit here is understood as the destruction of exiting production resources or the abandoning of an existing idea.

[18]For establishments of multi-establishment firms inter-municipality moves can in some cases trigger id changes.

[19]A key issue is that for the Federal Employment Agency ownership, legal form and industry changes do trigger new ids. Therefore, if a single-establishment firm changes ownership between t and $t+1$, the Federal Employment Agency will send the information on the number of workers of the establishment to the Statistical Offices of the Federal States in $t+1$ using a new id number and it will be the responsibility of the statistical offices to reconcile the old and the new id number. The tax authorities also follow different continuity rules.

[20]Firms that are part of a tax group or part of a firm group are also classified as incorporated.

[21]Note that the set of corporate and unincorporated establishments are not a partition of the set of all establishments. Some establishments are neither corporate nor unincorporated. These include public institutions and non-profit organizations as well as establishments for which the legal form was missing.

[22]The tradable vs. non-tradable sector distinction is motivated by the question of whether the effect of businesses taxes on establishment entry vary between establishments that provide local services such as barbers and restaurants (non-tradable) and those that provide goods and services that are sold regionally/nationally/globally.

corporate establishments with the average corporate establishment hiring twice as many workers as the average establishment overall (see Table 3 Panel (a) for details).

Approximately 1.75m establishment entries are observed in the data from 2004-2012 implying an average establishment entry rate of 9.7% (see Table 1 Panel (a) for details). Corporate entrants are larger, more likely to survive and more likely to grow, but not more or less likely to operate in the tradable sector (see Table 3 Panel (b) for details). Approximately 1.75m establishment exits are observed in the data from 2002-2010 implying an average establishment exit rate of 9.8% (see Table 1 Panel (b) for details). Corporate exits are larger but not more or less likely to operate in the tradable sector (see Table 3 Panel (c) for details).[23]

2.2.2 Other Data

Municipal Tax Data The municipal tax data used in this research were collected from the Federal Statistical Office and the Statistical Offices of the Laender.[24] Because municipality identifiers sometimes changed over time, the identifiers in the annual tax data were crosswalked to the 2017 identifiers using crosswalks from the Federal Institute for Research on Building, Urban Affairs and Spatial Development.

Labor Market Regions The labor market regions used as control variables in the regressions were obtained from the Federal Institute for Research on Building, Urban Affairs and Spatial Development. These areas are composed of counties (multiple municipalities comprise a country) and are determined based on commuting flows across counties.

2.2.3 Analysis Sample

Construction and Selection I collapse the business register microdata into municipality-year cells to construct a municipality-level panel. I create separate counts of the number of all, corporate and unincorporated establishments, entrants and exits. For characteristics of entrants and exits I calculate averages within the municipality-year cell. To this

[23] Unfortunately, a comparison to existing public statistics on employer establishment entry and exit is not possible as these statistics do not exit. Rink et al. (2013) use additional data to disentangle id changes from true entry and exit. However, their unit of observation is the firm and they consider employer and non-employer firms. As a consequence, the levels of entry and exit cannot be readily compared. Reassuringly though, the time series pattern of entry and exit are similar between their series (Figure 1 in their paper) and the series in Table 1. In the US, according to the Business Dynamics Statistics, the average entry rate between 2004-2012 was 10.8% and the average exit rate between 2002-2010 was 10.3%.

[24] I thank Sebastian Siegloch for providing the data for certain years and states where the data was not readily available at the statistical offices.

municipality-level version of the business register I add the tax data as well as the labor market regions.

The main analysis sample focusses on non-merged municipalities that have at least three corporate entrants and exits each year. I focus on non-merged municipalities because for merged municipalities the tax rate is not well defined prior to the merger and post-merger the tax rate can vary within the municipality across the former independent municipalities. I focus on municipalities with at least three corporate entrants and exits each year in order to obtain more meaningful average characteristics of entrants and exits. I examine the robustness of the results to requiring only at least one corporate entrant and exit every year. Note that among the 9,859 non-merged municipalities only approximately 7k host at least one corporate establishment every year, only approximately 2k host at least one corporate entrant and exit every year and only approximately 1k host at least 3 corporate entrants and exits every year.

Descriptive Statistics Table 3 contains the descriptive statistics of the main analysis sample. The sample consists of 1,105 municipalities that on average host 17,1798 workers and 1,148 establishments in a given year (medians: 6,698 and 536, respectively). Of these establishments approximately 41.6% are corporate and 49.3% are unincorporated. There are on average 117 entrants per municipality in a given year (median: 49). Of these entrants approximately 33.3% are corporate and 52.1% are unincorporated. There are on average 116 exits per municipality in a given year (median: 49). Of these exits approximately 30.2% are corporate and 53.4% are unincorporated.

2.3 Empirical Strategy and Econometric Implementation

Empirical Strategy This paper uses a difference-in-differences approach to study the relationship between local business taxes and establishment entry and exit. The approach examines whether, following a local tax change, the outcome of interest grew at a differential rate in the municipality that changed its tax rate compared to a control municipality where the tax rate was not changed. The identification assumption required for attributing differential growth rates of an outcome variable following a local corporate tax change to the tax change is that in the absence a change their would have been no such differential growth (parallel-trends assumption). Given that the local corporate tax rate is determined by the local government, an immediate concern is that local tax changes are driven by unobserved changes in economic activity and that the unobserved changes in economic activity, not the local tax change, are responsible for any response of

the outcome variable.

I perform two tests of the identification assumption. The first test examines whether the parallel-trends assumption was satisfied in the periods before the local tax change. If prior to a tax change the stock, entry and exit of corporate establishments grow at the same rate in a municipality that changes its tax rate and a control municipality, this suggests that at least in the pre-reform period there were no unobserved trends in economic activity that differentially affected the municipalities. The second test examines whether unincorporated businesses were similarly affected by the corporate tax change. Unincorporated businesses are similarly affected by changes in local economic conditions, but, because their owners can deduct the local corporate tax from their income tax, unincorporated businesses should be less affected by local tax changes. Therefore, examining whether unincorporated business are similarly affected by local tax changes provides evidence either in support or in opposition to the identification assumption.

Econometric Implementation I implement the empirical strategy by estimating distributed lag models and generating cumulated coefficients. The regression equation reads

$$\Delta y_{i,t} = \sum_{k \in \mathcal{K}} \delta_k \Delta \ln \tau_{i,t-k} + \gamma_{g(i),\mathrm{t}} + \epsilon_{i,t} \tag{1}$$

where $\Delta y_{i,t}$ measures the year-on-year change in the outcome variable in municipality i in year t, $\Delta \ln \tau_{i,t+k} = \ln \tau_{i,t+k} - \ln \tau_{i,t+k-1}$ is the year-on-year log change in the local corporate tax in municipality i k periods from t, $\mathcal{K}$ is a set of leads and lags, $\gamma_{g(i),\mathrm{t}}$ is year fixed effect that varies by geographic unit ($g(i)$ is a mapping from municipalities to geographic units) and $\epsilon_{i,t}$ is an error term which captures the combined impact of all other factors that determine $\Delta y_{i,t}$, clustered at the municipality level. For outcome variables that measure quantities (e.g. number of establishments), the year-on-year change is the percentage change measured by $\Delta y_{i,t} = \frac{y_{i,t} - y_{i,t-1}}{0.5\left(y_{i,t} + y_{i,t-1}\right)}$ which has the advantage of accommodating zeros. For outcome variables that measure percentages (e.g. shares), the year-on-year change is the simple difference $\Delta y_{i,t} = y_{i,t} - y_{i,t-1}$.

