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Reference Points Near a Border**

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Zentrum für Europäische
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Non-technical summary

Many studies of spatial policy interdependence in (local) fiscal policies concentrate on the relations between jurisdictions within a single region. These works usually disregard possible extra-regional effects. In this paper we evaluate the validity of such restriction by focussing on local tax competition. With respect to local corporate tax competition, the intensity of competition for mobile capital between jurisdictions should determine their intensity of strategic interactions in business tax policy. However, as the underlying reality (i.e., competitive forces) is hard to measure objectively, politicians' beliefs about what is real are especially likely to become of crucial importance. For this purpose, we study German local politicians' assessments of their jurisdictions' main competitors in the struggle to attract firms.

Our empirical results are based on both OLS and natural spline regressions using survey data from over 700 German municipal leaders in the state of Baden-Württemberg. They show that most politicians perceive other municipalities within their own state as the strongest competitive force. Yet, a crucial caveat to this finding concerns municipalities 'near' a border, in which politicians also perceive a strong competitive threat from across the border. This corroborates the idea that municipalities near a border have a broader reference group than is commonly assumed in the existing literature. Moreover, the importance of borders as a dividing line varies depending on the type of border. First, ceteris paribus, their effect is weaker (i.e., less constraining) for national than international borders: this means decision-makers in municipalities up to roughly 20km from the border take competition with jurisdictions beyond the border into consideration when a national, inter-regional border, is concerned, while the equivalent effect of an international border ceases after approximately 12.5km. Second, in our sample the French-German border is shown to have a stronger effect than the Swiss-German border. One tentative explanation is that politicians perceive the cultural dimension of these respective borders (i.e., language) to be more important than the institutional dimension (EU versus non-EU). Alternatively, it could reflect Switzerland's more aggressive corporate tax policy. Overall, our findings suggest that geographically close municipalities perceive each other as competitors for mobile capital regardless of the state or country where they are located. This indicates a need to refine the commonly used contiguity- and distance-based neighbourhood matrices by treating border-municipalities differently from in-land ones to avoid biased estimations of spatial interactions.

Das Wichtigste in Kürze

Zahlreiche Untersuchungen zu räumlichen Interaktionen von politischen Entscheidungen in der (kommunalen) Fiskalpolitik konzentrieren sich auf die Beziehungen zwischen Gebietskörperschaften in einer (einzigen) Region. Diese Arbeiten ignorieren gewöhnlich mögliche Interaktionen, die über die Regionengrenzen hinausreichen. In diesem Papier untersuchen wir die Gültigkeit einer solchen Einschränkung, wobei wir uns auf den kommunalen Steuerwettbewerb fokussieren. Im kommunalen Unternehmenssteuerwettbewerb sollte die Intensität des Wettbewerbs um mobiles Kapital zwischen den Gebietskörperschaften das Ausmaß ihrer strategischen Interaktionen in der Steuersetzung determinieren. Jedoch ist die zu Grunde liegende Wettbewerbsintensität kaum objektiv messbar, so dass der Einschätzung der Politiker über diese Realität eine entscheidende Rolle zukommt. Zu diesem Zweck analysieren wir die Einschätzungen von deutschen Lokalpolitikern hinsichtlich ihrer Hauptwettbewerber im Standortwettbewerb.

Unsere empirischen Ergebnisse basieren auf OLS- und Natural Spline-Regressionen, in denen Umfragedaten von über 700 baden-württembergischen Bürgermeistern verwendet wurden. Diese zeigen, dass die meisten Politiker andere Städte und Gemeinden innerhalb ihres Bundeslandes als ihre Hauptwettbewerber ansehen. Jedoch gilt dieser Befund nur eingeschränkt für diejenigen Gemeinden, die in der "Nähe" einer Grenze liegen; in diesen nehmen die Politiker auch einen starken Wettbewerbsdruck von jenseits der Grenze war. Dieses spiegelt die Einschätzung wider, dass Jurisdiktionen in der Nähe einer Grenze eine breitere Referenzgruppe aufweisen als gewöhnlich in der Literatur angenommen wird. Zudem unterscheidet sich die Bedeutung von Grenzen als Trennungslinie in Abhängigkeit von der Art der Grenze. Erstens ist ihr Effekt, ceteris paribus, schwächer (d.h. weniger einschränkend) für innerstaatliche im Vergleich zu internationalen Grenzen: Die Ergebnisse besagen, dass im Falle von innerstaatlichen Grenzen die Entscheidungsträger bis zu einer Grenzentfernung von etwa 20 km die Jurisdiktionen jenseits der Grenze berücksichtigen. Der äquivalente Effekt bei einer internationalen Grenze erlischt jedoch bereits nach etwa 12,5 km. Zweitens zeigt sich in unserem Datensatz, dass die französisch-deutsche Grenze einen stärkeren Effekt als die schweizerisch-deutsche Grenze ausübt. Eine vorsichtige Erklärung dafür ist, dass Politiker die kulturelle (d.h., die sprachliche) Dimension der jeweiligen Grenze als wichtiger erachten als die institutionelle Dimension (EU vs. nicht-EU). Alternativ könnte dies aber auch die aggressivere Unternehmenssteuerpolitik der Schweiz widerspiegeln. Insgesamt deuten unsere Ergebnisse darauf hin, dass sich geografisch nahe

liegende Jurisdiktionen als Wettbewerber um mobiles Kapital ansehen, ungeachtet des Bundeslandes oder Staates in dem sie gelegen sind. Daraus ergibt sich die Notwendigkeit, die gewöhnlich verwendeten nachbarschafts- und distanzbasierten Entfernungsmatrizen zu präzisieren, indem Grenzgemeinden anders als im Landesinneren gelegene Gemeinden behandelt werden, um so verzerrte Schätzungen der räumlichen Interaktionen zu vermeiden.

Politicians' Opinions on Rivals in the Competition for Firms:

An Empirical Analysis of Reference Points Near a Border

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Abstract Studies of spatial policy interdependence in (local) public policies usually concentrate on the relations between jurisdictions *within* a single analysed region, and disregard possible extra-regional effects. This paper evaluates the validity of such restriction by studying German local politicians' assessments of their jurisdictions' main competitors in the struggle to attract firms. We find that location near a border significantly undermines politicians' perception that the fiercest competitive pressure derives from jurisdictions *within* their own state. This effect sets in about 20km (12.5km) from a national (international) border. We also confirm that intra-national borders are perceived as much less constraining for firms than international ones, even in a highly integrated area such as the European Union. Overall, these results indicate that nearest municipalities perceive each other as competitors regardless of the state or country where they are located. The practical implications of these findings for future studies on spatial policy interdependence are discussed.

