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Abstract

This contribution studies the determinants of intermunicipal cooperation for small Hessian municipalities. Existing contributions have highlighted the role of cooperation demand factors, for example fiscal stress or demographic factors, on the one hand, and transaction cost issues on the other. This study asks how the spatial neighbourhood affects cooperation decision making taking characteristics of neighbouring municipalities into account (cooperation supply). The study focuses on intermunicipal cooperations in the field of labor intensive public administration services, for example, management and accounting tasks, personnel administration or civil registry offices. We find that the main driving forces are fiscal stress, population growth and size heterogeneity. Neighbourhood-related supply factors are only weakly significant. Cooperation is more likely for municipalities that are part of a set of neighbouring municipalities which are heterogeneous with respect to size.

JEL Classifications: H11, H77, H83

Keywords: Intermunicipal cooperation, neighbourhood structures, cooperation demand, cooperation supply, heterogeneity

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1 Introduction

During the last decades, municipalities have been facing strong challenges to cope with. They are required to meet steadily rising demands and standards for local public goods and services by the citizens (Hulst et al., 2009). Increased mobility and demographic change have led to an intensified competition for residents and businesses. Given that most municipalities suffer from tight budget or debt constraints and limited municipal autonomy to levy additional sources of revenues, municipal politicians are required to find answer to the question of efficient public service provision. Scholars of fiscal federalism and administration research agree that the historically grown jurisdictional borders are often inadequate to efficiently provide local public services (e.g. Bel, Fageda, and Mur, 2012; Spannowsky, 2009). Municipal borders do not meet the true requirements for efficient service provision. Moreover, the spatial requirements for efficient service provision differ by the type of service to be provided. To cope with this shortcoming, the idea of flexible cooperative solutions has been attaining more and more attention by national and subnational governments and administration (see Lenk and Falken-Großer, 2008). Some solutions do not allow to fully address the efficiency problems due to high costs of implementation and inflexibility (e.g. territorial reforms) and due to reasons of maintaining political autonomy (e.g. privatization). In Germany politicians on the state levels tend to support the idea of efficiency gains through cooperation and have run programs to induce local governments to engage in cooperation activities. Several conditional grant programmes require intermunicipal cooperation as a precondition for funding (e.g. LEADER, Stadtumbau Hessen). The state of Hessen even issues a specific conditional grant program and a competence center for intermunicipal cooperation to foster cooperative solutions in the field of local public administration.[1]

Although the issue of voluntary intermunicipal cooperation addresses key aspects of strategic behaviour and resource scarcity, there has been little attention from the current economics literature. Existing contributions mainly from public administration research, focus on intermunicipal cooperation in U.S. metropolitan areas. Although these contributions have provided convincing empirical evidence as well as a theoretical framework based on institutionalist arguments, there is still need for research "[...] to produce a consensus on the motivations for using these agreements [...]" (LeRoux and Carr, 2007). For countries other than the U.S., there are only few quantitative attempts to explain the occurrence of intermunicipal cooperation.

This study contributes to filling this gap along the case of small German municipalities. It addresses the following question: Why do some municipalities start to cooperate in the provision of public services whereas others do not? The objective is to identify the main influential factors for the cooperation decision. Existing contributions dealing with the is-

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[1]Hessisches Ministerium des Innern und für Sport, 2011.

sue of cooperation determinants have emphasized the role of potential gains, demographic and regional characteristics and transaction costs (see section 2). So far, however, spatial relations and characteristics of potential partners have been largely neglected. Therefore, we explicitly account for the role of neighbourhood characteristics. This means that we focus on the relationship of the municipalities and their close neighbours instead of larger regions or counties. The approach has three distinctive features. First, we introduce the concept of cooperation supply in order to amend the traditional transaction cost and demand based perspective: Cooperation activities will only take place if potential partner municipalities are also willing to cooperate. Moreover, the set of potential partners is exogenously determined through geographic location. If, for example, the fiscal situation of the neighbours does not create a need for cooperation activities cooperation is unlikely even if the municipality in the center reveals a high demand for cooperation. This means that neighbourhood characteristics also matter for the emergence of intermunicipal cooperation. Second, we use different transaction cost measures than former studies. In this study, transaction costs are captured in terms of differences between municipalities and their neighbours rather than using counties, districts or regions as reference groups. Third, the hypotheses are tested based on a cross sectional survey dataset and official data of small German municipalities. As there is still a large gap in quantitative empirical research on intermunicipal cooperation in Germany this study contributes to deepen the understanding of the German municipal governance.