The main specification makes the following decision regarding the geographic unit, the lead/lag structure and the regression weights. The year fixed effect is allowed to vary at the level of the local labor market region. The approximately 11k municipalities in Germany are grouped into approximately 400 counties which are grouped into approximately 260 labor market regions. The specification includes 4 leads and 5 lags. As a consequence, the main coefficients in the main specification are identified using tax reforms

that happen between 1998-2016.[25] Each municipality is weighted by the median number of workers in the municipality over the period 2002-2012. I examine the robustness of the results to these modeling choices.

3 Results

This section presents empirical evidence on the effects of a local business tax increase on establishment entry and the composition of entry, establishment exit and the composition of exit, the stock of establishments, spillovers to neighboring municipalities as well as the robustness of the evidence to perturbations of the empirical methodology.

3.1 Establishment Entry

Quantity An increase in the local business tax rate has a statistically and economically significant adverse impact on the entry of corporate establishments in a municipality. Figure 2 depicts the cumulated coefficients from the distributed lag regression (1), $\hat{\beta}_k = \sum_{t=-4}^{k} \hat{\delta}_t$ with $k \in \mathcal{K} = \{-4, -3, -2, -1, 0, 1, 2, 3, 4, 5\}$ and with $\hat{\beta}_{-5} = 0$, using corporate, unincorporated and all entrants as outcome variables. The estimates from the pre-reform period, $\{\hat{\beta}_k\}_{k<0}$, indicate the percent change in the number of entries between 5 periods prior to a 1% tax increase and k periods prior to the tax increase whereas the estimates from the post reform period, $\{\hat{\beta}_k\}_{k\geq 0}$, indicate the percent change in the number of entries between 5 periods prior to a 1% tax increase and k periods post the tax increase. The estimates depicted by the blue solid line in Panel (a) reveal that following a tax increase the number of corporate entrants in a municipality drops. The decrease builds over the course of three years and remains constant thereafter. Five years after a 1% increase in the local business tax rate, the number of corporate entrants in the municipality is 0.86% lower (se: 0.34). The -0.86 elasticity of corporate entry with respect to the tax rate translates into an elasticity with respect to the net-of-tax rate of approximately 5 and a semi-elasticity of approximately -5.9.[26]

Both tests of the identification assumption support a the notion that the drop in corporate entry following a tax increase is due to the tax increase as opposed to other unob-

[25] Note that currently the deductibility of local business taxes from the tax base prior to 2008 is not taken into account. This implies that the (log) tax changes induced by scaling factor changes prior to 2008 are too large, which should result in a downward bias of the estimates. This will be corrected in future analyses.

[26] Given an average local business tax rate of 14.5% over the event window (1997-2016), a 1% increase in the business tax rate translates into a 0.17% decrease in the net-of-tax rate, so that the elasticity of corporate entry with respect to the net-of-tax rate is approximately 5%. Moreover, given the average local business tax rate of 14.5%, a 1% increase in the tax rate translates into a 0.00145 increase in the local tax rate.

servable factors. First, the parallel-trends assumption is satisfied in the pre-reform period. The estimates depicted by the blue solid line in Figure 2 Panel (a) reveal that number of corporate entrants in a municipality which increases its business tax rate does not systematically increase or decrease prior to the year in which the rate rate is increased. These estimates support the hypothesis that the drop in entry following a tax increase does not reflect the continuation of a pre-existing trend. Second, the number of unincorporated entrants does not respond to a tax increase. The estimates estimates depicted by the grey dashed line in Panel (a) reveal that prior to and following the tax increase there are no systematic changes in the number of unincorporated entrants. These estimates support the hypothesis that the drop in entry following a tax increase does not reflect the effect of changes in economic conditions that are correlated with tax changes.

The decrease in the number of corporate entrants combined with a constant number of unincorporated imply that the total number of entrants in a municipality decreases following a business tax increase. Panel (b) of Figure 2 depicts the cumulated coefficients from the distributed lag regression (1) using the total number of entrants as the outcome variable. Five years after a 1% increase in the local business tax rate, the number of all entrants is 0.38% lower (se: 0.19). The smaller impact on the total number of entrants reflects that corporate entry decreases following a tax increase whereas unincorporated entry does not and that corporate entry accounts for approximately 33% of overall entry in municipalities on average. Indeed, the 0.38% decrease in total entry is close to the 0.28% decrease that would be expected when scaling the 0.86% decrease in corporate entry by 33%.[27] The decrease in total entry is also evidence in support of the hypothesis that the decrease in corporate entry is not simply the result of entering establishments choosing to not incorporate.

Composition An increase in the local business tax rate has no measurable impact on the characteristics of corporate entrants, nor does the decrease in corporate entry result in a measurable change in the overall characteristics of entrants. Figure 3 depicts the cumulated coefficients from the distributed lag regression (1) using the share of corporate or all entrants that have certain characteristics as outcome variables. Note that changes in the shares are measured as percentage point changes. Panels (a), (c) and (e) depict the dynamic effects of an increase in the local business tax rate on the share of corporate entrants that are small (<3 workers), the share of corporate entrants that survive, and the share of

[27] The fact that the total decrease is slightly higher than would be expected by scaling the decrease in corporate entry is potentially due to a decrease in the entry of unclassified establishments. The information on legal form was missing for some of these establishments and they are likely to reflect a combination of corporate and unincorporated establishments.

corporate entrants in the tradable sector, respectively. None of the panels reveal a clear measurable effect of business taxes on the characteristics of corporate entrants. While the share of corporate entrants in the tradable sector is lower 5 years after the reform than 5 years before, it appears that the decrease predates the tax increase. Panels (b), (d) and (f) are the counterparts of (a), (c) and (e) for all entrants as opposed to only corporate entrants. Although only approximately 55% of corporate entrants are small compared to 76% of all entrants, the decrease in the amount of corporate entrants following a tax increase has no measurable effect on the overall share of small entrants. While the share of entrants that survive is higher and the share of entrants in the tradable sector is lower 5 years after the reform than 5 years before, it appears that the increase and decrease predate the tax increase.

3.2 Establishment Exit

Quantity An increase in the local business tax has no statistically significant impact on the number of corporate exits over the medium term, however it does appear to trigger a one-off increase in exit one year before the reform. Figure 4 depicts the cumulated coefficients from the distributed lag regression (1) using corporate, unincorporated and all exits as outcome variables. The estimates depicted by the blue solid line in Panel (a) do no not reveal a statistically significant impact on the number of corporate exits following a tax increase over. There does however appear to be a one-off increase in the number of corporate establishments that exit in the year before the tax increase (point estimate: 0.41; se: 0.25).[28] The dashed grey line in Panel (a) depicts the estimates using the number of unincorporated exits as an outcome. The time-series pattern of the estimates for corporate and unincorporated establishments is similar in most years, however the jump in exits prior to the reform is unique to corporate exits. The latter fact is evidence in support of the hypothesis that the jump in corporate exits in the pre-reform year can be attributed to the subsequent tax increase. Panel (b) depicts the estimates using the total number of exits in a municipality as an outcome. The time-series pattern of the estimates tracks the estimates based on the number of corporate and unincorporated exits in most years.[29]

[28]The establishments that exit in the year prior to the reform were employed at least one worker during that year but did not employ a worker in either of the next two years. Recall that local business tax changes are announced either towards the end of the prior year or the first half of the reform year.

[29]Deviations between the series can be attributed to changes in the number of exits of establishments that are neither corporate nor unincorporated. These include public and non-profit institutions as well as establishments for which the legal form was missing. These establishments account for approximately 18% of total establishment exit in municipalities.

