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Does tax competition drive cooperation in local economic development policies?

Evidence on inter-local business parks in Germany

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Abstract

An increasing number of municipalities cooperates in the field of economic development. In this paper, we focus on a specific instrument in this field, namely the development of joint business parks. We apply a hazard model to data from West-German municipalities between 2000 and 2015. We find inter-local business parks to be more frequent among small municipalities and in constellations where suitable land is scarce. Our main focus rests on the role of tax competition. An analogy building on the literature on international tax coordination supports the hypothesis that inter-local business parks are more likely in regions where tax competition is intense. The evidence is affirmative: We find that the likelihood of inter-local business park formation to increase in the intensity of local tax competition.

Key-words: Inter-local business parks, inter-municipal cooperation, tax competition, hazard model, Germany

JEL: H77, H71, R58, R14

1. Introduction

Attracting firms is an important objective of local governments because local firms provide jobs for their residents and generate local tax revenues (e.g., Peddle, 1990; Büttner, 2016). Many municipalities develop strategies of local economic development to provide an economic environment that attracts firms. One essential element of this type of strategy is to provide attractive land for business settlements (e.g., Taylor, 1992). Here, local governments face a trade-off. On the one hand, they can benefit substantially from developing business parks jointly with neighboring jurisdictions. This cooperation allows them to exploit economies of scale, pool the risk associated with under-utilization and internalize spillovers (e.g., Oates and Schwab, 1988). On the other hand, these neighboring jurisdictions are competitors in the struggle to attract capital. Offering a business park that is better than the one in the neighborhood or finalizing it earlier may attract substantial amounts of capital – also from these neighboring jurisdictions (e.g. Taylor, 1992). Our paper takes this trade-off as its starting point.

There is a large body of literature on inter-municipal cooperation (e.g., Feiock and Scholz, 2009; Bel and Warner, 2016). So far, however, very few studies focus on cooperation in economic development. Feiock et al. (2009) spell out the potential gains that municipalities especially in metropolitan areas can generate when cooperating in this field. Among other things, these include a higher visibility and the possibility to provide higher quality infrastructure. Using data from a survey among development officials in US cities, Feiock et al. (2009) show that economic development joint ventures are more frequent in constellations in which these joint ventures can operate with low transaction costs. In addition, they find cooperation to be more likely in cities where economic development is considered critical.

In this paper, we focus on the role of tax competition in facilitating cooperation in economic development. Specifically, we focus on the development of joint (inter-local) business

parks. Business parks generally encompass a large entity of land specifically dedicated to commercial and/or industrial activities of several firms (Peddle 1990).[1] Our main hypothesis states that inter-local business parks are more likely to emerge in municipalities exposed to more intense competition for capital and qualified labor. The rationale builds on the economic theory of cartels (e.g., Levenstein and Suslow, 2006) and international tax coordination (e.g. Keene and Konrad, 2013). In the context of inter-local business parks, it reads as follows: Inter-local business parks may serve as local cartels that earn the cooperating municipalities more bargaining power and reduce the intensity of intra-regional competition. The more intense the intra-regional competition is, the more relevant are the potential gains from collusion and thus the larger the incentives to develop business land jointly with others.

We test this hypothesis using data on inter-local business parks in Germany developed between 2000 and 2015. German municipalities are a highly suitable testing ground. First, they have the competence to decide how much land is to provide for business settlements. Unlike in some other countries like the US, German municipalities not only regulate land-usage but usually develop it before it is sold to firms. Hence, public financing is common. Second and more importantly, German municipalities collect revenues from local business and land taxes and they are entitled to set the tax rates for both taxes. Economic theory predicts that regions with intense competition for mobile firms apply low tax rates to the mobile tax base (business profits) while simultaneously applying high tax rates to less mobile bases (real estate). Thus, the institutional settings in Germany allow for a very direct way to measure the intensity of tax competition and test the above hypothesis.

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[1] The term business parks covers entities of land devoted to business purposes regardless of the specific industry settling there (including industry parks and parks dominated by retail traders, craftsmen etc.)

To the best of our knowledge, the question whether tax competition fosters inter-municipal cooperation has not been raised in the literature, nor has it been tested. Thus, our paper breaks new grounds. The results strongly support our hypothesis: We find inter-local business parks to be more likely to emerge among municipalities that – other things equal – have low business tax rates and high land tax rates. This result remains stable over a wide range of econometric specifications. We control for many other factors that have the potential to drive the emergence of joint business parks. In line with the previous literature on inter-municipal cooperation, we find joint business parks to be more frequent among small municipalities. We also find evidence supporting the notion that inter-local business parks serves as an instrument to solve the problem of land scarcity. Furthermore, cooperative agreements are less likely in election years.

Section 2 reviews the existing literature before section 3 presents our main hypothesis. In section 4, we introduce the institutional framework. Section 5 describes the data. Method and results are presented in section 6. Section 7 discusses the results before section 8 concludes.

2. Review of literature

2.1 Inter-local competition

Economic theory takes it that local governments compete for mobile businesses and firms (e.g. Oates and Schwab, 1988; Boyne 1996). Classical location theory emphasizes the relevance of access to markets, transportation and/or raw materials (e.g., Dawkins 2003) while new economic geography emphasizes the importance of existing agglomerations in attracting new capital (e.g., Borck and Pflüger, 2006). From the perspective of a single municipality trying to attract firms, most of these factors are difficult to change. On the other hand, there are a number of factors such as education or tax policies that are controlled by local governments and thus

may serve as instruments in the inter-local competition for firms (e.g. Blair and Premus 1987; Oates and Schwab 1988; Wolkoff 1992).