The major results are the following: Demand factors, especially fiscal stress and population growth affect the probability of cooperation. Municipalities are more likely to engage in cooperation activities if they suffer from high fiscal stress. Growing municipalities seem to be more likely to cooperate. Internal transaction costs due to population diversity or geographic dispersion are positively related to the cooperation decision. The estimation results show no significant cooperation supply factors. Furthermore, the results suggest that municipalities are more likely to engage in cooperation activities if they differ from their median neighbour.

The paper is organized as follows: The following section 2 briefly reviews existing theoretical and empirical contributions from the intermunicipal cooperation literature and related fields of research. Section 3 lays out the main hypotheses and theoretical arguments. Specifically, we distinguish three major decision impacts: cooperation demand, cooperation supply and transaction costs. In the subsequent sections we present the German and Hessian institutional background and the data. Sections 6 and 7 present the empirical approach and estimation results. Section 8 discusses the results with respect to our hypothesis and related studies. The final section concludes.

2   Related literature

2.1   Theoretical contributions

Traditional fiscal federalism literature discusses the advantages and disadvantages of decentralized public service provision.[2] The famous decentralization theorem demands that public goods and services should be provided at the lowest government level "encompassing [...] the relevant benefits and costs" (Oates, 1999). It is based on the central assumption that lower government levels are relatively better informed about citizens' preferences than the central government and are therefore better suited for service provision.

The discussion of federal systems also has shown two main sources of inefficiency from decentralized local service provision: economies of scale and regional spillovers. The former arise when the provision of the public goods or service requires a certain minimum capacity or is characterized by a large share of fixed costs. An increase in the number of users leads to lower average costs. Regional spillovers are spatial externalities which arise if the goods and services provided by a central located jurisdiction are consumed by citizens of surrounding jurisdictions without having to pay for them. In other words the principle of fiscal equivalence, which requires beneficiaries of government services and taxpayers to congrue, is violated (Olson, 1969). Essentially this means that there is a mismatch between the actual and the optimal jurisdictional borders. As long as there is no form of interjurisdictional compensation, the amount of the provided services is inefficiently low. Intermunicipal cooperation can be seen as one of many instruments to address the issue of fiscal equivalence.

The seminal paper on a "Theory of clubs" by Buchanan (1965) has been the starting point of the concept of functional federalism. Efficient provision of the citizens with local public goods and services requires a specific jurisdictional size. It has been widely accepted that historically or politically grown formal jurisdiction boundaries are inappropriate in terms of efficient provision of services. Voluntary formation of "clubs" allows municipalities to create different jurisdictional sizes with respect to the characteristics of the public good or service to be provided. Frey and Eichenberger, 2001 take this argument even one step further proposing an institutionalized system of competing and overlapping jurisdictions. In this sense cooperative service provision can be seen as a flexible bottom-up form of club creation between municipalities (Bartolini and Fiorillo, 2008). Other instruments, such as territorial reforms, centralization of public tasks and privatization can also help fight inefficiencies. In contrast to voluntary horizontal cooperation activities, however, these instruments pose stronger restrictions on local autonomy due to the transfer of responsibilities to new or higher government levels or to private firms (see Hulst and

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[2]The generic term *public services* encompasses local public goods in the sense of Oates (1972) as well as impure public goods or private goods provided by state or municipal agencies.

Montfort, 2007a). Horizontal cooperation therefore allows local units to address efficiency problems and maintain political autonomy.