Composition An increase in the local business tax has no measurable impact on the share of corporate and total entrants that are small, but potentially reduces the share of exits that were operating in the tradable sector. Figure 5 depicts the cumulated coefficients from the distributed lag regression (1) using the share of corporate or all exits that have certain characteristics as outcome variables. Note that changes in the shares are measured as percentage point changes. Panels (a) and (b) depict the estimates based on the share of corporate and all exits, respectively, that have less than 3 workers. Neither panel reveals any clear impact of higher local business taxes on the size of exiting establishments. Panel (c) depicts the estimates based on the share of corporate exits in the tradable sector. The estimates suggest that the spike in corporate exits in the pre-reform period is driven by an increase in the exit of establishments in the non-tradable sector. Following a tax increase, the estimates suggest that the share of tradable corporate establishment exits declines (i.e. share of non-tradable exits increases). The estimates depicted in Panel (d) based on the share of all exits in the tradable sector reveal a similar time-series pattern.

3.3 Number of Establishments

An increase in the local business tax has a statistically and economically adverse impact on the number of corporate establishments in a municipality. As the preceding discussions of entry and exit responses have revealed, the decrease is driven primarily by a drop in the entry of new corporate establishments. Figure 6 depicts the cumulated coefficients from the distributed lag regression (1) using the number of corporate, unincorporated and all establishments as outcome variables. The solid blue line in Panel (a) depicts the estimates based on the number of corporate establishments. The estimates reveal that following a local business tax increase, the number of corporate establishments drops. The effect builds over time, reflecting a constant number of exits combined with a lower number of entrants. Five years after a 1% increase in the local business tax rate, the number of corporate establishments in a municipality is 0.22% lower (se: 0.063) than five years before the reform. The decrease is -0.17% (se: 0.058) relative to the pre-reform year reflecting the small decrease in the number of corporate establishments prior to the reform. The -0.17% elasticity of the number of corporate establishments with respect to the business tax rate translates into a elasticity with respect to the net-of-tax rate of approximately 1 and a semi-elasticity with respect to the tax rate of approximately -1.2.[30] Note that the

[30]Given an average local business tax rate of 14.5% over the event window (1997-2016), a 1% increase in the business tax rate translates into a 0.17% decrease in the net-of-tax rate, so that the elasticity of corporate entry with respect to the net-of-tax rate is approximately 5%. Moreover, given the average local business tax rate of 14.5%, a 1% increase in the tax rate translates into a 0.00145 increase in the local tax rate.

decrease in the number of corporate establishments following a tax increase is evidence in support of the hypothesis that the entry definition does not primarily capture other firm-level events such as ownership changes that potentially alter firm id numbers and trigger entry.

The decrease in the number of corporate combined with a constant number of unincorporated establishments imply that the total number of entrants in a municipality decreases following a business tax increase. The grey dashed line in Panel (a) depicts the estimates using the number of unincorporated establishments as the outcome. Consistent with the evidence on the effects of business taxes on the entry and exit of unincorporated establishments and in support of a causal link between local business taxes and the number of corporate establishments, the estimates do not indicate that an increase in the local business tax rate has an impact on the number of unincorporated establishments. Panel (b) depicts the estimates using the total number of establishments as the outcome. Five years after a 1% increase in the local business tax rate, the total number of establishments is 0.063% lower (se: 0.036) than 5 years prior to the reform. The decrease relative to the pre-reform year is -0.054% (se: 0.033). The smaller decrease in the total number of establishments reflects that the number of corporate establishments decreases following a tax increase whereas the number of unincorporated establishments does not and that corporate establishments account for approximately 42% of all establishments. Indeed, the 0.063% decrease in total establishments is close to the -0.092% decrease that would be expected when scaling the decrease in corporate establishments by 42%.[31] The decrease in the total number of establishments is evidence in support of the hypothesis that the decrease in the number of corporate establishments does not simply reflect establishments changing their legal form.

3.4 Spillovers

Understanding whether the tax-induced decrease in corporate entry following a business tax increase is offset by an increase in entry elsewhere matters for assessing the external validity of the results and for a welfare assessment of local business taxes from a national perspective. For any given municipality there is arguably a set of municipalities that are characterized by similar economic conditions and institutions. As a consequence, in response to a business tax increase in municipality a, an entrepreneur intending to open a corporate establishment in a may decide to instead open the establishment in another

[31] The difference can be partly attributed to a small increase in the number of unincorporated establishments ($\hat{\beta}_5 = 0.022$ and se: 0.043) and partly to the behavior of establishments that are classified neither as corporate nor unincorporated.

municipality with similar characteristics to a. Understanding whether such relocation of economic activity is responsible for the decrease in corporate entrants determines the extent to which the results can be extrapolated to business taxes that are set at a higher level where the set of alternative locations with similar economic conditions and institutions is limited. Moreover, the efficiency costs of local business taxation as measured at the national level are lower if reduced entry in one municipality is offset by higher entry in other municipalities.[32]

The approach of this paper to measuring spillovers is to classify sets of similar municipalities based on geographic proximity. The motivation is that both economic conditions and institutions are poised to be similar among groups of neighboring municipalities. To this end the paper examines whether, in response to a business tax increase in municipality a, the number of corporate entrants and establishments in municipalities that are in the same county as a increases. Note that the usefulness of this approach relies on the geographic level at which relocation occurs. Should relocation occur across all municipalities to the same extent, the approach will suggest that the decrease in local entry is not offset by entry elsewhere when in fact it may be fully offset.

The decrease in the number of corporate entrants and establishments following an increase in the local business tax rate does not appear to reflect a relocation of entrants and establishments to neighboring municipalities. Figure 7 depicts the cumulated coefficients from the distributed lag regression (1) using the number of corporate entrants, Panel (a), and establishments, Panel (b), in other municipalities within the same county as the outcome variable.[33] The estimates do not reveal a measurable effect of a local business tax increase on the number of corporate entrants or corporate establishments in other municipalities within the same county.

3.5 Robustness

The response of corporate entrants, exits and establishments to an increase in the local business tax discussed above are robust to changes in the empirical specification. Figure 8 Panels (a), (b) and (c) depict the cumulated coefficients from various perturbations of the distributed lag regression (1) using the number of corporate entrants, exits and establishments, respectively, as outcomes. Recall that the main specification is based on the sample of municipalities with at least 3 corporate entrants and exits each year, weights observations using the median number of workers in the municipality between 2002-2012

[32]Note that even if the decrease in entry in the municipality that raises its business tax rate is fully offset by an increase in entry elsewhere, the distortion of the spatial distribution of entry has efficiency costs.

[33]The average county consists of 28 municipalities.

and controls for labor-market-region-by-year fixed effects. Each panel contains the estimates from 4 different perturbations on the main specification. The 'unweighted' specification weights each observation equally. The 'sample' specification is based on the set of municipalities with at least 1 corporate entrant and exit each year. The 'region' specification controls for governmental-district-by-year fixed effects. Note that there are on average 289 municipalities in each district as opposed to 43 in each labor market region. The 'year' specification drops the first year of the data the regressions are based on (2003 for establishments, 2005 for entry, 2003 for exit).[34] The qualitative nature of the results discussed above holds across all perturbations. The quantitative nature of the results is similar across most specifications. The estimates based on the 'sample' specification for entry, exit and establishments are attenuated compared to the results of the main specification, suggesting that the effect of local business tax changes is more pronounced in larger municipalities.

4 Conclusion

This paper combined rich policy variation with administrative data on the population of German establishments to study the effects of local business taxes on the entry and exit of establishments. The results suggest that an increase in the local business tax rate reduces the number of corporate entrants in a municipality but has no measurable effect on the number of corporate exits. Lower entry combined with constant exit translate into a decrease in the total number of corporate establishments. In support of a causal link between local business tax increases and corporate establishments, there is no measurable effect on unincorporated establishments nor do the effects on corporate establishments capture the continuation of a pre-existing trend. The decrease in the entry of corporate establishments in the municipality that raises its tax rate does not appear to reflect a simple relocation of these entrants to neighboring municipalities. Given the importance attributed to new firms in endogenous growth theories as well as empirical evidence on the contribution of new firms to employment growth, the decrease in entry documented by this paper suggests the long-term efficiency costs of local business taxes are non-trivial.