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1 Introduction

Whether at the national or local level, a government deciding public policies in one juris-diction is likely to affect – and be affected by – decisions of governments in other juris-dictions (e.g., due to spillover effects or strategic decision-making). The resulting spatial policy interdependence has received significant attention from regional science scholars, urban and public economists and political scientists in recent years, both in terms of its measurement and its implications (for partial reviews, see Brueckner, 2003; Revelli, 2005). A central concern for empirical analyses of such spatial policy interactions relates to the specification of the neighbourhood matrix. As the components of this matrix – i.e., so-called 'spatial weights', which define who is expected to compete with whom – cannot be directly estimated from the data (due to a lack of degrees of freedom; e.g., Case et al., 1993), their specification is at the discretion of the researcher and critically depends on the underlying theoretical model (Brueckner, 2003; Revelli, 2005). In this paper, we focus on the competition of public authorities to attract mobile capital, so that the spatial weights should ideally reflect the mobility of capital between these ju-risdictions (Brueckner (2003)). However, most previous work either relies on a simple contiguity- or distance-based neighbourhood-specification, or augments the latter with socio-demographic criteria such as relative population size. Additionally, and crucially, the spatial weights are generally defined with reference to only a limited group of coun-tries in the literature on international competition (e.g., Devereux et al. 2008) or with reference to other jurisdictions *within* one single region which is analysed when studying local competition (which is the focus of this paper).[1]

Although the latter operational choice is often due to the lack of comparable data from outside the analysed region, it disregards any possible extra-regional effects, and implicitly assumes that competitive forces are independent of the distance to surrounding regions. While one could conceive of arguments to justify such assumptions[2], their validity

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[1]Prominent examples in the local tax competition literature include, among several others, Brueckner and Saavedra (2001) on cities in the Boston metropolitan area, Brett and Pinkse (2000) on municipalities in the Canadian province of British Columbia, and Buettner (2003) on jurisdictions in the German state of Baden-Württemberg.

[2]Depending on the underlying theoretical model, several partial defences can be provided. First, from a tax competition perspective, mobile factors, such as capital or workers, may face a significant hurdle to move across a border. Second, from a yardstick competition perspective, firms and/or citizens may not believe that jurisdictions at the opposite side of an (inter)national border are a relevant 'yardstick' for their own incumbents' policies or they may be less likely to obtain and/or process information from 'the other side'. In both cases, the result is that politicians' need to mimic cross-border jurisdictions' policies

has, to the best of our knowledge, not been subject to direct empirical scrutiny. Indirect evidence does exist, but it remains inconclusive. On the one hand, Gérard et al. (2010) fail to find significant interactions in the tax-setting of municipalities located in different Belgian regions. Sub-national borders in Belgium, however, are likely to constitute a significant barrier to firm mobility due to the predominant role of the regions in Belgian federalism as well as their concurrence with linguistic borders. On the other hand, Brügger and Parchet (2010) demonstrate that although linguistic borders in Switzerland weaken policy interdependence, fiscal interactions persist also between municipalities belonging to different regions. This suggests that jurisdictions' peer group need *not* consist exclusively of jurisdictions within their own region.

This paper takes a first step to assess this issue more directly by addressing two related questions. First, do jurisdictions near a border compete only with jurisdictions on their own side of the border (as implicitly assumed in most previous work), or do they have a broader reference group? This question regards what could be designated as a pure *border effect*; it evaluates the constraining strength of borders. Such border effects are well-known in the trade literature, and we will study whether they also matter in fiscal competition. Second, how far 'inland' do competitive pressures from beyond the borders reach? This question pertains to the radius within which the neighbourhood to another region is taken into account by local decision-makers (a *proximity effect*). The answers to both questions have important implications for the specification of contiguity- and distance-based neighbourhood matrices in future work, even for studies concerned with a single well-defined region. Specifically, when border-jurisdictions perceive themselves as having an inter-regional reference group (i.e., question 1), they should be treated differently from inland-jurisdictions in the analysis. The revelation that such effects *either* materialise only in close proximity to the border *or* persist also at significant distances (i.e., question 2) indicates how broadly such re-operationalisation should be applied (or, more negatively, how strong the bias in current approaches is likely to be).

We tackle both questions by surveying politicians about their perceptions of their jurisdictions' most important competitors.[3] While politicians' opinions have until now

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is weakened, though it obviously need not disappear completely.

[3] Alternatively, we could set up a spatial econometric model with separate spatial weights matrices for jurisdictions far from or near a border and re-estimate it under varying operationalisations of what defines being 'near' a border. As detailed in the main text, we think our use of politicians' opinions has distinct benefits for addressing our research questions and is less cumbersome in its approach to the proximity effect.

not been explicitly exploited to define jurisdictions' peer groups, the processes analysed in the literature (i.e., intergovernmental interactions) are real-world phenomena whereby politicians take behaviour elsewhere into account. As the underlying competitive forces are hard to measure objectively, politicians' *beliefs* about what is real are especially likely to become of crucial importance. In line with this idea, Revelli and Tovmo (2007) illustrate that spatial policy dependence is particularly strong between jurisdictions where politicians *believe* that voters engage in benchmarking of their performance against other jurisdictions (for a related finding, see Brülhart and Parchet, 2010). This suggests that politicians' opinions about the importance of competitive pressures and the extent of tax base mobility have important implications for their policy decisions. As demonstrated by Heinemann and Janeba (forthcoming), the opinions of politicians can exhibit considerable variation also within the same institutional environment. This justifies the approach taken in the present analysis.

Our empirical results are based on both OLS and natural spline regressions using survey data from over 700 German municipal leaders in the state of Baden-Württemberg. This state is located in the south-west of Germany; it is surrounded by three German states to the north and east, as well as France to the west and Switzerland to the south. The results show that most politicians perceive other municipalities within their own state as the strongest competitive force. Yet, a crucial caveat to this finding concerns municipalities 'near' a border, in which politicians also perceive a strong competitive threat from across the border. This corroborates the idea that municipalities near a border have a broader reference group than is commonly assumed in the existing literature. Moreover, the importance of borders as a dividing line varies depending on the type of border. First, ceteris paribus, their effect is weaker (i.e., less constraining) for national than international borders: this means decision-makers in municipalities up to roughly 20km from the border (or about 10% of the maximum possible distance to such a border in our sample) take competition with jurisdictions beyond the border into consideration when a national, inter-regional border, is concerned, while the equivalent effect of an international border ceases after approximately 12.5km (or about 6% of the maximum possible distance). Although these distances appear relatively small, the effect is substantive, as it comprises 21% and 9.5% of all municipalities in the state, respectively. Second, in our sample the French-German border is shown to have a stronger dividing effect than the Swiss-German border. One tentative explanation is that politicians perceive the cultural

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dimension of these respective borders (i.e., language) to be more important than the institutional dimension (EU versus non-EU). Alternatively, it could reflect Switzerland's more aggressive corporate tax policy. Overall, our findings suggest that geographically close municipalities perceive each other as competitors for mobile capital regardless of the state or country where they are located. This indicates a need to refine the commonly used contiguity- and distance-based neighbourhood matrices by treating border-municipalities differently from in-land ones to avoid biased inferences.

The remainder of the paper is structured as follows. Section 2 critically reviews the types of spatial weights matrices commonly employed in the literature and derives testable hypotheses concerning the effect of (inter)national borders. Section 3 discusses our survey design and the empirical methodology employed to verify the existence and persistence of border-effects. The results are described in section 4, while section 5 contains a concluding discussion.