Regarding the realization of efficiency gains through scale economies an increasing number of authors views intermunicipal cooperation as substitute for privatization of local public services (e.g. Bel and Fageda, 2008; Bel, Fageda, and Mur, 2012; Warner, 2011): The advantage of cooperative solutions over privatization is that municipalities maintain control over public service provision. Private production may lead to bureaucratic slack or an insufficient degree of service provision on the one hand and to deterioration of the conditions of employment on the other (Holcombe, 1991). In technical sectors such as water supply and sewage disposal, for example, the superiority of private solutions is heavily questioned since market competition is limited through the high share of sunk costs creating market entry barriers (e.g. Wackerbauer, 2011). Therefore privatized service production is only feasible if there are substantial efficiency gains from market competition. Recent studies have argued that for small municipalities access to private providers is more limited than for larger cities which makes intermunicipal cooperation more attractive for them (see Bel, Fageda, and Mur, 2012).

To date, theoretical contributions to intermunicipal cooperation have been relatively scarce. Probably the most coherent and systematic theoretical treatment - the institutional collective action approach (ICA) - stems from the public administration and metropolitain governance literature: Feiock (2007) develops several propositions which relate the emergence and durability of cooperative agreements to the institutional context of local communities. He distinguishes between two types of benefits to intermunicipal cooperation: Collective benefits and selective benefits. The former type uses classic concepts of efficiency gains from economies of scale and internalization of spillovers whereas the latter type refers to private interests of local stakeholders. Building on Inman and Rubinfeld (1997), Feiock (2007) views the cooperation decision as a transaction cost minimization problem. More precisely, cooperation takes place if the expected gains exceed the total costs of cooperation including transaction costs. Contributions of the institutional economics literature distinguish several forms of transaction costs (e.g. Richter and Furubotn, 1996): costs of information/coordination, of negotiation and gain division, enforcement and monitoring and agency costs. In the intermunicipal context transaction costs are believed to be positively related to the degree of homogeneity between municipalities and within municipalities (see Feiock, 2007, proposition 2a). This is in line with the theoretical cost function framework by Adelaja and Racevskis (2005) which encompasses several concepts of cooperation cost to evaluate the implications for cooperation effectiveness. They conclude that homogeneous municipalities are more likely to cooperate than unequal municipalities due to lower transaction costs or a higher likelihood of sharing common objectives.

On the one hand, ICA theory focuses on community and leader characteristics which drive the local demand for cooperation. On the other hand, it focuses on the impact of the four types of transaction costs (see Kwon and Feiock, 2010). Whereas the individual municipalities' demand and transaction cost impacts have been addressed in numerous empirical studies (see Krueger, 2010), the supply side of cooperation has received only limited attention. In this paper we highlight the role of cooperation supply. Cooperation supply factors decide whether the potential partners are willing to cooperate. Supply can therefore be understood as an aggregate of the potential partners' cooperation demand. The concept captures, whether a municipality is located in a cooperation friendly environment.[3] In the empirical part of this paper we control for (spatial) neighbourhood variables to operationalize the supply side.

There are very few economic studies which explicitly use a formal model approach to intermunicipal cooperation. One exception are Bartolini and Fiorillo (2011) who develop a model based on the Dixit-Stiglitz monopolistic competition framework (Dixit and Stiglitz, 1977) to analyze the feasibility of different organisational arrangements of shared service provision. The monopolistic competition approach allows for scale economies as well as scope economies through assumption of love-of-variety preferences. Their model compares the trade-off between cooperation gains and the loss of political or administrative power for two types of intergovernmental arrangements: Unions (a strong institutionalized form of cooperation with high discretionary power, but high political transaction costs) and consortia (a weaker institutionalized form with lower discretionary power and lower political transaction cost). They find that the optimal organizational form of cooperation is determined by the elasticity of substitution of public services provided, the number of users and the level of transaction cost. This result implies that it is important to distinguish the cooperation issues according to the types of services.