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Tables

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	**Mean**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Entry												
# (000s)			200	198	198	202	203	190	190	190	178	**194**
Rate (%)			10.2	10.1	10.0	10.2	10.1	9.4	9.3	9.3	8.7	**9.7**
Panel B: Exit												
# (000s)	235	218	211	182	185	184	184	177	179			**195**
Rate (%)	11.9	11.0	10.7	9.3	9.4	9.2	9.1	8.8	8.8			**9.8**

Table 1: Overview of entry and exit

Note: Table depicts the number and rate of employer establishment entry and exit. An employer establishment is an establishment that employs at least one worker at the end of a given calendar year. An employer establishment enters in t if its establishment id is not found in the list of employer establishments in $t-1$ and $t-2$. Similarly, I define an employer establishment as exiting in t if its establishment id is not found in the list of employer establishments in $t+1$ and $t+2$. Note that entry is measured in each year between 2004-2012 whereas exit is measured each year from 2002-2010.
Source: RDC of the Federal Statistical Office and Statistical Offices of the Laender, AFiD-Panel Unternehmensregister - System 95, Berichtsjahre 2002-2012, own calculations.

	All	Corporate	Non-Corporate
	(1)	(2)	(3)
Panel A: Establishments			
# Establishments (2002-2012)	22,003,543	8,727,781	13,275,762
Mean # workers per establishment	13.61	26.82	4.93
Panel B: Entrants			
# entrants (2004-2012)	1,749,769	538,871	1,210,898
Mean # workers per entrant	4.20	9.03	2.05
Share small (<3 workers)	0.76	0.54	0.86
Share survive	0.75	0.83	0.71
Share grow	0.29	0.40	0.24
Share in tradable sector	0.24	0.24	0.24
Panel C: Exits			
# exits (2002-2010)	1,754,824	494,745	1,260,079
Mean # workers per exit	3.44	6.48	2.24
Share small (<3 workers)	0.78	0.63	0.84
Share in tradable sector	0.22	0.24	0.22

Table 2: Descriptive statistics of microdata

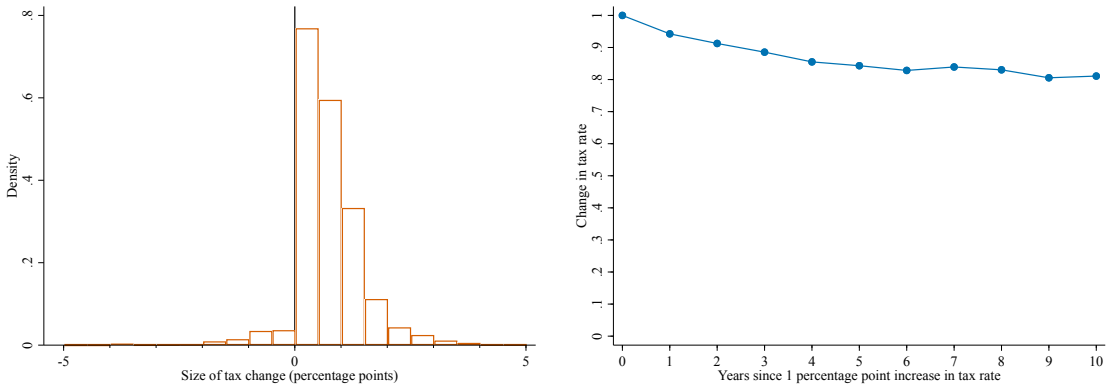
Note: Table depicts descirpitve statistics of the microdata. The level of observation is an establishment year. The sample consists of all establishments (single-establishment firms or establishments of multi-establishment firms) that employed at least one worker on 31-Dec of a given calendar year. For single-establishment firms the legal form determines whether the firm is incorporated. Establishments of multi-establishment firms as well as firms that are part of a tax group are classified as incorporated. Note that non-corporate includes both unincorporated establishments as well as establishments that are either a public/non-profit institution or for which the legal form is missing. Approximately 85% of non-corporate establishments are unincorporated, approximately 78% of non-corporate entrants are unincorporated and approximately 77% of non-corporate exits are unincorporated. The number of workers corresponds to the number of workers subject to social security contributions employed at an establishment on 31-Dec of a given calendar year. An entrant survives if it has at least one worker on 31-Dec of the subsequent year. Growth is defined only for entrants that survive.
Source: RDC of the Federal Statistical Office and Statistical Offices of the Laender, AFiD-Panel Unternehmensregister - System 95, Berichtsjahre 2002-2012, own calculations.

	Mean	Median	Observations
	(1)	(2)	(4)
# workers	17,798	6,698	12,155
Panel A: All			
# Establishments	1,148	536	12,155
# Entrants	117	49	9,945
# Exits	116	49	9,945
Panel B: Corporate			
# Establishments	478	217	12,155
# Entrants	39	15	9,945
# Exits	35	14	9,945
Panel B: Unincorporated			
# Establishments	566	275	12,155
# Entrants	61	28	9,945
# Exits	62	28	9,945
# Unique municipalities: 1,105			

Table 3: Descriptive statistics of main analysis sample

Note: Table contains descriptive statistics of the main analysis sample over the period 2002-2012. The data are at the municipality-year level. The main analsis sample consists of municipalities with at least 3 corporate entrants and exits each year. Note that the number of municipality-year observations is lower for entry and exit counts as these require two years backwards/forwards. As a consequence entry is first defined in 2004 and exit is last defined in 2010.
Source: RDC of the Federal Statistical Office and Statistical Offices of the Laender, AFiD-Panel Unternehmensregister - System 95, Berichtsjahre 2002-2012, own calculations.

Figures



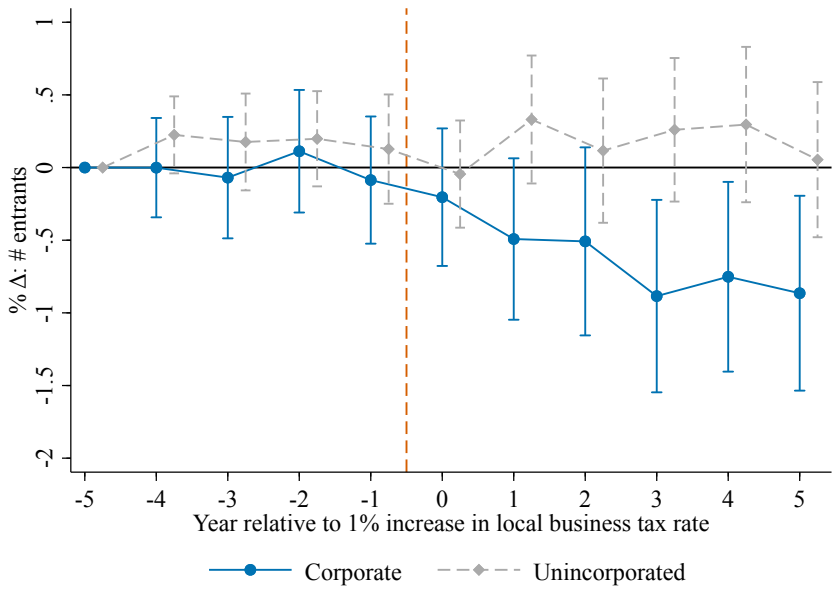
(a) Histogram of Tax Changes **(b)** Persistence of Tax Changes