2 Defining the neighbourhood

2.1 A critical view of existing approaches

Independent of the underlying theoretical framework, operationalisations of a jurisdiction's 'neighbourhood' in studies of spatial policy interdependence most often rely on a simple contiguity- or distance-based criterion. Neighbours are thereby defined as two jurisdictions which share a border (e.g., Heyndels and Vuchelen, 1998; Geys, 2006; Rincke, 2007) or are within a certain Euclidian or travel distance from each other (e.g., Büttner, 2001, 2003; Bosch and Solé-Ollé, 2007; Brett and Tardiff, 2008). In a similar vein, the inverse of the distance between jurisdictions is often invoked to approximate the strength of the assumed competitive relation between them (e.g., Brueckner and Saavedra, 2001; Charlot and Paty, 2007; Koh and Riedel, 2010). Such distance-based criteria can be justified by the fact that proximity is important for the dissemination of information – certainly at the local government level (Allers and Elhorst, 2005) – and is significantly linked to relocation decisions, both for individuals (e.g., Day, 1992) and firms (e.g., van Dijk and Pellenbarg, 2000).[4]

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[4]In order to define peers more specifically, some scholars move beyond a merely geographical neighbourhood criterion by including information on, for example, relative population sizes, migration patterns

Interestingly, and somewhat surprisingly, the delineation of jurisdictions' peer groups in most studies relies exclusively on 'objective' data and never accounts for politicians' perceptions about who they *believe* to be competing with. Such beliefs, however, are likely to play a critical role. Revelli and Tovmo (2007), for example, indicate that the spatial parameter estimated for local government efficiency patterns in Norway is significantly larger for jurisdictions whose politicians *believe* that voters employ other jurisdictions' performance as a yardstick, suggesting the importance of politicians' perceptions for observed policy interactions.

More generally, politicians' beliefs are likely to matter for their decisions independent of whether they are correct (i.e., accurately reflecting reality) or biased. On the one hand, if one assumes that rational politicians have unbiased beliefs, their observable decisions will reflect the underlying reality. Even then, however, politicians' subjective opinions will continue to play a crucial role in settings where the underlying reality is hard to measure objectively (such as, for example, concerning inter-jurisdictional competitive forces). In such a setting, objective data are arguably 'unavailable', and subjective perceptions – which in this case are assumed unbiased – become central to the decision-making process. On the other hand, if one allows for biased beliefs, the actual truth (e.g., mobility of firms) might become less relevant than politicians' perceptions thereof, since it is these perceptions that shape their decisions. This idea rests on a substantial academic literature indicating that individuals' actions in a wide variety of situations are more often driven by subjective perceptions rather than objective facts.[5] Politicians are unlikely to be immune to such effects. Evidence in this direction is provided by Brülhart and Parchet (2010) who find that Swiss municipalities strategically interact in their inheritance tax decisions *in the belief that tax competition takes place.* However, the authors do not find any tax base effects induced by tax differentials. Hence, politicians apparently base their decisions on wrong assumptions about the mobility of the taxable object (referred to as "alleged tax

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between jurisdictions (e.g., Case et al., 1993; Baicker, 2005; Rincke, 2010) or, in studies of international tax competition, the level of trade integration between countries (e.g., Prakash and Potoski, 2006; Exbrayat, 2009).

[5]Voter turnout in elections and participation in rebellious collective action, for example, have been linked to the individuals' overestimation of their personal influence on such actions' outcomes (e.g., Muller and Opp, 1986; Opp, 2001). Similarly, "subjective interpretations of recurrence risks are better predictors of reproductive intentions [of people with genetic disorders] than the 'objective' risks" (e.g., Shiloh and Saxe, 1989, 45). With respect to US tax policy, Birney et al. (2006), Krupnikov et al. (2006), Slemrod (2006) and Sides (2010) analyse the critical role of voter misconceptions and ignorance in explaining voters' views on, for example, the repeal of estate taxation and the replacement of income taxes by flat or retail sales taxes.

competition" by Brülhart and Parchet, 2010, 1).

It is then only a small step to exploit politicians' subjective perceptions about the *identity* of their most important competitors in order to construct the neighbourhood matrix, rather than their view on the mere existence of such competitors (as studied in, e.g., Ashworth and Heyndels, 1997, 2000; Hendrick et al., 2007; Heinemann and Janeba, forthcoming).

Moreover, applying contiguity- or distance-based specifications of the neighbourhood matrix only *within* one analysed region, as most studies do, implicitly assumes that the world ends at the region's border. This clearly does not need to be the case, as Brügger and Parchet (2010) demonstrate for culturally defined regions in Switzerland. They find that local income tax burdens in Swiss municipalities do not change discreetly at the language border dividing the regions, but exhibit smooth spatial gradients. Although 'cross-border' interactions are found to be weaker than 'within-region' interactions, the mere presence of such interregional interdependence indicates that municipalities along a (language) border are *not only* competing with neighbours in their own region. Indeed, it demonstrates that decision-making processes in at least some jurisdictions *are* influenced by what happens beyond a border.[6]

2.2 Hypotheses on the effect of (proximity to) borders

In what follows, we take up both criticisms simultaneously by empirically evaluating whether the inclusion of politicians' opinions (criticism 1) can help to disclose the limitations of uni-regional analyses (criticism 2). The central idea is that decision-makers in jurisdictions near a border may well perceive themselves to have a different peer group than the one consisting only of jurisdictions *within* the own region. This allows for potential cross-border interactions because in such setting borders are not always perceived by politicians to be insurmountable obstacles for, for example, mobile capital. Moreover, one could argue that such effects need not be constrained to jurisdictions located physically at the border (e.g., effects of cross-border trade often persist at considerable distances from the border; see Asplund et al., 2007; Beatty et al., 2009). Such a proposition indeed follows naturally from the commonly acknowledged central importance of distance

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[6]The same inference can obviously be drawn from the vast literature on cross-border shopping (for reviews, see Chiou and Muehlegger, 2008; Lovenheim, 2008).

(see above); however, while the existing literature has consistently assumed that distance is crucial *within a given region*, the same logic can easily be transferred to jurisdictions *outside that region*. Doing so implies that proximity to jurisdictions outside the analysed region (i.e., on the other side of the border) defines the extent to which local decision-makers perceive the intensity of competition with these jurisdictions (relative to those within the own state). This leads to a first testable hypothesis:

H1: Proximity to competing jurisdictions beyond subnational or international borders shifts politicians' perceptions on the relative importance of 'internal' and 'external' competitors: they perceive a stronger competitive pressure from 'external' competitors; a *proximity effect*.

Clearly, however, the mere existence of borders is likely to retain at least some 'closing-off' effect. Indeed, although Basile et al. (2009) demonstrate that location choices for multinationals in Europe are becoming increasingly uncoupled from national borders due to increased integration, significant evidence indicates that borders continue to impede trade (e.g., McCallum, 1995; Anderson and van Wincoop, 2003), even in highly integrated areas such as NAFTA and the European Union (EU). Some authors explain this persistence by the existence of technical barriers (e.g., Chen, 2004), while others suggest that cultural factors may drive these results (e.g., Guiso et al., 2009).