The existing literature places a special focus on the role of local (business) taxes. The seminal paper by Zodrow and Mieskowski (1986) and a large number of theoretical papers building on them (e.g., Wilson, 1999) show that municipalities will set low tax rates for the mobile factor and high tax rates for immobile factors (typically land and labor).[2] The largest bulk of the empirical studies on tax-setting behavior show that local tax rates are spatially correlated – thus supporting the notion of tax mimicking among local governments (e.g. Revelli 2001; Allers and Ellhorst 2005).[3]

Taylor (1992) analyzes the role of infrastructure investments in attracting mobile capital. He argues that time is the main strategic variable: Municipalities can increase the chance of attracting firms if they are faster in providing the necessary infrastructure than their competitors. Jayet and Paty (2006) build a two-stage model of inter-local competition. In stage 1, the municipalities build infrastructure before they compete using tax rates in stage 2. Their model explains why we often see an overprovision of land devoted to business purposes (see also Dembour and Wauthy, 2009). After setting up a theoretical model, Büttner (2016) uses data from Germany to analyze the relationship between tax competition and amount of land that municipalities dedicate for commercial purposes. Exploiting institutional characteristics of the

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2 Besley and Case (1995) show that low tax rates on mobile factors can also result from yardstick competition among municipalities.

3 The stability of this regularity has recently been challenged by a number of studies that use quasi-experimental methods (e.g., Baskaran 2014).

fiscal redistribution system, he finds that municipalities which are exposed to more intense tax competition due to lacking equalization grants provide a higher amount of commercial land.

2.2 Inter-municipal cooperation

The second strand of literature deals with inter-municipal cooperation (IMC). IMC is widespread in many industrialized countries and covers a wide spectrum of municipal activities (Hulst et al. 2009; LeRoux et al. 2010). Over the last 20 years, scholars mostly from public administration have compiled a large body of empirical studies on the emergence of IMC (see Bel and Warner, 2016 for an excellent review of literature). Some studies focus on municipal characteristics and how they shape the expected gains from IMC – showing that especially small and fiscally weak municipalities are more likely to cooperate (e.g., Warner and Hefetz 2002; Bel et al. 2013; Schoute et al. 2017).

Pioneered by Richard Feiock and co-authors, the Institutional Collective Action approach illustrates that negotiating, implementing and controlling IMC-contracts entails substantial transaction costs (e.g., Feiock and Scholz 2009). Empirical studies following this logic show that municipalities with similar characteristics are more likely to cooperate (e.g., Feiock et al., 2009). Furthermore, pre-existing political networks are found to promote IMC (e.g., LeRoux et al., 2010). The applicability of the Institutional Collective Action approach to the field of joint economic development has been empirically confirmed in a number of papers that investigate the formation conditions of such cooperation in US (metropolitan) areas (e.g., Feiock et al. 2009, Feiock et al. 2012, Hawkins 2010, Hawkins 2017).

Few studies have investigated the emergence of IMC in Germany. Bergholz (2018) focusses on IMC in tourism marketing while Bischoff and Wolfschütz (2019) analyze IMC in administrative services. Using the same survey among German municipalities, they both find IMC to be more likely among small municipalities. Bischoff and Wolfschütz (2019) also find

population decline to be an important driver of IMC-arrangements while IMC-agreements are less frequent in election years. Wuschansky and König (2006) conducted a survey among German municipalities involved in inter-local business parks: The respondents state that inter-local business parks are most frequently motivated by the particular suitability of piece of land situated at the municipal border. Other factors include strategic development goals, financial straits or the shortage of land in at least one participating community.

2.3 Tax coordination

Let us now turn to the intersecting set of the studies on inter-local (tax) competition and on IMC. Di Liddo and Giuranno (2016) provide a theoretical model showing that local governments can impair inter-local competition through IMC. They argue that governments interested in extracting rents make use of IMC because this increases the amount of extractable rents without reducing the probability of re-election. While rent extraction is unlikely to play a major role in business parks, the main logic of Di Liddo and Giuranno (2016) clearly applies to business parks: Inter-local business parks may serve as a means to take the bite out of intra-regional competition for mobile capital.

In the literature on international tax competition, one central question asks for obstacles to tax coordination. Very generally, the existing studies point at limits in the enforceability of tax agreements and at the fact that tax rates are just one among many instruments in the competition for mobile capital. The literature also shows that tax coordination is more difficult among heterogeneous jurisdictions because the outsider position is particularly interesting for small jurisdictions with large neighbors (e.g. Keen and Konrad 2013). Drawing analogies from the literature on cartels (e.g. Levenstein and Suslow, 2006), the likelihood of successful tax coordination can be increased if jurisdictions are organized in associations because these facilitate surveillance and side-payments and provide a platform to punish defectors (see Feuerstein, 2005).

Only very few papers relate IMC to tax setting behavior. Breuille et al. (2018) analyze the impact of IMC on local taxation. They show that the membership in the French "Establishments for inter-municipal cooperation" increases municipal tax rates. Büttner and von Schwerin (2016) explore the fact that a strikingly large number of German municipalities apply exactly the same tax rate. They argue that this tax bunching is an indication of partial tax coordination, though they do not provide any empirical evidence to back this hypothesis. Blesse and Martin (2016) analyze the tax setting behavior of municipalities in the German state North Rhine-Westphalia and find more intense tax interactions among municipalities located in the same county or administrative district (Regierungsbezirk) or covered by the same local newspaper. While these studies indicate that tax coordination takes place where there are networks or organizations of inter-local interaction, they do not test for the role of tax competition in the establishment of these networks or organizations. This is where our paper comes in.

3. Main Hypothesis

Consider the government in a certain municipality m. Assume that it wants to maximize expected business tax revenues net of business-related expenditures. The government may share this objective with the local electorate if tax competition is too intense. And even if this condition does not apply, it is in the interest of the local governments to reduce the intensity of tax competition, because this increases their propensity to generate tax revenues and increase expenditures without burdening the local median voter (e.g. Aidt et al, 2011). To achieve its aim, the government can either change the tax rate or improve the quality of firm-related infrastructure. The latter can be achieved by improving the quality of the existing land or by developing new land for business activities. New business land can either be developed individually or jointly with neighboring municipalities. The expected return from these investments is larger the higher the business tax rate – other things equal.