Figure 1: Local Business Tax Changes

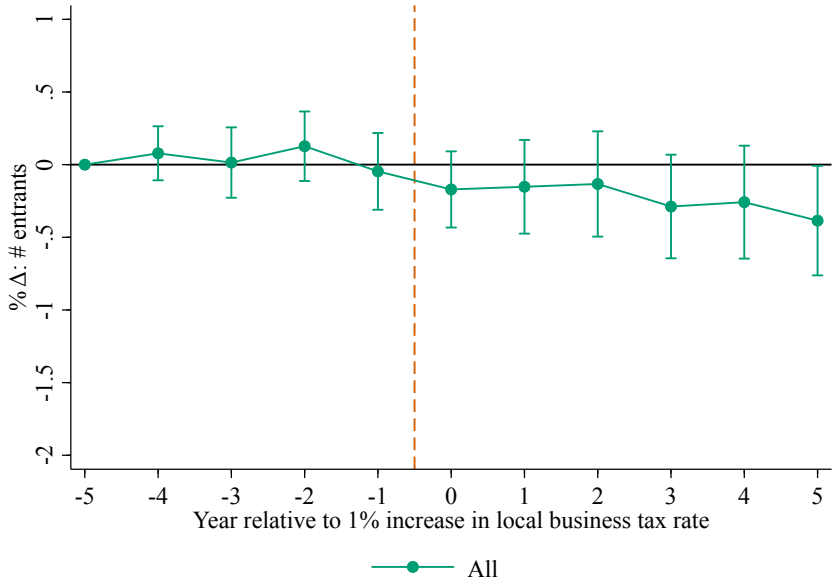
Note: The sample consists of all non-merged municipalities and considers all local scaling-factor-induced business tax changes between 1997 and 2016. Panel (a) contains a histogram for year-on-year changes in the local business tax rate induced by changes in the local scaling factor. The deductibility of the local business tax from the tax base prior to 2008 is taken into account. For 2008, the year in which the deductibility was eliminated and the federal base rate changed, I calculate the year-on-year change assuming that the same federal policies applied in 2007. Panel (b) depicts the persistence of local business tax changes induced by changes in the local scaling factor. The figure depicts the β_h coefficients from the regression

$$\theta_{i,t+h} - \theta_{i,t-1} = \beta_h \left(\theta_{i,t} - \theta_{i,t-1}\right) + \gamma_t + \epsilon_{i,t}$$

for $h \in \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ where $\theta_{i,t}$ is the scaling factor in municipality i in year t and γ_t is a year fixed effect. At any horizon h, $\hat{\beta}_h$ indicates how much of a given change in the scaling factor between t and $t-1$ persists h periods in the future.
Source: Federal Statistical Office and Statistical Offices of the Laender, Hebesaetze der Realsteuern, 1996-2016, own calculations.



(a) Corporate and Unincorporated

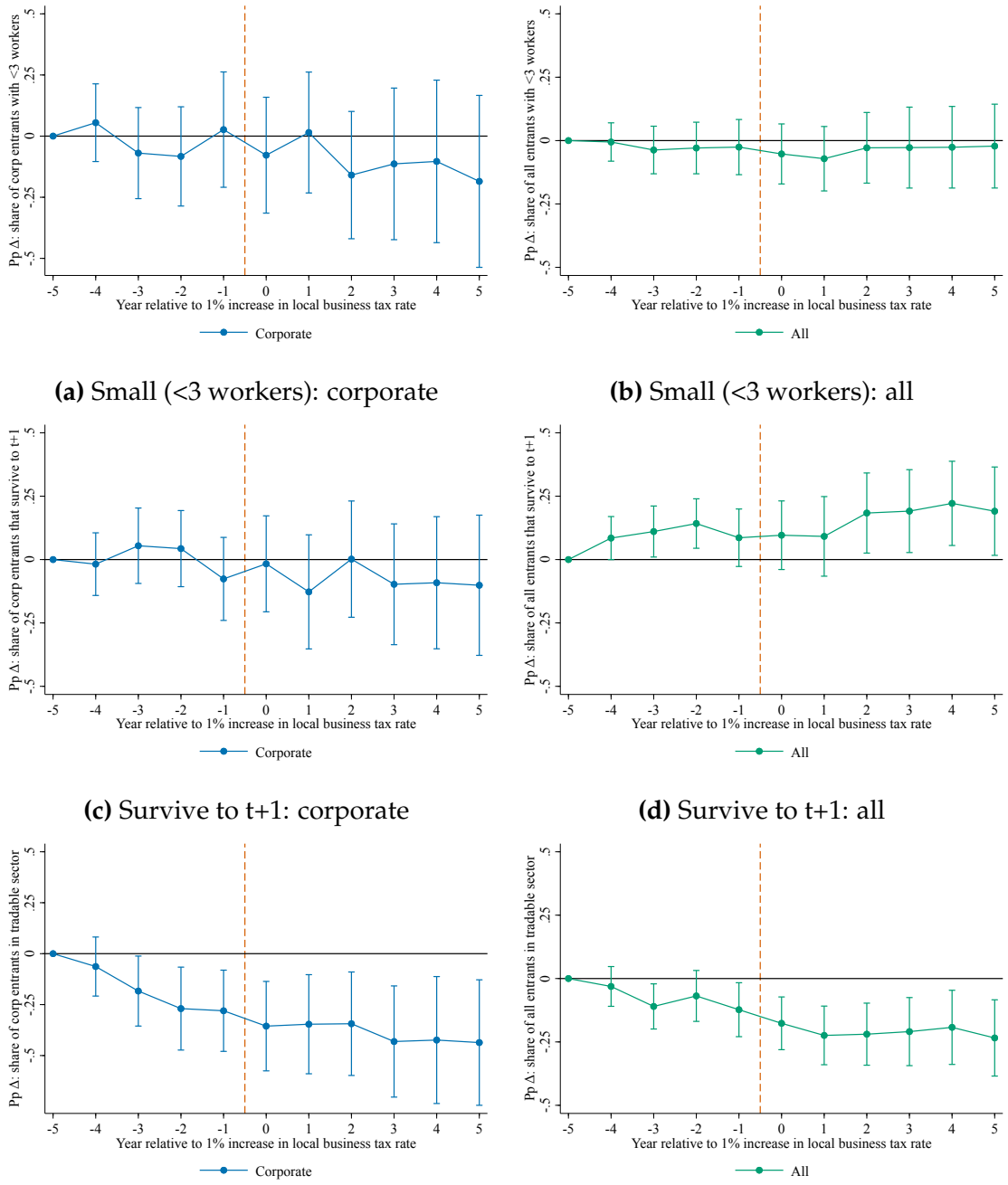


(b) All

Figure 2: Effect of 1% increase in local business tax on establishment entry

Note: Figure depicts the cumulated coefficients from the distributed lag regression (1), $\hat{\beta}_k = \sum_{t=-4}^{k} \hat{\delta}_t$ with $k \in \mathcal{K} = \{-4, -3, -2, -1, 0, 1, 2, 3, 4, 5\}$ and with $\hat{\beta}_{-5} = 0$, using corporate, unincorporated, and all entrants as outcome variables. The estimates from the pre-reform period, $\{\hat{\beta}_k\}_{k<0}$, indicate the percent change in the number of entries between 5 periods prior to a 1% tax increase and periods prior to the tax increase whereas the estimates from the post reform period,$\{\hat{\beta}_k\}_{k\geq 0}$, indicate the percent change in the number of entries between 5 periods prior to a 1% tax increase and periods post the tax increase. Standard errors are clustered at the municipality level. The regression controls for labormarket-region-by-year fixed effects. The sample consists of municipalities with at least 3 corporate entrants and exits each year. Observations are weighted by the median number of workers in the MSA between 2002-2012.

Source: RDC of the Federal Statistical Office and Statistical Offices of the Laender, AFiD-Panel Unternehmensregister - System 95, Berichtsjahre 2002-2012, own calculations.