While this suggests a perceptible effect of international borders, a similar effect could also be expected from subnational borders in a federal state, such as Germany. In our German setting, the effect might be driven by cultural factors since state borders in Germany largely coincide with historical and/or cultural borders, and the latter have been shown to still matter for economic decisions such as migration (e.g., Falck et al., 2010). It may also be caused by institutional factors as firms need to register at chambers of commerce (IHK), whose authority coincides with state borders. Furthermore, employment conditions (including wages) are often defined in so-called "master contracts" arranged at the state level. Such administrative requirements increase the cost of firm mobility across state borders. Finally, German municipalities are geographically arranged in districts (Landkreis) and represented in state-level organisations (Gemeindetag), both of which have an advisory and coordination function and lead to information exchange. Moreover, their statistical and accounting systems are coordinated at the state level. As a result,

local decision-makers are likely to be much better informed about the policies of municipalities in the same state, thus becoming more likely to focus on municipalities in the same state as their reference group. Moreover, Turrini and van Ypersele (2010) identify asymmetries in judicial systems as driving forces of the border effect in trade, both at the national level (due to international differences in the judicial system) and the subnational level (due to the competency of different courts of appeal, which is also a relevant dividing line between German states).

Taken together, state borders are likely to have a relatively weaker 'closing-off' effect than national borders since mobility as well as information costs are arguably lower across the former. This discussion leads to our second hypothesis:

H2: Both national and international borders are perceived as real barriers; a *border effect*. International borders are likely to exert a stronger influence than national ones.

Given the institutional setting analysed below (i.e., municipalities in the German state of Baden-Württemberg), the latter hypothesis can be specified a bit further. As Baden-Württemberg shares a direct border with both France and Switzerland, this provides the possibility to test for diverging effects of different types of international borders. On the one hand, the border with France has a much stronger cultural dimension than the one with Switzerland as Swiss municipalities near the Swiss-German border are German-speaking. On the other hand, France is a member of the EU, while Switzerland is not (although many of the economic freedoms provided by the EU apply to transactions with Switzerland) and has its own currency. Hence, there might be a larger institutional hurdle for firms to move from Germany to Switzerland than from Germany to France as they effectively leave the EU-area in the former case. Analysing how politicians' perceptions of their jurisdictions' main competitors varies along the French and Swiss borders provides an opportunity to gain some (preliminary) insight into the relative importance of these two effects. This is reflected in our third and final proposition:

H3: The effect of international borders varies with the cultural and institutional dimensions of such borders. The exact nature (and strength) of such mediating effects is theoretically open and thus constitutes an empirical question.

3 Data and methodology

3.1 Data

We surveyed local decision-makers in the German state of Baden-Württemberg regarding their perceptions of the competitive pressures between various jurisdictions to empirically test the hypotheses derived in the previous section. We selected this setting for two main reasons. First, local business tax revenues (i.e., the 'Gewerbesteuer') make up roughly 48% of municipal tax revenue (or 21% of total revenues; figures for 2004), and constitute the main source of tax revenues for local governments in Baden-Württemberg (e.g., Geys et al., 2010; Kalb et al., 2010). Moreover, previous research found evidence of strong competition between municipalities in this state (Büttner, 2001, 2003; Hauptmeier et al., 2009). This not only indicates the relevance of business tax revenues and competition for such revenues within our setting, but also allows us to relate our findings to existing work. Second, there exists a quasi-presidential system in the municipalities of Baden-Württemberg, with a strong mayor and a rather weak council. This is important since it implies that the decision-makers we surveyed (i.e., the mayors, see below) have real decision-making power regarding fiscal policies.[7]

Specifically, we employ the results of a survey conducted in May 2008 among the mayors of all 1108 municipalities in Baden-Württemberg. The survey obtained a response rate of 64.3%, thus providing a sizeable sample (N=712). Both the sample size and response rate are exceptionally high compared to the few previous economic studies of politicians' opinions (e.g., Ashworth and Heyndels, 1997, 2000; Hendrick et al., 2007; Heinemann and Janeba, forthcoming). Also, and importantly, this sample is representative of the entire population in terms of the geographical distribution of the municipalities (see table 3 in the appendix). There are some quantitatively minor, but statistically significant, differences with respect to population size, unemployment rate, fiscal capacity and political make-up. Hence, we directly control for the influence of these variables in the analysis below.

The central question of interest for our purposes is the following: "With which cities and municipalities do you perceive yourself to be particularly in competition for busi-

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[7]Mayors are elected directly by the citizens for eight year periods and lead the administration of the municipality. Moreover, they preside over the local council and have full voting rights there. This generates a unique combination of executive authority and agenda-setting power.

nesses?" Respondents were thereby asked to assess the strength of competitive pressures on a discrete scale from -4 (not at all regarded as competitors) to +4 (very strongly regarded as competitors) regarding three types of jurisdictions: (Q1) cities and municipalities in Baden-Württemberg, (Q2) cities and municipalities in other German states, and (Q3) cities and municipalities in other countries.[8]

The distribution of responses is illustrated in figure 1. Clearly, and unsurprisingly, most respondents regard internal competitors (i.e., those from the state of Baden-Württemberg) as their most important competitors. Still, significant variation exists across respondents, especially when they are asked about external competitors (i.e., those from other states or countries). Moreover, and crucially, respondents often strongly vary their responses across the three types of competitors mentioned. This not only indicates that answers to the survey were taken seriously, but also that mayors indeed perceive and report differences in the extent of competitive pressures across the three groups mentioned. It is this variation we exploit in our analysis.

Figure 1: **Survey results, perceived competitive pressures (N=712)**
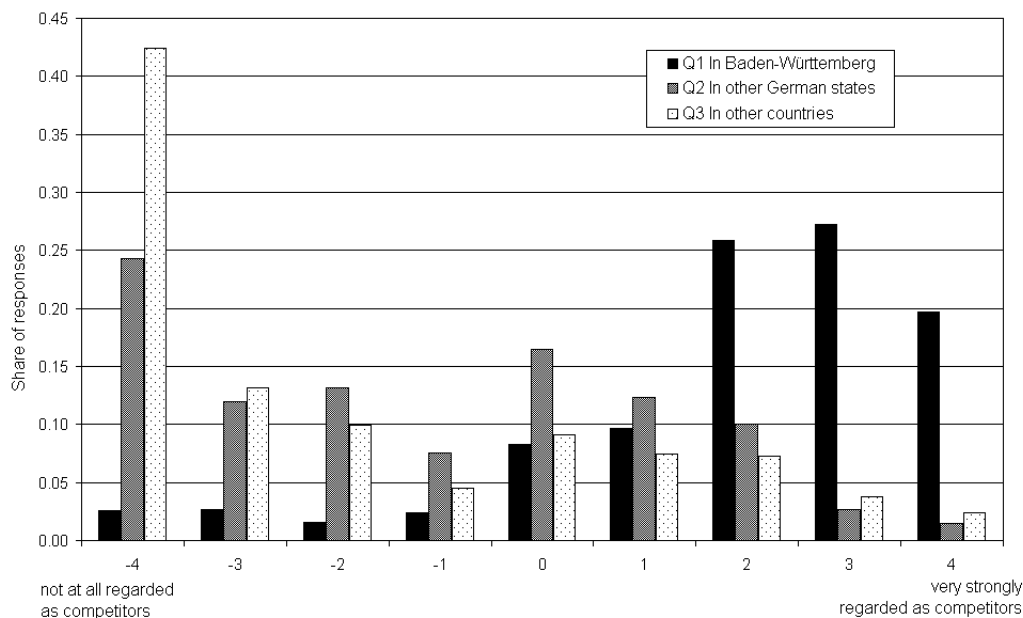
For each of the three questions, the percentages add up to 100%. Source: Own calculations

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[8]The original wording in German is: "Mit welchen anderen Städten und Gemeinden sehen Sie sich besonders im Wettbewerb um Unternehmensansiedlungen?" Note that we did not ask respondents about specific municipalities, but requested an opinion concerning the three general municipality types outlined.