The literature on tax coordination and collusion sketched above shows that pre-existing organizational structures and institutional platforms facilitate effective tax coordination. By establishing an inter-local business park, municipalities create an institutional platform that facilitates inter-local tax coordination in the future. This effect cannot be reached by improving the infrastructure in existing business parks or by establishing its own business park. While an improved quality of infrastructure opens up some leeway to increase business taxes without expelling firms, this leeway is larger in a coordinated move with neighboring municipalities. This leads to our main hypothesis:

Hypothesis H1:

The more intense the intra-regional tax competition, the more likely municipalities are to form a joint business park.

Another point adds to this argument: When installing a joint business park, municipalities must agree on a common quality of infrastructure and timing of land development. Thereby, they commit themselves not to circumvent a possible agreement on tax coordination by shifting the competition to the field of infrastructure quality or the time of finalizing it. It is important to note that the potential benefits are likely to be regionally limited in scope. In other words, inter-local business parks may help to reduce *intra*-regional competition but are unlikely to have any effect on *inter*-regional competition. Thus, it is the intensity of tax competition within the region that defines the incentives to provide business parks jointly.

4. Institutional background

We use data on West-German municipalities between 2000 and 2015 to test the above hypothesis. East-Germany is excluded because it went through fundamental regional reforms that prevent the use of long panel data sets. German municipalities provide important public services like local roads, business parks, cultural infrastructure and pre-school childcare. They

account for approximately 20 percent of overall government expenditures (Zimmermann, 2009: 93-99). While having to fulfill minimum standards set by upper-tier governments, German municipalities have considerable leeway when choosing quality and quantity of many important public tasks and services such as economic development. More than 50 percent of municipal revenues come from state grants and vertical tax sharing. The largest part of state grants are unconditional grants distributed through a formula-based fiscal equalization system. It gives more grants per capita to fiscally weak municipalities without fully eliminating differences in fiscal capacity (e.g., Büttner, 2016).

The local business tax is the most important endogenous source of municipal revenues accounting for more than 18 percent of revenues in West-Germany in 2017. Municipalities decide about the effective rate on the profits of local business establishments. Specifically, they set a so-called tax multiplier that is applied to a unified tax base. A multiplier of 400 is equivalent to a tax burden of 14 percent. Similarly, they determine the tax multipliers and receive the revenues from local land taxes (e.g. Bischoff and Krabel 2017). The so-called land tax A is imposed on agricultural and forested land while land tax B burdens developed real estate and buildable ground. In 2017, both sum up to 5.7 percent of average municipal revenues (West-Germany). Around 96 percent of the land tax revenues stem from land tax B. Table 1 provides descriptive statistics for the tax multipliers in West German municipalities for business and land tax B. There is substantial variation across space and time. On average, both multipliers increase in the period of observation.

[Table 1]

German local governments have the power to regulate the use of land within its borders. The German land-use regulation system rests on the principle of functional zoning and – in its basic mechanism – resembles other systems such as land zoning in the US (e.g. Hirt, 2012). The municipalities develop plans of land-usage in which they legally dedicate land to specific

purposes (Hirt, 2012). Changes in the plans for land-usage must pass the municipal council and need approval by a upper-tier administration. The main categories of land-usage are residential, agricultural, commercial/industrial purposes and natural reserves. Firms are only allowed to operate on land which is dedicated to business activities. This creates a direct link between the provision of commercial land and tax revenues on the local level (Büttner, 2016). Table 1 shows that most municipalities (5591 of 8394) have increased the share of land dedicated to business purposes between 2000 and 2015 (on average by 0.67 percentage points).

The provision of commercial land is an (if not the most) important instrument for promoting local economic development for German municipalities (Lehmann-Grube and Pfähler, 1998). Unlike in some other countries where the development of commercial land tends to be carried out by private sector companies, German municipalities actively develop business land. They acquire suitable land from its owners (if not already owned by the municipality), develop it, conduct marketing and sale activities and take over ongoing management and/or maintenance tasks.[4] This makes the development of business land an expensive endeavor with inherent risks for the municipality. If business parks fail to attract firms, municipalities must still bear the costs.

In an increasing number of cases, business parks are developed jointly by two or more municipalities. The municipalities participating in these inter-local business parks generally settle their agreements in a formal contract. It settles the land allocation as well as fiscal aspects:

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[4] Some small businesses, service providers and retail traders are situated in mixed zones that allow for certain business activities and housing in the same quarter. At the same time, firms from most other sectors, especially from manufacturing, wholesale and logistics, as well as large parts of the retail trade sector are located in special business parks. In the last decades, German municipalities provide additional commercial land almost exclusively in the form of business parks.

Municipalities agree on the division of both development costs and local tax revenues from the joint business park. Often, costs and revenues are divided between the participants accordingly, e.g. a municipality that bears 20 percent of the costs also receives 20 percent of the tax revenues.

5. Data

There is no official data on inter-local business parks in Germany. We collect data on joint business parks from various sources. Data was extracted 1) from an extensive study on German joint business parks by Wuschansky and König (2006), 2) from official data on municipality owned enterprises, 3) from official data on administrative unions, 4) from federal commercial estate databases and 5) - to identify outliers - supplementary internet searches using keywords.[5] Given the complementary approach of our data collection, we are confident to having constructed a complete data set of joint business parks in Germany.[6] For every joint business park, we know which municipalities participate in it and we know the year in which the contractual agreement between the participants was signed. Finally, we gather information about which of the cooperating municipalities provide land for the business park (so-called situs municipality).

[Figure 1 & 2]

5 Since municipalities publicly market free commercial areas, a web-search is much more convenient than in other fields of IMC, where the information about IMC is only made available via local channels.

6 The data on joint business parks is complemented by a wide range of official municipal level data provided by the Regional Database of the German Federal Statistical Office and the statistical Offices of the Länder. Further data on the Germany highway network was kindly provided by Leibniz Institute of Ecological Urban and Regional Development (http://autobahn.ioer.info/).

In total, we have identified 180 joint business parks as of December 2017 involving 570 participating municipalities (approximately 6,5 percent of West German municipalities). There has been a general increase in joint business parks which intensified during the 1990s. Figure 1 depicts how many municipalities have started a joint business parks between 1970 and 2015. Figure 2 maps the involved municipalities across Germany. It becomes clear that joint business parks are not spread equally across Germany. Most notably, there is much more cooperation in Western and South-Western regions.