(a) Small (<3 workers): corporate

(b) Small (<3 workers): all

(c) Survive to t+1: corporate

(d) Survive to t+1: all

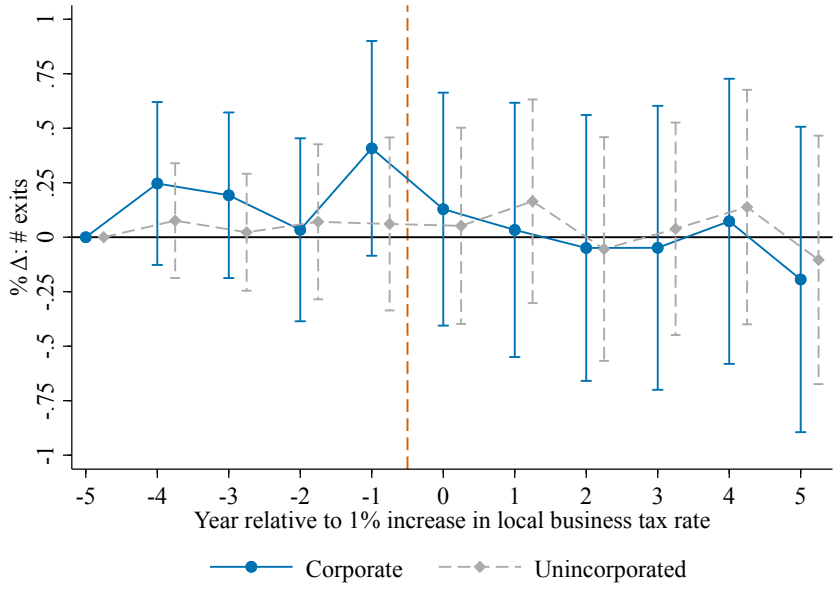
(e) In tradable sector: corporate

(f) In tradable sector: all

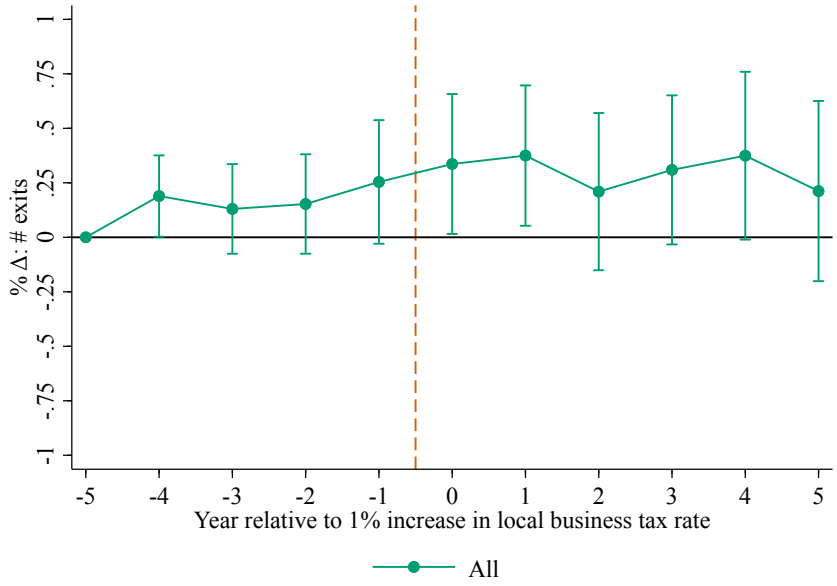
Figure 3: Effect of 1% increase in local business tax composition of establishment entry

Note: Figure depicts the cumulated coefficients from the distributed lag regression (1), $\hat{\beta}_k = \sum_{t=-4}^{k} \hat{\delta}_t$ with $k \in \mathcal{K} = \{-4, -3, -2, -1, 0, 1, 2, 3, 4, 5\}$ and with $\hat{\beta}_{-5} = 0$, using shares of corporate and all entrants that have certain attributes as outcomes. Panels (a) and (b) depict estimates using the share of entrants that are small (<3 workers) as an outcome. Panels (c) and (d) depcit estimates using the share of entrants that survive to t+1 as an outcome. Panel (e) and (f) depict the estimates uuing the share of entrants that are in the tradable sector as an outcome. Note that changes are measured in percentage points. Standard errors are clustered at the municipality level. The regression controls for labormarket-region-by-year fixed effects. The sample consists of municipalities with at least 3 corporate entrants and exits each year. Observations are weighted by the median number of workers in the MSA between 2002-2012.

Source: RDC of the Federal Statistical Office and Statistical Offices of the Laender, AFiD-Panel Unternehmensregister - System 95, Berichtsjahre 2002-2012, own calculations.