2.2 Empirical contributions

During the last decade, there has been a growing body of empirical studies on intermunicipal cooperation. One group of ICA oriented studies addresses the determinants of intermunicipal cooperation by focusing on U.S. cities with a population of at least 50,000 inhabitants located in metropolitan areas (e.g. Feiock, Steinacker, and Park, 2009; Krueger and Bernick, 2010; LeRoux, Brandenburger, and Pandey, 2010). These studies largely rely on and elaborate the institutionalist framework investigating the impact of transaction costs on the cooperation decision. Krueger and Bernick (2010) estimate a two-step selection model to explain the emergence (step 1) and the intensity (step 2) of intermunicipal agreements among U.S. cities. They show that a central government may

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[3]Some researches have investigated the role of regional characteristics and geographical fragmentation (see section 2.2). These concepts are different from cooperation supply. Specifically they neglect that the uniqueness of the individual municipalities location leads to different sets of potential partners.

set incentives for municipalities to cooperate by limiting substitute policies which tend to be more feasible to serve the interest of the local decision makers.

The municipal fiscal situation has been widely accepted as a central factor to explain intermunicipal cooperation. Fiscal capacity is widely seen as a key factor for intermunicipal cooperation demand. Carr, Gerber, and Lupher (2007) analyze the role of local fiscal capacity for horizontal and vertical cooperation on several categories of public services for U.S. metropolitan areas. They report that large cities with strong fiscal capacity appear to be more likely than small towns to self-provide public services and thus reject cooperation. Wealthy municipalities seem to be less likely to cooperate. The majority of studies finds similar support of this observation (e.g. Feiock, 2007; Krueger and Bernick, 2010; Kwon and Feiock, 2010; Lackey, Freshwater, and Rupasingha, 2002; LeRoux and Carr, 2007) although some researches report the opposite (e.g. Steiner, 2003) or who find insignificant impacts of fiscal stress (e.g. Morgan and Hirlinger, 1991). Most of the aforementioned studies use debt or expenditure variables to account for fiscal stress. When it comes to the fiscal effects, however, this does not necessarily mean that cooperation leads to cost reduction: Based on Swiss case study evidence Steiner (2003) finds, for example, that intermunicipal cooperation instead leads to service expansion.

Aside from the fiscal situation several studies analyze or control for demographic characteristics. LeRoux and Carr (2007) report strong evidence for positive population size and growth effects for cooperation in several fields of technical infrastructure. They conclude that intermunicipal cooperation serves as an instrument to deal with growing service requirements due to population growth. Lackey, Freshwater, and Rupasingha (2002) report a negative population growth coefficient for rural municipalities.

Since the issue of demographic change due to aging and population decline is a country specific phenomenon many studies do not (need to) address this issue. Still, some studies report effects from the share of elderly citizens. The evidence and lines of reasoning so far have been mixed: LeRoux, Brandenburger, and Pandey (2010) report a positive sign of the elderly share coefficient, although this variable only served as a control variable for the composition of local citizens. In contrast Morgan and Hirlinger, 1991 report a negative relationship between aging and cooperation activities. They hypothesize that elderly citizens are more involved in local politics and tend to be more conservative with respect to institutional changes (such as starting cooperation activities), but they add that the reason for the negative sign is unclear. For our estimations focus on Germany we use the share of elderly population to capture the demographic change effect. Among industrialized countries, Germany faces severe changes due to demographic changes (Hamm, Seitz, and Werding, 2008). Demographic change materializes in population decline, low birth rates and an aging population (rising median age) (Höhn, Mai, and Micheel, 2008). Population researchers agree that the consequences of demographic change will lead to additional challenges for fiscal policy at all government levels (Seitz, 2008). For munic-

ipalities cooperation can be seen as an instrument to jointly cope with these challenges, especially in order to address the problem of shrinkage and changing demand patterns for local public services.

Post (2002) investigates the relationship between geographic concentration of local governments and intermunicipal agreements. She finds support for the hypothesis that the geographic density of metropolitain area governments measured by the number of local governments per square mile is positively related to the incidence of interlocal agreements. Moreover she identifies an only weakly significant impact of fragmentation on the number of cooperation activities. The results support her hypothesis that geographic relationships matter (see also Post, 2004). LeRoux and Carr (2007) only find weak evidence for the impact of population concentration in the county. Centrally located municipalities may act as service providers to their surrounding neighbours and therefore tend to cooperate more (e.g. Steiner, 2003).