Most inter-local business parks encompass two cooperating municipalities (95 cases; 53 percent). In 43 cases, three municipalities are involved. Business parks with four or more partners are rare (cf. Figure 3). Slightly more than half of the inter-local business parks are cross-boundary in nature (at least two municipalities contribute land) while intra-boundary inter-local business parks (only one land donor) comprise about 44 percent of the cases.

[Figure 3]

Our main hypothesis states that the intensity of intra-regional tax competition drives the emergence of joint business parks. Two decisions have to be made when developing a measure for intra-regional tax competition. First, we have to decide about the boundaries of the relevant intra-regional market on which municipality m is competing with other municipalities for firm settlements. Following the studies on spatial interaction in local tax-setting behavior (e.g., Bischoff and Krabel, 2017), we will use the cluster of municipality m and its direct neighbors, i.e. municipalities that share a common border with m. Second, we have to decide which measure best captures the intensity of intra-regional competition within this cluster. Following the basic logic of the tax competition literature (see section 2.1), we use the multiplier of the local business tax as well as the multiplier of the local land tax (B). Economic theory predicts that municipalities facing intense competition for mobile capital will impose low taxes on capital and high taxes on land (e.g., Wilson, 1999). Building on this logic, we use these two tax rates as

proxies for the intensity of tax competition: The intensity of tax competition is high if the business tax rate is low and the land tax rate is high. Consequently, hypothesis H1 translates as follows: Joint business parks are more likely to emerge in local clusters with high business and low land tax rates.

[Table 2]

We introduce numerous control variables. First, we account for the fact that municipalities may be limited in the availability of suitable land and thus the ability to develop new business parks. In these municipalities, the incentives to join an inter-local business parks are high (e.g., Wuschansky and König 2006). Other things equal, the scarcer suitable land is in municipality m, the more likely it is to develop a business park jointly with other municipalities. In addition, the availability of land among the potential cooperation partners is likely to have a moderating effect on the probability of a municipality with land scarcity to develop a business park jointly with other municipalities. In particular, joint business parks may be more likely to emerge in constellations where municipality m and its neighboring municipalities differ in the availability of suitable land – other things equal. Thus, we first introduce the dummy variable "land_scarce". It takes on the value 1 if the share of land available for development (captured by land currently used in farming and forestry) in m is below the median of all municipalities (0 else). Second, we introduce the number of neighboring municipalities for which the corresponding share is larger than the median. Finally, we interact the latter variable with the dummy variable "land_scarce".

We also control for the availability of a good transport connection in municipality m and its neighbors. Transport connection is regarded as a major location factor (e.g., Meinel et al., 2007; Möller and Zierer, 2018) and hence an essential factor determining the quality of business parks. We capture the availability of a transport connection in municipality m using a dummy variable that takes on the value 1 if there is a motorway junction within the jurisdictional borders

of m (0 else). To account for the transport connections in municipality m's neighbors, we introduce the number of neighboring municipalities with a motorway junction on their territory.

Next, we control for variables that have been found to drive IMC in earlier studies. These studies suggest that municipality's m inclination to start IMC is driven the its fiscal situation and size (Ferris and Graddy, 1988; Garrone and Marzano, 2015; Di Porto et al., 2016). The impact of municipal size is captured by the logarithm of the total number of citizens. We measure fiscal capacity by per capita tax revenues from vertical tax sharing generated by the observed municipality. The tax revenues from business and land taxes are excluded to avoid endogeneity issues. To account for the situation in municipality m's neighbors , we also include the spatial lags, more precisely the median value for logarithmic population size and fiscal capacity among municipality m's neighbors. A dummy variable marks urban clusters. It takes on the value 1 in all cases where municipality m or one of its neighbors has more than 100.000 inhabitants.

We control for the share of seats in the municipality m's council held by "local initiatives" (including free voters associations) and by the Christian democrats (CDU). To accommodate the Institutional Collective Action approach, we control for similarities in citizens' tastes between municipality m and its potential partners by introducing the number of neighboring municipalities that have the same strongest party in the local council as municipality m (e.g. Feiock, 2007; LeRoux and Carr, 2007; Bel and Warner, 2016; Bergholz, 2018). Furthermore, we include the share of neighbors that are similar to municipality m in their age composition; a neighbor is considered similar if the share of inhabitants younger than 18 years deviates by less than 10 percent from that in municipality m. On average, slightly more than half of the neighboring municipalities qualify as similar in this respect. We control for possible timing effects of IMC-agreements in the election cycle by introducing a dummy variables for the election year

(e.g., Bischoff and Wolfschütz, 2019). Finally, we use dummies indicating whether municipality m is located at a county border. Cities with county rights are marked by a separate dummy. State dummies are used to control for all time-invariant institutional differences, e.g. in the degree of decentralization and in the fiscal equalization system. Except for the political measures and geographical variables, all independent variables are lagged by one year to avoid a simultaneity bias.

6. Empirical Analysis

6.1 Empirical Strategy

Previous studies on IMC in Germany show that IMC agreements – once reached – are very rarely resolved (e.g., Rosenfeld et al., 2016). When it comes to joint business parks, it is even more costly to resolve the cooperation than e.g. in the field of construction yards or administrative services. Within our sample, only one municipality decided to exit a joint business park arrangement. Thus, the incident that requires explanation is the decision to *install* a joint business park.

An adequate empirical method to analyze the emergence of such an incident is a hazard model (Chen et al. 2016; Bergholz, 2018; Bischoff and Wolfschütz, 2019). Municipalities that start cooperating in t are dropped from the analysis in t+1. This draws a clear line between starting cooperation and continuing cooperation after t. Following Allison (1982), the discrete-time hazard rate is defined as the conditional probability of municipality m cooperating in time t given that it did not cooperate before.

$$P_{mt} = \Pr[T_m = t \mid T_m \geq t, x_{mt}] \tag{1}$$

Solving the corresponding discrete-time hazard function provides the complementary log-log function (Allison, 1982):

$$\log[-\log(1-P_{mt})] = \alpha_t + \beta' x_{mt} \quad (2)$$

Here, α_t is a vector of constants reflecting the baseline hazard of starting cooperation for each year and $\beta'$is a vector that captures the effects of the explanatory variables in matrix x_{mt} on the instantaneous probability to start cooperation. Positive values for β' signify an increase in the likelihood of municipalities starting a joint business park while negative values signify a decrease.