3.2 Specification and Methodology

Our baseline specification takes the following form:

$$RPC_i = a + b_1 Border_i + X_i b_2 + e_i$$

The left-hand-side variable Relative Perceived Competition (RPC) is constructed as the difference of the perceived intensity of competition between two types of competitors: those inside and those outside the state. This effectively leads to two separate variables:

a) RPC^{state}, which is calculated as the perceived intensity of competition with municipalities in other German states (Q2) minus the perceived intensity of competition with municipalities in Baden-Württemberg (Q1),

b) $RPC^{country}$, which measures the perceived intensity of competition with municipalities in other countries (Q3) minus the perceived intensity of competition with municipalities in Baden-Württemberg (Q1).

A value of zero in either case denotes that a given respondent regards municipalities in other German states (or other countries) as equally important competitors compared to municipalities in their own state. A negative (positive) value denotes that municipalities in the same (other) state or country are more important competitors.

The central explanatory variables relate to the geographical placement of municipalities. We introduce a number of different operationalisations to address our various hypotheses (see section 2.2). First, to study the impact of direct neighbourhood to a state border (see H2), we introduce a dummy variable equal to 1 for municipalities directly located on one of Baden-Württemberg's borders to its three surrounding German states (i.e., Bavaria, Hessen and Rhineland-Palatinate), and 0 otherwise. Such an indicator variable is appropriate since there are no major institutional differences between these three neighbouring states. Altogether, 54 municipalities in our sample (7.6%) are located adjacent to a state border. Second, to study the impact of direct neighbourhood to a country border (see H2), we introduce an indicator variable equal to 1 for municipalities bordering France (18 municipalities) or Switzerland (likewise 18 municipalities), and 0 otherwise. Given the institutional and cultural differences between these neighbours, we also differentiate between the effect of the Swiss and the French border (see H3). Third, to estimate the spatial reach of borders' effects (i.e., see H1), we replace the dummies

for adjacent municipalities with distances to the closest municipality beyond a state or country border (and its squared value to capture non-linearities).[9]

Finally, in the vector X_i, we introduce a number of socio-economic control variables, which are summarised in table 4 in the appendix. They first of all comprise the municipal unemployment rate and the population of working age. Then, we include two political variables reflecting the share of seats in the local council held by left-wing parties and independents (so-called "Freie Wählervereinigungen", see Geys et al., 2010), respectively. They capture the influence of the ideological position of a given jurisdiction, which is included because political ideology has been show to significantly affect politicians' perception of business tax competition (Heinemann and Janeba, forthcoming). Thirdly, we introduce dummies identifying those municipalities which are the main beneficiaries of transfers in the local system of fiscal equalisation. Since these municipalities are arguably partially protected from competition (i.e., the system compensates for losses in municipalities' tax bases; e.g., Büttner, 2006), their decision-makers might have different perceptions of competitive pressures.[10] Fourth, we insert a dummy indicating that survey responses were given directly by the mayor (rather than delegated by him to a member of his bureaucracy). Finally, municipal size and dummies for highly agglomerated cities intend to capture that urban centres are generally more exposed to external competition, as demonstrated by Janeba and Osterloh (2010).

Before we turn to our estimation results, it is important to mention three aspects regarding our estimation methodology. First, we centre all control variables by subtracting their means. Hence, all right-hand side variables – except the neighbourhood dummies and the distance measures – are rescaled to have an average of 0. This transformation facilitates the interpretation of our results, especially for the coefficient on the constant, which cannot be clearly interpreted without this transformation. Second, given the non-continuous nature of the independent variables, we initially estimated all models using an ordered probit approach; however, as there is a relatively large number of values those variables can take (i.e., 17 options ranging from -8 to 8), we also ran all estimations using OLS. Both sets of results provide qualitatively very similar results. As the OLS

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[9]Distances are thereby defined as the minimum land distance between the centres of the relevant jurisdictions.

[10]We exploit a discontinuity in the local system of fiscal equalization, which categorises municipalities according to their "fiscal capacity" and gives those with a low fiscal capacity the highest contribution rate, i.e., compensates them most extensively for reductions in their tax base (see Büttner, 2006).

results are easier to interpret, we present those in section 4 (the ordered probit results are available upon request). Finally, as the effect of proximity to borders is likely to be highly non-linear, we complement the OLS regressions, which include distance and distance squared as discussed above, with natural spline regressions. This particularly accounts for nonlinear effects and allows a much more detailed analysis of the proximity effect (see Beatty et al., 2009, and Brülhart et al., 2010, for recent applications of this estimator to the analysis of border effects).

4   Empirical results

4.1   State borders

Table 1 reports our results regarding the impact of subnational borders on mayors' perceptions of inter-jurisdictional competitive pressures. In column (1), we focus on the impact of direct neighbourhood to a state border. The coefficient estimate for the constant equals -3.155 and is statistically significant beyond the 1% level. This indicates that mayors on average regard municipalities in their own state as much closer competitors than those beyond the state borders (remember that a value of 0 would set both competitors at the same level), which suggests a relatively important 'closing-off' potential of state borders. Yet, in line with our hypothesis H2, this effect is strongly and statistically significantly counteracted by direct neighbourhood to state borders (see the top row of table 1). This indicates that a decision-maker from a border-municipality perceives, *ceteris paribus*, much higher competitive pressure from other German states than decision-makers from municipalities in the interior of the state. Nevertheless, even a border-municipality perceives significantly higher competition intensity from municipalities within their own state (-3.155+1.953=-1.202; p=0.002). However, this disaggregation of the constant demonstrates that the apparent strength of the 'closing-off' effect of state borders is predominantly driven by the distance of most municipalities to state borders (i.e., the adverse *proximity effect*, see below), and not by the *border effect* itself.

Replacing the dummies for adjacent municipalities with the distance to the closest municipality beyond a state border (and its squared value) in column (2), two things are worth emphasising. First, the value of the constant term, which now represents the

Table 1: **Effect of subnational borders, OLS regressions**

|	Relative Perceived Competition with municipalities in other states (RPC^{state})	
	(1)	(2)
Neighbour state border	1.953***	
	(0.335)	
State Border Distance		-0.0490***
		(0.00899)
State Border Distance^2		0.000302***
		(6.88e-05)
Unemployment rate$_{t-1}$	-2.706	0.822
	(17.98)	(17.97)
Population Working-age$_{t-1}$	-5.423	-7.706*
	(4.397)	(4.407)
Left-wing$_t$	0.870	0.286
	(0.964)	(0.964)
Free Voters$_t$	-0.147	-0.0518
	(0.470)	(0.474)
Fiscal capacity$_t$: low	-0.766**	-0.877***
	(0.329)	(0.330)
Fiscal capacity$_t$: medium	-0.527*	-0.465
	(0.317)	(0.317)
Mayor	0.120	0.141
	(0.187)	(0.187)
Log(Population)$_{t-1}$	-0.172	-0.073
	(0.160)	(0.165)
Regional centre	1.567**	1.392*
	(0.748)	(0.758)
Secondary centre	0.710*	0.651*
	(0.365)	(0.368)
Constant	-3.155***	-1.684***
	(0.212)	(0.310)
Observations	712	712
R-squared	0.067	0.071

Standard errors in parentheses: * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

perceptions of mayors on the state border (or, technically, for municipalities where the distance to this border is 0km), is still significantly negative. This re-confirms that, although mayors of municipalities on the border still regard municipalities in their own state as closer competitors than those beyond the state borders, the strength of their perception is much weaker than the estimated average value (which is -3.155, see column (1)). Second, we find a significant non-linear effect of proximity to borders.