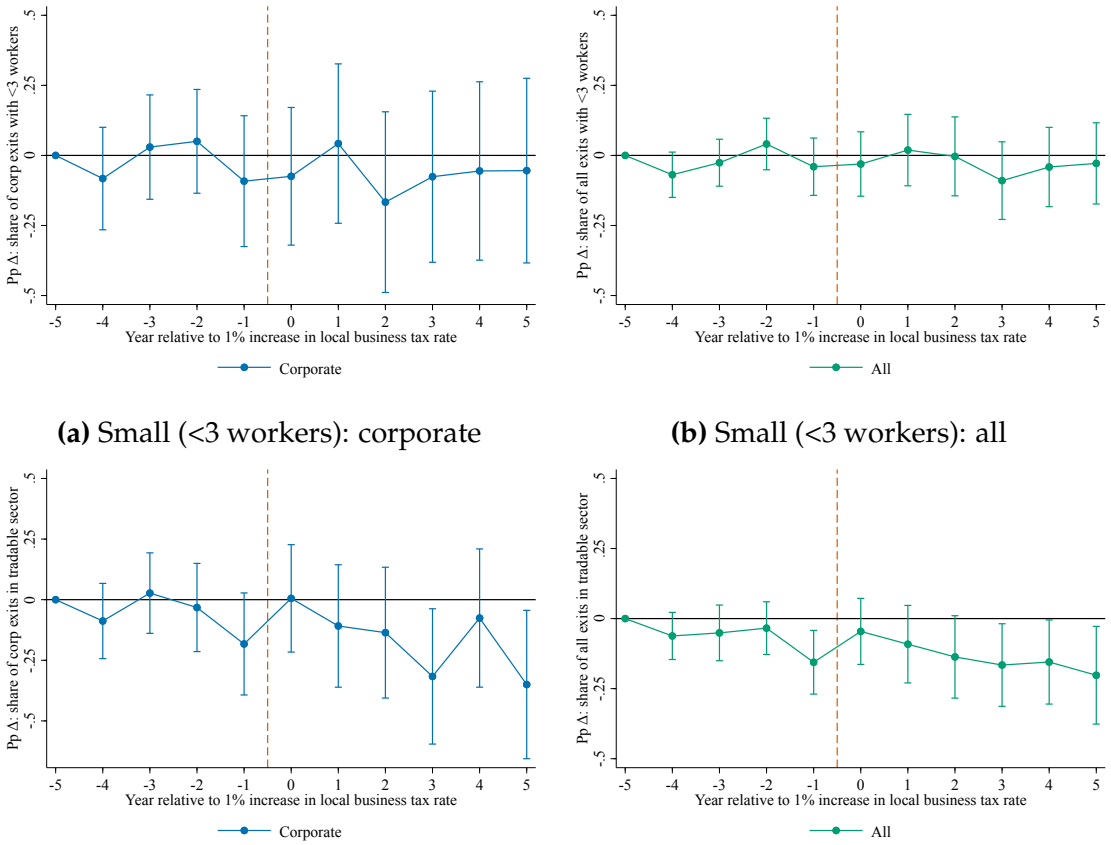
(a) Corporate and Unincorporated



(b) All

Figure 4: Effect of 1% increase in local business tax on establishment exit

Note: Figure depicts the cumulated coefficients from the distributed lag regression (1), $\hat{\beta}_k = \sum_{t=-4}^{k} \hat{\delta}_t$ with $k \in \mathcal{K} = \{-4, -3, -2, -1, 0, 1, 2, 3, 4, 5\}$ and with $\hat{\beta}_{-5} = 0$, using corporate, unincorporated, and all exits as outcome variables. The estimates from the pre-reform period, $\{\hat{\beta}_k\}_{k<0}$, indicate the percent change in the number of entries between 5 periods prior to a 1% tax increase and periods prior to the tax increase whereas the estimates from the post reform period,$\{\hat{\beta}_k\}_{k\geq 0}$, indicate the percent change in the number of entries between 5 periods prior to a 1% tax increase and periods post the tax increase. Standard errors are clustered at the municipality level. The regression controls for labormarket-region-by-year fixed effects. The sample consists of municipalities with at least 3 corporate entrants and exits each year. Observations are weighted by the median number of workers in the MSA between 2002-2012. *Source*: RDC of the Federal Statistical Office and Statistical Offices of the Laender, AFiD-Panel Unternehmensregister - System 95, Berichtsjahre 2002-2012, own calculations.



(a) Small (<3 workers): corporate

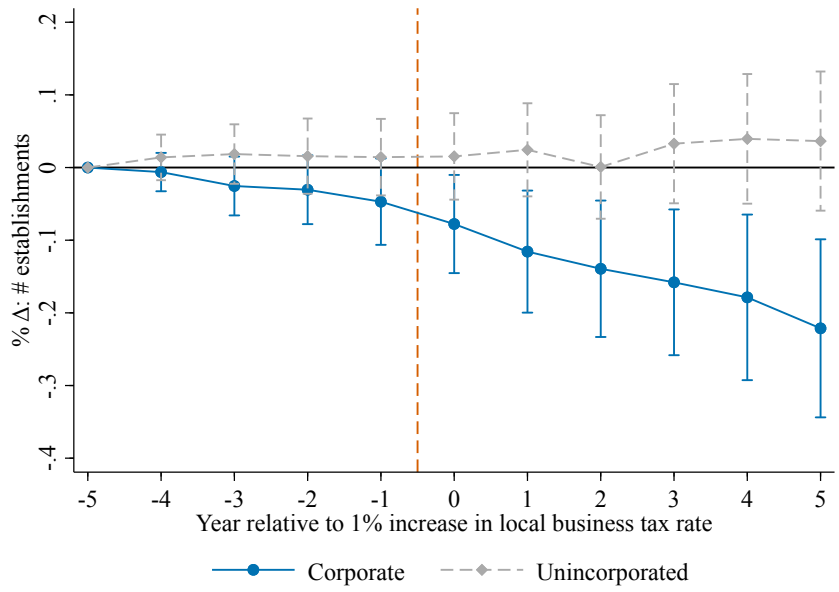
(b) Small (<3 workers): all

(c) In tradable sector: corporate

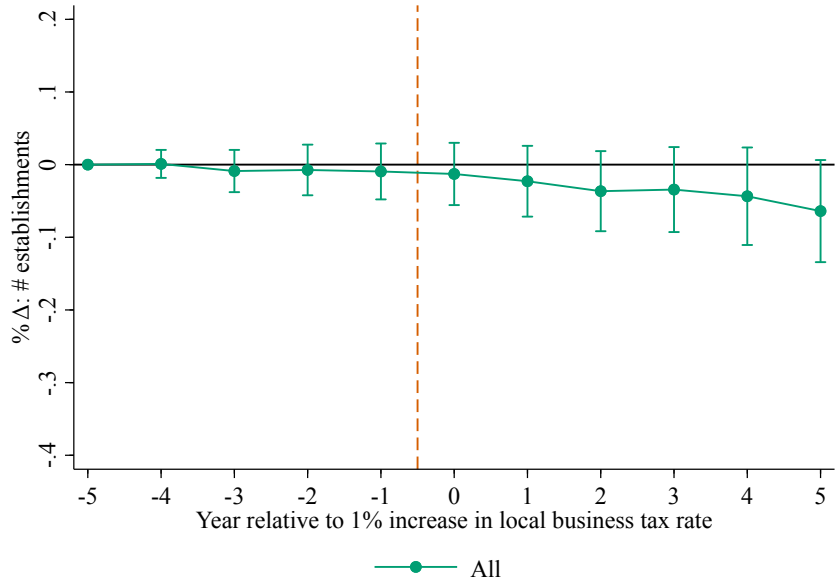
(d) In tradable sector: all

Figure 5: Effect of 1% increase in local business tax composition of establishment exit

Note: Figure depicts the cumulated coefficients from the distributed lag regression (1), $\hat{\beta}_k = \sum_{t=-4}^{k} \hat{\delta}_t$ with $k \in \mathcal{K} = \{-4, -3, -2, -1, 0, 1, 2, 3, 4, 5\}$ and with $\hat{\beta}_{-5} = 0$, using shares of corporate and all exits that have certain attributes as outcomes. Panels (a) and (b) depict estimates using the share of entrants that are small (<3 workers) as an outcome. Panels (c) and (d) depcit estimates using the share of entrants that survive to t+1 as an outcome. Panel (e) and (f) depict the estimates using the share of entrants that are in the tradable sector as an outcome. Note that changes are measured in percentage points. Standard errors are clustered at the municipality level. The regression controls for labormarket-region-by-year fixed effects. The sample consists of municipalities with at least 3 corporate entrants and exits each year. Observations are weighted by the median number of workers in the MSA between 2002-2012.
Source: RDC of the Federal Statistical Office and Statistical Offices of the Laender, AFiD-Panel Unternehmensregister - System 95, Berichtsjahre 2002-2012, own calculations.



(a) Corporate and Unincorporated

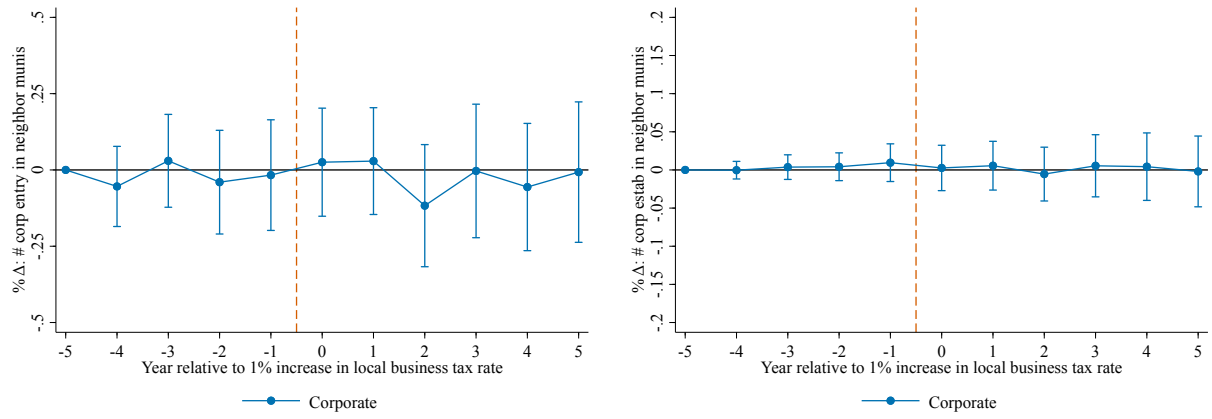


(b) All

Figure 6: Effect of 1% increase in local business tax on number of establishment

Note: Figure depicts the cumulated coefficients from the distributed lag regression (1), $\hat{\beta}_k = \sum_{t=-4}^{k} \hat{\delta}_t$ with $k \in \mathcal{K} = \{-4, -3, -2, -1, 0, 1, 2, 3, 4, 5\}$ and with $\hat{\beta}_{-5} = 0$, using counts of corporate, unincorporated, and total establishments as outcome variables. The estimates from the pre-reform period, $\{\hat{\beta}_k\}_{k<0}$, indicate the percent change in the number of entries between 5 periods prior to a 1% tax increase and periods prior to the tax increase whereas the estimates from the post reform period,$\{\hat{\beta}_k\}_{k\geq 0}$, indicate the percent change in the number of entries between 5 periods prior to a 1% tax increase and periods post the tax increase. Standard errors are clustered at the municipality level. The regression controls for labormarket-region-by-year fixed effects. The sample consists of municipalities with at least 3 corporate entrants and exits each year. Observations are weighted by the median number of workers in the MSA between 2002-2012.