6.2 Results

We use a hazard model as described in expression (2) to identify factors driving the fact that a certain municipality m forms a joint business park in period t (year of signing the inter-municipal contract). Our sample consists of all municipalities in West-Germany and covers the time period 2000 to 2015. Because of missing values in explanatory variables, we are left with 82 878 observations from an initial number of 6 097 municipalities in the sample, 248 of which start to cooperate during our observation period.

Table 3 reports the results of different specifications using different measures for our central variables. It is important to note that we report odds ratios rather than regression coefficients. Odds ratios tell us by what (multiplicative) factor the probability that municipality m starts cooperating in t increases when the corresponding explanatory variable increases. Odds ratios lower than 1 indicate that a factor retards the formation of a joint business parks while odds ratios above 1 indicate that a factor accelerates it. Standard errors are clustered at the municipal level.

The baseline specification includes all variables described above. The tax multiplier for the business tax does not have a significant effect on the likelihood that municipality m cooperates in the development of business land while the tax multiplier for the land tax has a positive

effect. Turning to the spatial lags, we find municipality m's likelihood of cooperating to decrease in the median business tax multiplier among m's neighbors while the median land tax multiplier is insignificant. These results are partially in line with hypothesis H1. Municipality m is more likely to enter a joint business park if land is scarce and/or it has a motorway access on its territory. A negative effect is observed for the tax capacity of municipality m, its population size and the median population size of its neighbors. Agreements on joint business parks are more likely in urban clusters and cities with county rights while election years see fewer agreements. Municipalities at the county border are less likely to engage in joint business parks. The probability to form a joint business parks increases in the share of seats in the municipal council held by free voter associations. All other control variables – including the measures for similarities between municipality m and its neighbors – are insignificant.

[Table 3]

In model 2, we replace the multipliers for land and business tax as well as the corresponding spatial lags by joint measures covering the tax multipliers in the cluster of municipality m and its neighbors. Specifically, we calculate the median tax multiplier applied in the cluster. The rationale behind using these joint measures is that the intensity of tax competition is expected to affect the tax setting behavior in municipality m in the same way it affects the tax setting behavior of its neighbors. This translates into a substantial degree of collinearity between the tax rates in municipality m and its neighbors. The joint measures help reduce collinearity while the logic behind hypothesis H1 applies alike. Both joint tax multipliers perform as predicted. Apart from minor deviations, all other variables perform like they do in the baseline model.

Like in model 2, we use yet another set of measures to test hypothesis H1. In model 3, we introduce the ratio of business tax multiplier and land tax rate for municipality m and its neighbors. In model 4, we calculate the corresponding ratio for the median value in the cluster of

municipality m and its neighbors. The higher these ratios, the lower is the local tax intensity. As predicted in hypothesis H1, they have a significantly negative impact on the probability of municipality m cooperating in the development of business land. Compared to model 1 and 2, the tax capacity and size of municipality m becomes insignificant. The same holds for access to a highway. At the same time, the number of neighboring municipalities with a similar share of young inhabitants becomes significantly positive.

In section 4, we learned that not all municipalities developed additional land during the period of observation. The fact that some municipalities did not devote additional land to business purposes may have two reasons: First, there may have been no demand for additional business land. Second, there may have been demand yet the development of business land was not possible because a stand-alone business park was unfeasible or too expensive or the municipalities were unable to find suitable partners. Thus, it is not clear ex ante whether the municipalities that did not develop additional land between 2000 and 2015 should be part of the population that we apply our regression model to. To test the robustness of our results, we rerun the models in table 3 with a reduced starting population consisting only of those municipalities that actually develop additional business land in the period 2000-2015 (see table 4). Unlike in table 3, the share of CDU members in the local council has a negative impact on municipality m's likelihood of developing a joint business park with other municipalities. Apart from that, the performance of the exogenous variables is qualitatively unchanged. Most importantly, the performance of the main variables of interest remains unchanged. Again, they strongly support hypothesis H1.

The size of the odds ratios for significant variables informs us about the magnitude of their impact on municipality m's probability to form a joint business park. It is important to note that the overall probability of establishing a joint business park in our sample is low.

Among the 6 097 municipalities in our baseline sample, 248 eventually establish a joint business park. This amounts to slightly more than 4 percent. The odds ratio inform us about the degree to which this average probability is scaled up or down. The odds ratio of 2.68 for urban clusters informs us that municipalities in urban clusters have a probability of forming a joint business park that is by 168 percent higher than those of municipalities outside the clusters – other things equal. The value of 1.62 for the dummy variable indicating land scarcity means that municipalities with less available land for business development than the median municipality are by 62 percent more likely to cooperate than municipalities with a share of available land above the median. A very strong effect emerges for the election year: In election years, the probability to sign an agreement on a joint business park drops by almost 50 percent. Having access to the motorway reduces the by about 25 percent. Let us now turn to the main variables of interest: The impact of one probability standard deviation in the median tax rate on business profits in the cluster of m and its neighbors amounts to more than 40 percent. For the land tax multiplier, the change by one standard deviation in the tax rate is equivalent to an increase in the probability of cooperation by 40 percent. In sum, the effects are sizeable.

We run a large number of additional models to test the robustness of the results. Among other things, we include other fiscal indicators and additional control variables (e.g. on population dynamics or topographic characteristics). This does not change the performance of the main variables of interest, nor does it yield interesting new insights (results are available upon request).