In order to evaluate the implied persistence of the border's effects in more detail, it is instructive to switch to the results from the natural spline regressions, which are visualised in figure 2. These results first of all confirm that the null hypothesis of "no border effect", i.e., municipalities regard internal and external competitors as equally important, can be rejected even for municipalities with a very low distance to other states (i.e., the 95%-confidence interval around the point estimate never encompass 0). Second, the lower bound of the confidence interval around the estimated effect intersects with

the mean value of the dependent variable, which is represented by the horizontal line in figure 2, at a distance of 20.3 kilometres. This indicates a significant and strong (but declining) proximity effect in the perceptions of the mayors of municipalities up to 20.3 kilometres from the state border (in line with H1). Beyond this point, the estimated value is no longer statistically significantly different from the average of all jurisdictions. Consequently, our results indicate that politicians' perceptions become 'immune' to extra-regional competitive forces at distances beyond 20km from the border. Altogether, 233 out of the 1108 municipalities of the state are located within this critical distance (21.0%).

Figure 2: **Subnational borders, natural spline regressions**
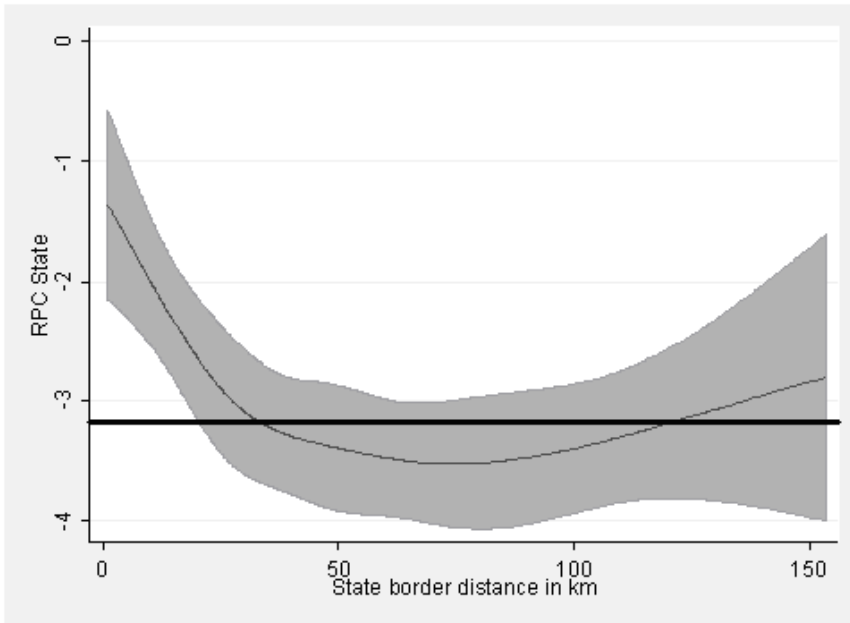
Note: Smooth line is obtained by cubic spline with five knots. 95% confidence interval indicated by shaded area. Straight line represents mean value of RPC^{state} = -3.17.

4.2 Effect of international borders

Turning to the analysis of international borders, our results are summarised in table 2. In column (1), we do not differentiate between the French and Swiss border and focus on direct adjacency to one of these countries. The estimated coefficient of the constant is again negative and even larger than in the previous section. Although we once again find that this effect is counteracted by direct neighbourhood to the border (see the top row of table 2), this reductive effect is both substantively and statistically ($p < 0.10$) weaker than in the sub-national case. Both these results imply that international borders are

indeed perceived by local mayors as 'stronger' borders than regional ones (supportive of H2). Interestingly, this finding helps illuminate recent failures to find cross-border interactions by means of traditional spatial econometrics techniques in the tax setting of French and German municipalities (Cassette et al., 2010). Indeed, our findings suggest that politicians generally perceive country borders to be relatively strong, and therefore focus predominantly on the decisions of neighbours on their own side of the border. The only exceptions are those in charge of a municipality in very close proximity to this border, as we will see below.

In order to evaluate H3, we differentiate in column (2) between the effect of the Swiss and the French border. The results indicate that the effect of the Swiss border is about twice the size of that of the French one. It also is significantly different from zero at the 10% significance level, whereas the effect of adjacency to France remains statistically insignificant. Given the different nature of both borders, one tentative explanation is that politicians perceive the cultural dimension of these respective borders (i.e., language) to be more important than the institutional dimension (EU versus non-EU).[11] Hence, our results appear supportive of the idea that the effect of international borders varies with the cultural and institutional dimensions of such borders (as proposed in H3). Still, an alternative explanation may lie in Switzerland's aggressive corporate tax policy. The average effective tax rates of the adjacent cantons' capitals ranged from 13.9 to 20.9% in 2009, compared to 34.2% in the French city of Strasbourg and between 21.9 and 26.8% in the state of Baden-Württemberg (see BAK Basel 2009).

We obtain the results in columns (3) and (4) by replacing the border dummies with the minimum distance to the closest foreign municipality. As before, the value of the constant term rises above the average value, indicating that mayors' perception of municipalities in their own state as closer competitors than those beyond the country's borders is weaker in municipalities *on* the border than in municipalities away from the border.[12] The difference, however, is much weaker than in the regional-border case, reinforcing our earlier finding that local mayors perceive international borders as 'stronger' borders than

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[11] A potential problem here is that many direct neighbours to France have a sizeable distance to the next French city because the river Rhine runs between them. Restricting the sample to those municipalities with a direct connection to France via a bridge or ferry (13 observations), however, does not affect our results in terms of both coefficient estimate and statistical significance (available upon request).

[12] Note that the intercept in column (4) obviously becomes meaningless since no municipality can at once be at 0km distance from France, Switzerland *and* Austria. Hence, this interpretation is only valid for column (3).

