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Do governments tax agglomeration rents?

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ABSTRACT

Empirical evidence suggests that firms receive rents from locating in economic agglomerations and industry clusters. Using the German local business tax as a testing ground, we empirically investigate whether these agglomeration rents are taxable for local governments. The analysis exploits a rich data source on the population of German plants to construct measures for the communities' agglomeration characteristics. The findings indicate that economic agglomerations and industry clusters exert a positive impact on the jurisdictional tax rate choice. Further analysis moreover suggests that a municipality's potential to tax agglomeration rents depends on its firm and industry agglomeration *relative* to neighboring communities. To account for potential endogeneity problems, our analysis exploits long-lagged population and infrastructure variables as instruments for the agglomeration measures.

1. Introduction

Standard models on interregional corporate taxation predict that capital mobility across jurisdictional borders deteriorates the ability of governments to collect corporate tax revenues. Precisely, with mobile capital, jurisdictions have an incentive to lower their tax rate in order to attract the mobile capital base, which leads to a race-to-the-bottom in corporate tax setting behavior (see for example Zodrow and Mieszkowski, 1986; Wilson, 1986).

This prediction is challenged by the economic geography literature which argues that firms obtain rents from locating close to other corporations in economic and industry clusters. These agglomeration economies reduce the interregional mobility of capital and allow agglomeration-hosting governments to set a high corporate tax rate without triggering an immediate capital outflow even if capital is in principle highly mobile (see Ludema and Wooton, 2000; Andersson and Forslid, 2003; Baldwin and Krugman, 2004; Borck and Pflüger, 2006).

Empirical evidence on the relevance of this argument is however scarce at best. Although a small set of papers suggests that the sensitivity of firm location to corporate taxes diminishes in the presence of agglomeration economies (Devereux et al., 2007; Brülhart et al., 2012; Jofre-Monseny and Solé-Ollé, 2012), the literature has so far largely neglected to assess whether "policy makers [...] effectively seek to tax agglomeration rents, and whether this [agglomeration] effect is strong enough to have a noticeable impact on the evolution of statutory corporate tax burdens" (Brülhart et al., 2012).

Our paper contributes to close this gap and empirically tests for an impact of agglomeration economies on the corporate tax rate choice. We exploit the local business tax rate in Germany (*Gewerbesteuer*) as a testing ground and use a unique data set on the population of German plants to construct agglomeration measures for German communities. Our findings are in line with the prediction from the economic geography literature and suggest that economic and industry agglomerations exert a statistically significant and quantitatively large impact on the local business tax choice.

The paper starts out with a brief section on theoretical considerations to receive guidance for the specification of our empirical framework. Theoretical models predict that corporate *urbanization* and *localization* economies (i.e. corporate benefits from locating close to economic agglomerations and industry clusters respectively, see Rosenthal and Strange, 2004) dampen the mobility of firms and raise the optimal corporate tax rate chosen by the agglomeration-hosting jurisdiction, which thus captures a fraction of the associated corporate agglomeration rents. Moreover, the jurisdictions' ability to tax agglomeration rents is suggested to depend on its agglomeration characteristics *relative* to neighboring regions. Precisely, if a neighboring community hosts a comparable economic agglomeration or industry cluster, the community's

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position to capture the agglomeration rents is reduced as it does not provide a locational benefit *relative* to its neighbor.[1]

The theoretical predictions are tested using a rich data set which links information on the German municipalities' local business tax to measures for economic and industry agglomerations in Germany between 1999 and 2007. For the construction of the agglomeration measures, we use annual data on the population of German plants. Following previous studies, urbanization is captured by the overall number of workers in a jurisdiction. For the construction of the localization measure, we use our plant level information to identify four-digit industries with significant geographical clustering following Duranton and Overman (2005). Based on this information, we define community-specific localization measures which account for the municipality's number of workers in the localized four-digit industries, the fraction of the localized industries' employment hosted by the community and the industry-specific importance of externalities that arise through industrial clustering.

Our estimation results suggest that both, urbanization economies and localization economies, exert a positive impact on the jurisdictions' tax rate choice. The effects are statistically significant, quantitatively large and appear across a wide range of specifications, in which we use alternative variables to capture localization economies. Our preferred estimates suggest that doubling the overall number of employees increases the local business tax by around 1.3%, while doubling the number of employees in *localized* industries raises the local business tax by around 4.0% on average.