7. Discussion

We use a hazard model to analyze the factors that drive the establishment of joint business parks in West Germany between 2000 and 2015. In line with the previous literature, we find cooperation to be more frequent among small municipalities. The role of similarities in political orientation between decision makers at the municipal level seems to be less prominent in the

case of joint business parks. Furthermore, our results indicate that joint business parks are used as a means by which municipalities with cope with land scarcity. The fact that inter-local business parks are more likely in urban clusters further supports this notion. Interestingly, agreements for local business parks are less likely in election years.

Our research is motivated by the role of local tax competition in fostering joint business parks: We hypothesized that joint business parks are more likely to emerge in municipalities facing intense intra-regional tax competition. Our results strongly support this hypothesis: inter-local business parks are more likely when municipalities (and their neighbors) apply high tax rates on business profits and low tax rates on land.

Our analysis is not without shortcomings. Unfortunately, we cannot observe the degree of capacity utilization of the municipalities' existing business parks. Thus, we lack information on the individual municipalities' need to develop new business land. We account for this shortcoming through the sample reduction in table 4. However, it cannot fully account for differences in demand for additional business land. Second, the national account data is only available at county level. Thus, we cannot control for the local industry structure and possible differences in their specific demand for business land.

8. Conclusion

We provide an empirical study on the role of intra-regional tax competition in fostering inter-municipal cooperation. To the best of our knowledge, it is the first study on this issue. Neither has there been a large-scale empirical analysis on the emergence of inter-local business parks, nor has the specific role of tax competition been emphasized before. Based on the literature on international tax coordination, we argue that inter-local business parks can be seen as a cartel of municipalities aimed at achieving higher business tax rates. Thus, we hypothesized

that they are more likely to emerge among municipalities suffering from intense tax competition.

We test this hypothesis applying a hazard model to a large panel of more than 6500 West-German municipalities spanning over a time period of more than 15 years (2000 – 2015). In line with the literature, we find small municipalities to cooperate more frequently. Furthermore, our results indicate that joint business parks help municipalities with scarce land to overcome land shortage. Most importantly, the results strongly support our main hypothesis. Joint business parks are more frequent among municipalities that apply low business tax rates and high tax rates on land. This result is stable and the effect size is economically meaningful. Thus, tax competition is identified to be one important driver of joint business park formation.

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Figures and Tables

Figure 1: Number of West German municipalities starting an inter-local business park from 1970 to 2015

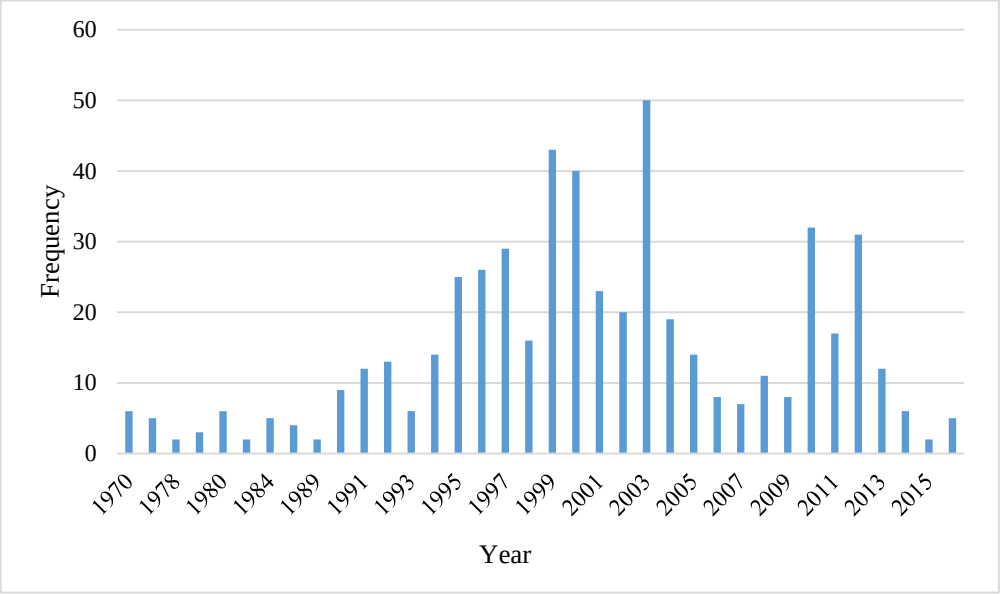

Figure 2: Municipalities with joint business parks in Germany in green (East Germany faded