Table 2: **International borders, OLS regressions**

	Relative Perceived Competition with municipalities in other countries ($RPC^{country}$)			
	(1)	(2)	(3)	(4)
Neighbour International Border	0.942*			
	(0.484)			
Neighbour Int. Border: FRA		0.652		
		(0.677)		
Neighbour Int. Border: SUI		1.226*		
		(0.672)		
Int. Border Distance			-0.0215**	
			(0.0106)	
Int. Border Distance^2			0.000132*	
			(7.48e-05)	
Int. Border Distance: FRA				-0.0391*
				(0.0227)
Int. Border Distance^2: FRA				0.000159**
				(7.24e-05)
Int. Border Distance: SUI				-0.0175*
				(0.0106)
Int. Border Distance^2: SUI				0.000149
				(0.000115)
Int. Border Distance: AUT				-7.55e-05
				(0.0140)
Int. Border Distance^2: AUT				-7.23e-05
				(7.71e-05)
Unemployment rate$_{t-1}$	0.882	1.097	7.020	13.52
	(21.40)	(21.41)	(21.76)	(22.67)
Population Working-age$_{t-1}$	-4.494	-4.188	-3.894	-3.972
	(5.209)	(5.235)	(5.211)	(5.322)
Left-wing$_t$	-0.108	-0.129	0.0623	0.272
	(1.138)	(1.139)	(1.143)	(1.164)
Free Voters$_t$	-0.971*	-0.981*	-0.775	-0.714
	(0.559)	(0.559)	(0.575)	(0.587)
Fiscal capacity$_t$: low	-1.049***	-1.048***	-1.069***	-1.084***
	(0.390)	(0.391)	(0.391)	(0.396)
Fiscal capacity$_t$: medium	-0.609	-0.612	-0.606	-0.605
	(0.376)	(0.377)	(0.376)	(0.376)
Mayor	0.193	0.187	0.193	0.189
	(0.222)	(0.222)	(0.222)	(0.222)
Log(Population)$_{t-1}$	-0.207	-0.211	-0.164	-0.156
	(0.190)	(0.190)	(0.192)	(0.198)
Regional centre	1.770**	1.753**	1.553*	1.354
	(0.887)	(0.887)	(0.894)	(0.911)
Secondary centre	0.814*	0.820*	0.757*	0.681
	(0.431)	(0.431)	(0.433)	(0.443)
Constant	-3.757***	-3.748***	-3.041***	-0.464
	(0.251)	(0.252)	(0.403)	(2.606)
Observations	712	712	712	712
R-squared	0.034	0.035	0.035	0.040

Standard errors in parentheses: * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

regional ones. As before, we also find a significant non-linear effect of proximity to the border. This finding is replicated when separating France, Switzerland and Austria, although the results for Austria remain statistically insignificant.[13] The associated natural

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[13]Although Baden-Württemberg does not share a border with Austria, we pick it up here as it is the nearest country for a small number of municipalities.

spline regressions, depicted in figure 3, differ from those for the state borders in two central respects. First, we observe that the border effect is much stronger in the case of country borders (as could also be gathered from a comparison of tables 1 and 2). Second, the proximity effect is much weaker than in the regional-border case and ceases after a much shorter distance. Already at a distance of 12.5 km, the lower bound of the confidence interval intersects the abscissa indicating the mean value. In other words, for municipalities more than 12.5 kilometres away from the neighbouring country, 'proximity' to the border no longer affects decision-makers' perceptions of the intensity of international competition.[14] Even so, 105 municipalities (9.5% of all municipalities in the state) are located within this critical distance. The geographical location of municipalities within the critical distance to a state or country border is visualised in figure 4.

Figure 3: **International borders, natural spline regression**
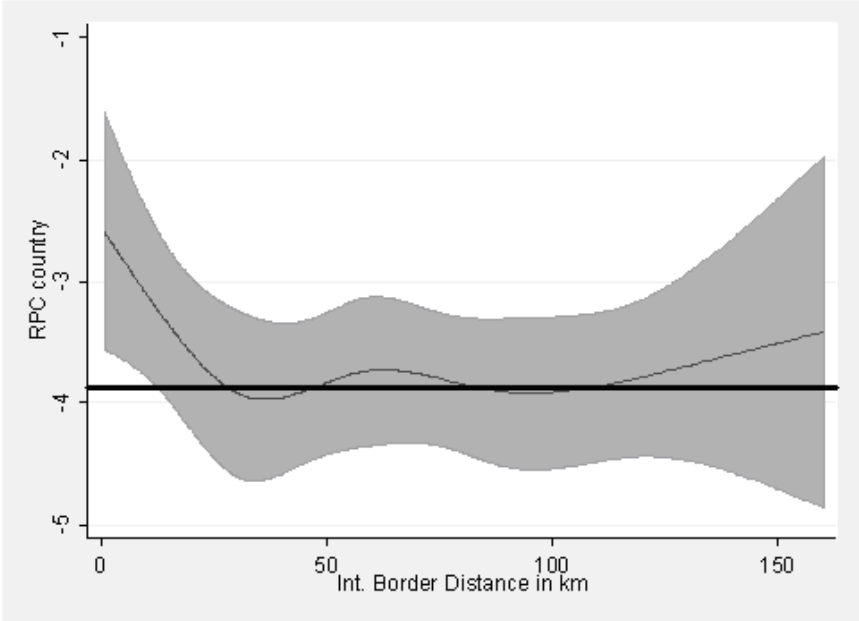
Note: Smooth line is obtained by cubic spline with five knots. 95% confidence interval indicated by shaded area. Straight line represents mean value of $RPC^{country}$ = -3.88.

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[14]This might in part explain the non-significant effects for Austria discussed above. Indeed, since there are only few municipalities with a rather low distance to Austria in the sample, the fact that the effect of proximity to other countries ceases quickly implies we cannot expect a strong effect for Austria.

Figure 4: **Location of municipalities within critical distances**
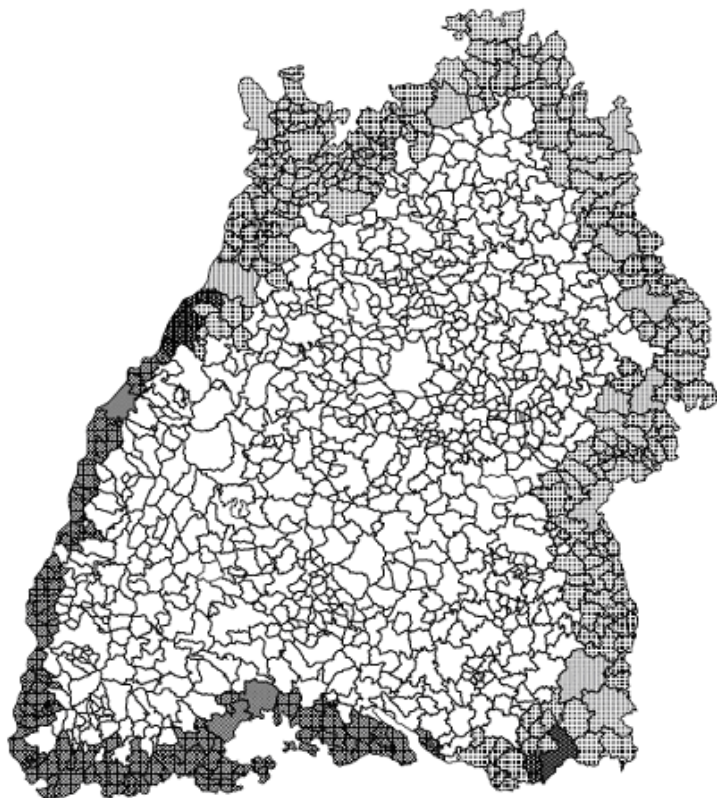
Light-coloured: distance to closest municipality in other German state < 20.3km; *Intermediate-coloured*: distance to closest municipality in other country < 12.5km; *Dark-coloured*: distance to closest municipality in other German state < 20.3km and distance to closest municipality in other country < 12.5km

Before we conclude, we should say a few words about the results of our control variables, which perform fairly consistently across tables 1 and 2. Most significantly, we find that the local system of fiscal equalisation indeed appears to affect the competition perceptions of decision-makers in municipalities with low (and, to a lesser extent, medium) fiscal capacity. In line with the idea that this system compensates such municipalities for losses in their tax bases relative to other municipalities in the state, their mayors perceive that competition is rather a local issue. We also confirm that decision-makers of highly agglomerated cities, as they are generally more exposed to external competition, perceive competitive pressures to come relatively more from extra-regional municipalities (see also Janeba and Osterloh, 2010). Neither the local unemployment rate nor the population of working age plays a significant role in politicians' perceptions. Furthermore, political variables play no consistent role in our estimations either.