Moreover, we evaluate the impact of a municipality's *relative* firm and industry agglomeration compared to its geographical neighbors on the local business tax choice. Our regression results indicate that these relative agglomeration variables are a strong predictor of the jurisdictional local business tax choice and explain more variation in the tax rate than the communities' own agglomeration characteristics. This suggests that the ability to tax agglomeration rents is restricted if neighbors host economic clusters or comparable sectoral agglomerations.[2]

All our results furthermore turn out to be robust against the inclusion of a large set of control variables that capture differences in primary nature characteristics (e.g. the quality of soil and the proximity to rivers, mountains and the sea), the communities' demographic composition, budgetary situation and public good provision. Moreover, our estimation approach takes into account that neighboring communities may be hit by correlated shocks and that we might face reverse causality problems as the local business tax rate choice may simultaneously affect firm and industry agglomeration in a municipality. To overcome the latter identification problem, we employ an instrumental variable (IV) approach which relies on long-lagged historical population data and on historical information on railway connections from the time prior to the introduction of local business taxation in Germany.

Our paper is closely related to the empirical literature on agglomeration economies. Contributions in this area usually find a positive effect of geographical agglomeration on worker productivity (Henderson, 1986, 2003; Combes et al., 2007) and economic growth (Glaeser et al., 1992; Henderson et al., 1995), thus providing evidence for the existence of agglomeration economies. A subset of papers moreover analyzes the relative impact of urbanization and localization on corporate productivity. Using data for Japan, Nakamura (1985) for example shows that doubling city population as a proxy for urbanization increases firm productivity by 3.4% on average while doubling the industry scale (i.e. the city's number of workers in a certain industry) as a proxy for localization increases firm productivity by 4.5%. Similar results are reported in Moomaw (1983), Henderson (2003), Rosenthal and Strange (2003), whereas especially localization rents are found to be quantitatively relevant.

As described above, incorporating agglomeration economies in a tax competition model predicts that agglomeration rents dampen the mobility of firms and capital across borders, which allows governments to set higher tax rates. Empirically, the impact of agglomeration economies on the governmental tax rate choice is largely unexplored though. Two exceptions are Büttner (2001) and Charlot and Paty (2007) who link region size, as proxied by population and aggregated income levels, to the tax rate choice of local jurisdictions. Both papers, however, neglect urbanization and localization economies in the firm dimension and do not account for the importance of relative agglomeration characteristics compared to neighboring communities. Furthermore, they do not address potential identification problems caused by reverse causality, a problem that we circumvent in our analysis by using an IV approach.[3] Additionally, as appropriate control variables are commonly missing, a positive link between jurisdiction size and corporate taxes may partly capture differing financing needs and public good provision costs of small and large jurisdictions. Our analysis accounts for this and focusses on determining the impact of *industry localization* on the local business tax choice (conditioned on community size) as the localization measures are plausibly not prone to such concerns and are thus better suited to identify agglomeration effects on tax setting behavior. The focus on the empirical identification of localization effects also helps to circument an issue raised in a recent working paper by Luthi and Schmidheiny (2012) who argue that a positive empirical link between location size and local business tax choices may reflect the taxation of urbanization rents as well as asymmetric tax competition.[4] Using Swiss data, the authors explicitely differentiate between the two mechanisms by distinguishing effects related to the economic and political size of locations on business tax rate choices.

The rest of the paper is structured as follows: In Section 2, we discuss the main theoretical hypotheses underlying our empirical work. Sections 3 and 4 describe the data set and the estimation strategy. The estimation results are presented in Section 5. Section 6 concludes.

2. Theoretical considerations

The purpose of our analysis is to determine the effect of agglomeration economies on a jurisdiction's local business tax choice. In order to receive guidance for the specification of our empirical

[1] Our empirical analysis will define neighboring jurisdictions according to geographical proximity. For geographically very close neighbors, the described effect may be dampened by positive spillovers and agglomeration effects which prevail across jurisdictional borders. This may make the community's tax base less elastic with respect to other locations in the periphery (as firms benefit from staying close to big neighbors) and may thus exert a positive impact on the jurisdictional tax rate choice.

[2] In robustness checks, we moreover decompose the relative agglomeration measure in the community's own agglomeration characteristics and the average agglomeration characteristics of geographically close neighboring jurisdictions. In line with the results for the relative agglomeration variables, we find that economic agglomerations and comparable industry clusters in neighboring communities generally tend to dampen the local business tax. Agglomeration characteristics of direct geographical neighbors in very close proximity have a positive effect on the business tax though which may reflect that positive agglomeration externalities prevail across jurisdictional borders within very short geographical distances (see e.g. Rosenthal and Strange, 2004).

[3] Note that our analysis largely focuses on agglomeration economies which arise through the geographical clustering of firms. Nevertheless, our results are unaffected by the inclusion of a control variable for the consumer market access.

[4] The asymmetric tax competition literature proposes that smaller countries set lower tax rates because the marginal product of capital and the elasticity of capital with respect to the business tax rate is higher than in larger countries (see e.g. Bucovetsky, 1991).