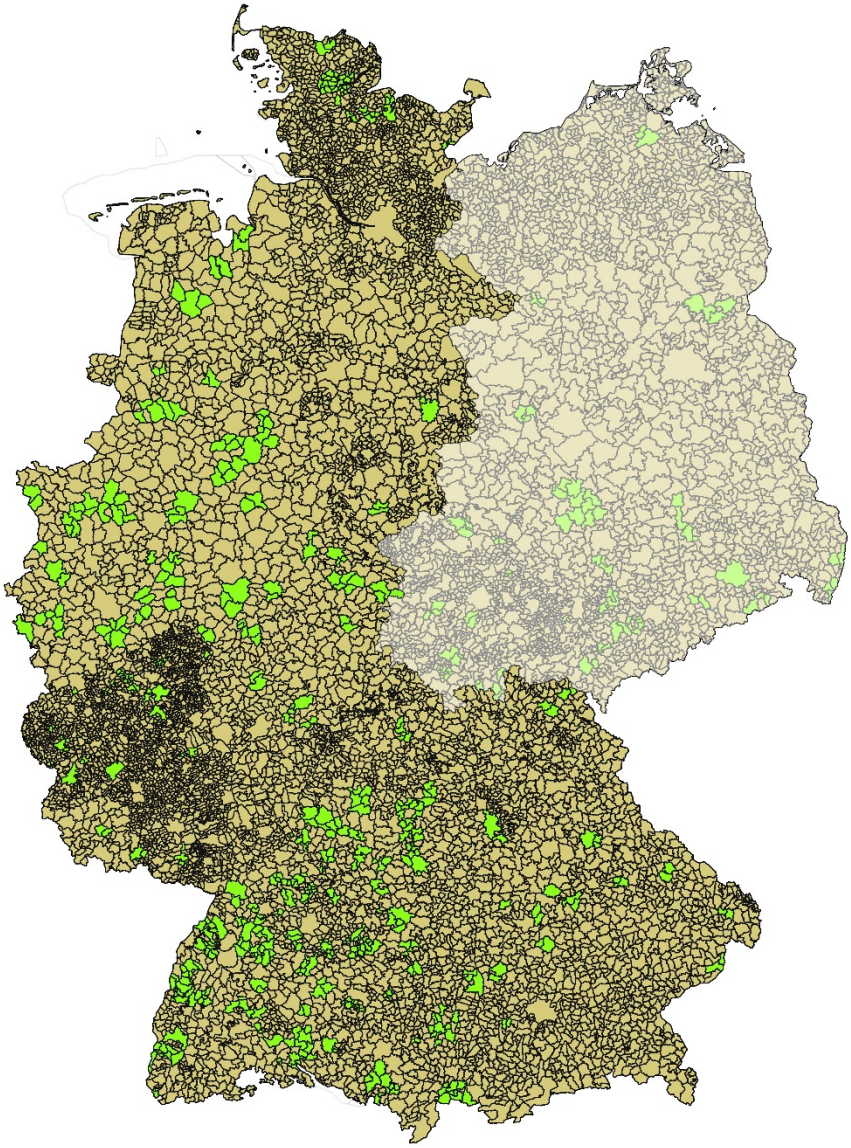

Figure 3: Number of participating municipalities

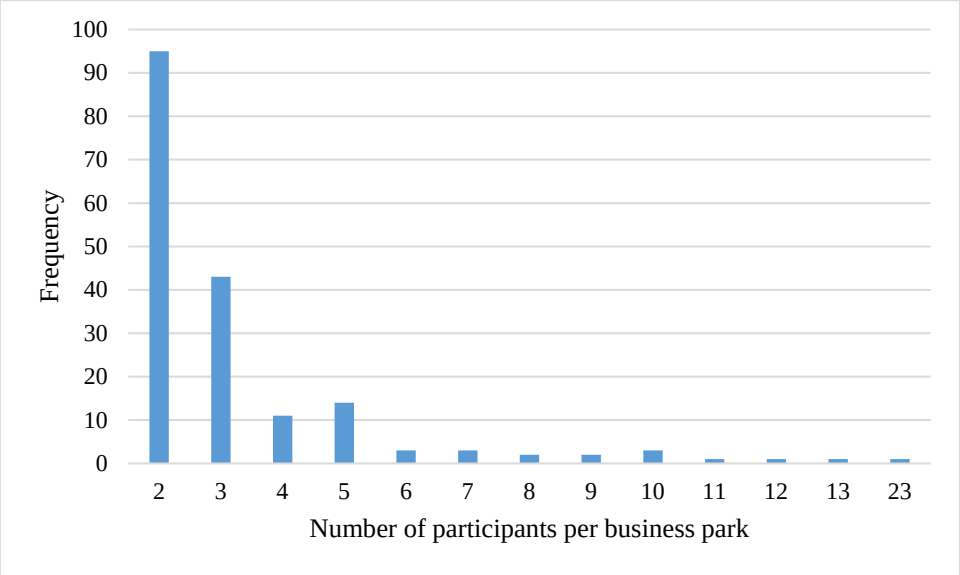

Table 1: Local tax multipliers, and business and industrial land-use in West-German municipalities

Category	year	obs.	mean	std. dev.	min.	max.
Business tax multiplier	2000	8,525	327.58	36.358	0	900
	2015	8,579	356.59	44.09	0	900
Land tax B multiplier	2000	8,526	298.99	48.17	0	900
	2015	8,579	359.59	72.39	0	960
Business and industrial land	2000	8,394	.4103	1.77	0	77
(km^2, absolute)	2015	8,394	.4999	1.78	0	68.3
Share of business and industrial land	2000	8,394	1.019	1.94	0	33.7
(percent)	2015	8,394	1.295	1.87	0	21.7
Change in the above share among municipalities with changes > 0 (percent)	2000-2015	5,591	.6657485	.8729744	.1	17.8

Source: own calculations, data from Regional Database of the German Federal Statistical Office (tax multipliers) and IÖR-Monitor (land-use)

Table 2: List of variables

Category	Variable	Measure
Municipal characteristics	Population size	Natural log of the total number of citizens
	Urban cluster	Dummy = 1 if m municipality m or one of its neighbors has 100 000 inhabitants or more
	City with county rights	Dummy = 1 if municipality m is a city with county rights
	Tax capacity	Natural log of tax revenue from tax-sharing (income- and value-added taxes) per capita,
	Land tax rate	Municipal land tax rate w.r.t. developed real estate and buildable ground
	Business tax rate	Municipal business tax rate
	Land scarce	Dummy = 1 if the share of agricultural and forest area in municipality m is below the median
	Motorway access	Dummy=1 if motorway access exists within the municipality's bounds
	Border county	Dummy=1 if m is located at county border
	Share CDU	Share of members from the Christian Democratic Union in the municipal council (Christian Social Union in Bavaria)
	Share local initiatives	Share of members from local initiatives in the municipal council
Additional variables	No. of neighbors with (at least one) motorway access	Number of neighboring municipality that have a motorway access within its bounds
	No. neighbors with abundant land	Number of neighboring municipality that have a share of agricultural and forest area that is above the median
	No. sim. neighbors share under 18	Number of neighboring municipality that have a share of young citizens that deviates by less than 10 percent from the share in municipality m
	Election year	Dummy=1 in year of municipal council election
	State dummies	Dummy=1 if municipality m is located in state X

Table 3: Results from the hazard model on the emergence of joint business parks (odds ratios)