5   Concluding discussion

A common characteristic of existing work investigating local-level spatial policy interactions is that the specification of the neighbourhood matrix, which defines who is expected to compete with whom, occurs solely with respect to other jurisdictions *within* the region under study and, consequently, by assumption ignores the potential influence of jurisdictions in neighbouring regions. Analysing German local politicians' perceptions about their municipality's main competitors in the struggle for business investments (i.e., other jurisdictions *a)* in their own region, *b)* in other regions in the same country, or *c)* in other countries), we evaluated the credibility of this assumption. Our results provide at best a partial confirmation. Specifically, we find that local decision-makers on average indeed regard municipalities in their own state as much closer competitors than those beyond the state borders. Crucially, however, we show, that location close to a border significantly undermines the perception that the fiercest competitive pressure derives from jurisdictions *within* their own state. Moreover, this effect is stronger for, and is felt at further distances from, subnational than inter-national borders. Overall, nearest municipalities appear keenly aware of each other as competitors for mobile capital. This effect persists independent of the state or country where they are located.

In our view, these results have two important practical implications. First, they provide a parsimonious explanation for the presence of cross-regional local-level strategic interactions (e.g., Brügger and Parchet, 2010) and the difficulties to identify equivalent cross-country interactions (Cassette et al., 2010). Indeed, our findings suggest that it is politicians' perceptions about the relative constraints imposed by these different types of borders that defines the (absence of) reaction to extra-regional jurisdictions' actions. Moreover, our empirical approach allows us to quantify the spatial extent of such border-related effects. In particular, whereas the proximity to international borders ceases to affect local decision-makers' opinions at a distance of about 12.5km, the proximity to subnational borders plays a role up to about 20km. Interestingly, the latter finding is in close accordance with recent findings by Brügger and Parchet (2010) using a sample of Swiss municipalities separated by a cultural border. They show that jurisdictions' tax choices are constrained by tax competition at a distance of up to 20 kilometres. Our results suggest that these conform findings may well result from the fact that decision-makers do not consider municipalities beyond this critical distance as their rivals in the

competition for mobile capital. This also corroborates with the finding by van Dijk and Pellenbarg (2000) that firm migration is mostly short distance; short distance moves allow firms to keep most of their workforce since it is within a reasonable commuting distance. Moreover, within the identified critical distance firms can still maintain relations with local suppliers or selling markets as well as local networks.

Second, our results imply that if one refrains from taking these inter-border links into account, one runs the risk of attributing the fiscal reactions of the analysed jurisdictions to an inappropriately constrained reference group of competing jurisdictions; this could result in an overestimation of the spatial interaction coefficient. The results of our natural spline regressions suggest that the likelihood of obtaining such biased estimates is sub-stantial; indeed, no less than 21% of all municipalities in our sample are located within the critical distance to a state border, and 9.5% within the critical distance to another country. Inappropriate coding of such a large share of observations is unacceptable. Con-sequently, future studies of local-level policy interactions in regional science and urban and public economics should *either* move beyond the customary single-region design (as, e.g., Brügger and Parchet, 2010; Cassette et al., 2010; Gérard et al., 2010) *or* refine the commonly used contiguity- or distance-based neighbourhood matrices. Since one often lacks comparable data when trying to include jurisdictions from a different administrative region or country, the second option appears most feasible. Specifically, given the differ-ences in the perceptions of their local decision-makers, jurisdictions near a border should be treated differently (i.e., receive a different weight in the spatial weights matrix reflect-ing this difference in perceptions) from 'inland' jurisdictions to avoid biased inferences. Alternatively, one could account for any potential distinctiveness of border-jurisdictions by splitting up the weights matrix into multiple independent matrices for border- and non-border jurisdictions (see also footnote 3).[15] At the very least, robustness analyses should be presented indicating whether or not the inclusion/exclusion and/or different treatment of border-jurisdictions affects the inferences from the analysis.

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[15]Based on our finding that different types of borders can have different effects (e.g., regional versus national borders, France versus Switzerland), such differential treatment should – ideally – take the specific context of the jurisdiction into account and depend on the extent to which two jurisdictions separated by a border are close or distant substitutes.

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6 Appendix

Table 3: Means of respondents and non-respondents

Variable	Mean: Respondents	Mean: Non-respondents	t-test for equal mean (p-value)
Neighbour State Border	0.076	0.066	0.576
State Border Distance	50.871	52.938	0.378
Neighbour International Border	0.051	0.072	0.165
Neighbour Int. Border: FRA	0.025	0.035	0.405
Neighbour Int. Border: SUI	0.025	0.041	0.176
Int. Border Distance	61.268	61.074	0.940
Int. Border Distance: FRA	80.708	86.778	0.044
Int. Border Distance: SUI	101.664	92.393	0.013
Int. Border Distance: AUT	138.882	129.812	0.006
Log(Population)	8.710	8.357	0.000
Unemployment rate	0.019	0.018	0.010
Share working-age	0.655	0.657	0.284
Left wings	0.185	0.158	0.008
Free voters	0.465	0.534	0.001
Fiscal Capacity: low	0.389	0.465	0.022
Fiscal Capacity: medium	0.518	0.475	0.198
Regional centre	0.020	0.006	0.109
Secondary centre	0.103	0.069	0.088

Table 4: Variable definitions

Variable	Description	Mean	Std. Dev.	Min	Max	Source
Log(Population)	Logarithm of total population	8.710	0.978	5.814	13.296	Statistical Office of Baden-Württemberg (SOBW)
Unemployment rate	Share of registered unemployed in total population	0.019	0.006	0.006	0.040	SOBW
Share Workage	Share of population aged between 15 and 65 years	0.655	0.021	0.571	0.742	SOBW
Left wing	Seat share of left-wing parties in local council	0.185	0.150	0	0.571	SOBW
Free voters	Seat share of free voter unions ("Freie Wählervereinigungen") in local council	0.465	0.297	0	1	SOBW
Fiscal Capacity: low	Dummy = 1 if fiscal capacity is smaller than 0.6; highest transfers from the local system of fiscal equalisation	0.389	0.488	0	1	SOBW
Fiscal Capacity: medium	Dummy = 1 if fiscal capacity is between 0.6 and 1.0; moderate transfers from the local system of fiscal equalisation	0.518	0.500	0	1	SOBW
Regional centre	Dummy = 1 if classified as regional centre ('Oberzentrum'), highest category of centrality in German spatial planning policy	0.020	0.139	0	1	Wirtschaftsministerium Baden-Württemberg
Secondary centre	Dummy = 1 if classified as secondary centre ('Mittelzentrum'), second highest category of centrality in German spatial planning policy	0.103	0.304	0	1	Wirtschaftsministerium Baden-Württemberg
Mayor	Dummy = 1 if response directly from mayor	0.475	0.500	0	1	Own survey