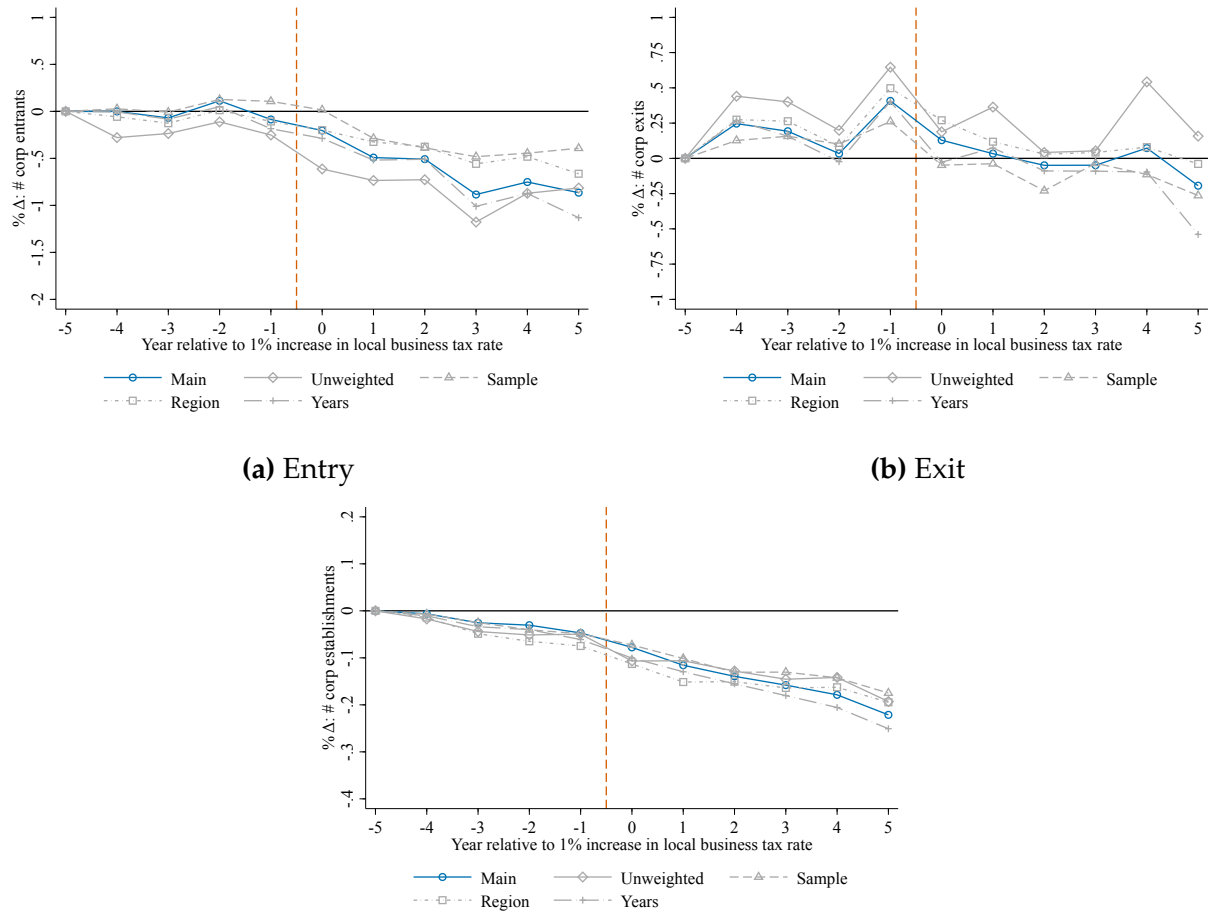
Source: RDC of the Federal Statistical Office and Statistical Offices of the Laender, AFiD-Panel Unternehmensregister - System 95, Berichtsjahre 2002-2012, own calculations.



(a) Entry **(b)** Establishments

Figure 7: Effect of 1% increase in local business tax on number of establishment and entry in other municipalities within same county

Note: Figure depicts the cumulated coefficients from the distributed lag regression (1), $\hat{\beta}_k = \sum_{t=-4}^{k} \hat{\delta}_t$ with $k \in \mathcal{K} = \{-4, -3, -2, -1, 0, 1, 2, 3, 4, 5\}$ and with $\hat{\beta}_{-5} = 0$, using counts of corporate establishments and entrants in other municipalities within the same county as the municipality with the tax change as outcome variables. The estimates from the pre-reform period, $\{\hat{\beta}_k\}_{k<0}$, indicate the percent change in the number of entries between 5 periods prior to a 1% tax increase and periods prior to the tax increase whereas the estimates from the post reform period,$\{\hat{\beta}_k\}_{k\geq 0}$, indicate the percent change in the number of entries between 5 periods prior to a 1% tax increase and periods post the tax increase. Standard errors are clustered at the municipality level. The regression controls for labormarket-region-by-year fixed effects. The sample consists of municipalities with at least 3 corporate entrants and exits each year. Observations are weighted by the median number of workers in the MSA between 2002-2012. *Source*: RDC of the Federal Statistical Office and Statistical Offices of the Laender, AFiD-Panel Unternehmensregister - System 95, Berichtsjahre 2002-2012, own calculations.



(a) Entry **(b)** Exit

(c) Establishments

Figure 8: Effect of 1% increase in local business tax on number entry, exit and number of establishments: robustness

Note: Figure depicts the cumulated coefficients from the distributed lag regression (1), $\hat{\beta}_k = \sum_{t=-4}^{k} \hat{\delta}_t$ with $k \in \mathcal{K} = \{-4, -3, -2, -1, 0, 1, 2, 3, 4, 5\}$ and with $\hat{\beta}_{-5} = 0$, using counts of corporate entrants, exits and establishments within a municipality as outcome variables. The estimates from the pre-reform period, $\{\hat{\beta}_k\}_{k<0}$, indicate the percent change in the number of entries between 5 periods prior to a 1% tax increase and periods prior to the tax increase whereas the estimates from the post reform period,$\{\hat{\beta}_k\}_{k\geq 0}$, indicate the percent change in the number of entries between 5 periods prior to a 1% tax increase and periods post the tax increase. Standard errors are clustered at the municipality level. The main speicification controls for labormarket-region-by-year fixed effects, is based on the set of municipalities with at least 3 corporate entrants and exits each year, and weights observationsby the median number of workers in the MSA between 2002-2012. The 'unweighted' specification weights each observation equally. The 'sample' specification is based on the set of municipalities with at least 1 corporate entrant and exit each year. The 'region' specification controls for governmental-district-by-year fixed effects (there are on average 289 municipalities in each district as oposed to 43 in each labor market region). The 'year' specification drops the first year of the data the regressions are based on (2003 for establishments, 2005 for entry, 2003 for exit).
Source: RDC of the Federal Statistical Office and Statistical Offices of the Laender, AFiD-Panel Unternehmensregister - System 95, Berichtsjahre 2002-2012, own calculations.