VARIABLES	(1)	(2)	(3)	(4)
Business tax rate	0.998			
	(0.00374)			
Business tax rate (spatial lag)	0.990**			
	(0.00434)			
Land tax rate	1.004***			
	(0.00143)			
Land tax rate (spatial lag)	1.004*			
	(0.00243)			
Business tax rate (neighborhood median)		0.987***		
		(0.00356)		
Land tax rate (neighborhood median)		1.009***		
		(0.00224)		
Ratio business tax rate/ land tax rate			0.140***	
			(0.0700)	
Ratio business tax rate/ land tax rate (spatial lag)			0.0782***	
			(0.0644)	
Ratio business tax rate/ land tax rate (neighborhood median)				0.00953***
				(0.00663)
Land scarce	1.618***	1.617***	1.563**	1.544**
	(0.299)	(0.296)	(0.306)	(0.296)
No. neighbors with abundant land	0.994	0.993	0.991	0.992
	(0.0463)	(0.0461)	(0.0473)	(0.0470)
Land scarce#No. neighbors with abundant land	0.912	0.909	0.916	0.913
	(0.0569)	(0.0563)	(0.0595)	(0.0587)
Motorway access	1.265**	1.270**	1.219*	1.226*
	(0.127)	(0.128)	(0.131)	(0.131)
No. of neighbors with motorway access	1.064	1.064	1.022	1.026
	(0.0446)	(0.0445)	(0.0444)	(0.0438)
Same strongest party	0.967	0.967	0.965	0.962
	(0.0279)	(0.0278)	(0.0286)	(0.0279)
Share CDU	0.992*	0.992*	0.993*	0.993*
	(0.00406)	(0.00407)	(0.00396)	(0.00390)
Share local initiatives	0.993***	0.993***	0.995**	0.995**
	(0.00260)	(0.00258)	(0.00256)	(0.00250)
Election year	0.520***	0.516***	0.505***	0.500***
	(0.119)	(0.118)	(0.115)	(0.113)
Population size	0.873**	0.894*	0.923	0.942
	(0.0508)	(0.0517)	(0.0567)	(0.0577)
Population size (spatial lag)	0.707***	0.692***	0.779***	0.772***
	(0.0594)	(0.0597)	(0.0664)	(0.0655)
Urban cluster	2.676***	2.566***	2.290**	2.183**
	(0.928)	(0.887)	(0.800)	(0.747)
No. sim. neighbors share under 18	1.046*	1.048*	1.059**	1.062**
	(0.0267)	(0.0266)	(0.0273)	(0.0268)
Tax capacity	0.772**	0.762**	0.902	0.889
	(0.0902)	(0.0895)	(0.111)	(0.113)
Tax capacity (spatial lag)	0.868	0.878	1.002	1.021
	(0.0819)	(0.0812)	(0.0970)	(0.0947)
Border county	0.830**	0.841*	0.906	0.907
	(0.0759)	(0.0770)	(0.0869)	(0.0863)
City with county rights	2.577***	3.508***	2.762***	3.916***
	(0.868)	(1.200)	(0.990)	(1.477)
State and year dummies	YES	YES	YES	YES
Observations	82,878	82,878	82,876	82,878

Robust se eform in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4: Results from the hazard model on the emergence of joint business parks (odds ratios), reduced sample

VARIABLES	(1)	(2)	(3)	(4)
Business tax rate	0.999			
	(0.00379)			
Business tax rate (spatial lag)	0.990**			
	(0.00444)			
Land tax rate	1.004***			
	(0.00142)			
Land tax rate (spatial lag)	1.004*			
	(0.00246)			
Business tax rate (neighborhood median)		0.988***		
		(0.00366)		
Land tax rate (neighborhood median)		1.009***		
		(0.00228)		
Ratio business tax rate/ land tax rate			0.136***	
			(0.0685)	
Ratio business tax rate/ land tax rate (spatial lag)			0.0853***	
			(0.0722)	
Ratio business tax rate/ land tax rate (neighborhood median)				0.00998***
				(0.00724)
Land scarce	1.523**	1.517**	1.458*	1.434*
	(0.286)	(0.283)	(0.288)	(0.277)
No. neighbors with abundant land	0.984	0.983	0.982	0.982
	(0.0464)	(0.0461)	(0.0470)	(0.0467)
Land scarce#No. neighbors with abundant land	0.928	0.925	0.933	0.931
	(0.0578)	(0.0572)	(0.0598)	(0.0591)
Motorway access	1.259**	1.261**	1.206*	1.212*
	(0.124)	(0.125)	(0.126)	(0.126)
No. of neighbors with motorway access	1.061	1.061	1.022	1.027
	(0.0445)	(0.0444)	(0.0442)	(0.0436)
Same strongest party	0.967	0.967	0.965	0.961
	(0.0276)	(0.0275)	(0.0282)	(0.0276)
Share CDU	0.992**	0.992**	0.993*	0.993*
	(0.00402)	(0.00402)	(0.00392)	(0.00385)
Share local initiatives	0.993***	0.993***	0.995**	0.995**
	(0.00264)	(0.00262)	(0.00260)	(0.00255)
Election year	0.514***	0.510***	0.498***	0.493***
	(0.118)	(0.116)	(0.113)	(0.112)
Population size	0.845***	0.868**	0.898*	0.917
	(0.0497)	(0.0508)	(0.0556)	(0.0566)
Population size (spatial lag)	0.707***	0.691***	0.780***	0.773***
	(0.0614)	(0.0611)	(0.0678)	(0.0668)
Urban cluster	2.821***	2.698***	2.460**	2.360**
	(1.016)	(0.966)	(0.886)	(0.831)
No. sim. neighbors share under 18	1.041	1.043*	1.054**	1.057**
	(0.0266)	(0.0265)	(0.0269)	(0.0265)
Tax capacity	0.793*	0.782**	0.951	0.937
	(0.0983)	(0.0971)	(0.125)	(0.127)
Tax capacity (spatial lag)	0.886	0.898	1.047	1.066
	(0.0858)	(0.0848)	(0.107)	(0.104)
Border county	0.824**	0.837*	0.894	0.897
	(0.0752)	(0.0762)	(0.0850)	(0.0845)
City with county rights	3.848***	5.290***	4.230***	6.444***
	(1.215)	(1.729)	(1.464)	(2.179)
State and year dummies	YES	YES	YES	YES
Observations	53,097	53,097	53,095	53,097

Robust se eform in parentheses *** p<0.01, ** p<0.05, * p<0.1