Some authors discuss the role of regional characteristics (e.g. Feiock, 2007; LeRoux and Carr, 2007) or geographic factors (e.g. Morgan and Hirlinger, 1991; Post, 2002). These studies point out that the regional characteristics influence the likelihood of cooperation activities. The former studies control for regional factors by using county information whereas the latter use fragmentation and density measures for metropolitan areas. Cooperation supply as represented by neighbourhood characteristics has only been incorporated into these investigations by controlling for the number of neighbours variable, but the spatial effects of other supply variables have been largely neglected so far. Regional and county data is also used as reference to calculate transaction cost measures. In our empirical analysis we use neighbourhood information for both to capture the supply effects and as reference information for transaction costs.[4]

Whereas intermunicipal cooperation decisions always reveal some kind of spatial pattern, only few studies so far have used spatial modelling methods such as spatial lag or spatial error models in the field of local public administration. A possible (but not satisfactory) explanation may be that spatial modelling approaches entail strong data requirements and cause problems when dealing with missing values. In other fields of strategic local government interaction such as tax competition researchers regularly account for spatial patterns (see Brueckner, 2003, for an overview). Indeed, data on intermunicipal cooperation is less well-defined than tax-rates; in many countries, intermunicipal cooperation, is not even covered by official statistics. To our knowledge studies investigating cooperation using methods of spatial econometrics center around specific institutionalized forms of cooperation: The studies by Di Porto, Merlin, and Paty (2011) and Di Porto, Merlin, and Paty (2013), for example, use spatial models based on a large panel dataset to analyze French intermunicipal cooperation decision making. These authors view the cooperation decision as strategic simultaneous decision making. They focus on a specific

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[4]These issues are discussed in more detail in section 6.2.

form of cooperation where municipalities may voluntarily join a new intermunicipal body with the right to levy an additional tax.

Empirical studies which emphasize the importance of intermunicipal transaction costs for cooperation decision making rely on the concept of heterogeneity. The larger the degree of heterogeneity between the observed municipality and a specified reference group of other municipalities the more costly is the cooperation decision. Feiock, Steinacker, and Park (2009) report a negative impact from economic heterogeneity on the likelihood of cooperation. Many of these studies rely on fixed reference groups by using the deviation of municipal characteristics from the county median. This approach may be problematic for large counties. Moreover, it implies the same reference group regardless of the spatial location of the individual municipality. In this study we therefore propose to measure heterogeneity based on deviations from the median of adjacent neighbours. This heterogeneity measure is closer to the true set of potential partners and uses individual reference groups for each municipality.

Even if the decision to cooperate is frequently justified by strategic or economic considerations it is finally a political decision. Therefore the cooperation decision is subject to the interests of numerous stakeholders such as mayors, council members, but also other important local stakeholders such as the administration staff (Heinz, 2007). Recent studies in the metropolitan governance school deal with the impact of network relationships among municipal politicians. They find that intermunicipal cooperation activities rise with the number of interpersonal contacts and formalized weak tie relationships (e.g. LeRoux, Brandenburger, and Pandey, 2010). Other researchers have analyzed how politicians' career concerns may work as barriers or promotors of intermunicipal cooperation: Bickers, Post, and Stein (2009) report that mayors who engage less in intergovernmental relationships are more likely to seek higher office. Focusing on formal agreements they find that career trajectories of mayors seem to have no relationship with intergovernmental agreements. However, they conclude with the hypothesis that mayors' career trajectories are more likely to be enhanced by informal modes of cooperation as informal relationships allow politicians to develop their political networks. Contrary to the common perception that municipal administrative staff opposes cooperation, Steiner (2003) finds that intermunicipal cooperation has a positive impact on staff motivation due to the changing job descriptions. Some studies assume a party ideology effect (e.g. Bel, Fageda, and Mur, 2012) regarding the preferences between privatization (preferred by conservative and pro-market ideologies) and cooperation (preferred by left-wing parties and labour unions). Since not all fields of municipal activity are well suited for privatization, this hypothesis does not generalize to a clear prediction whether or not certain ideologies are more cooperation-friendly than others. Other political factors such as the concentration of political power in local councils so far have been largely neglected in existing contributions. In this study we control for different degrees of power concentration using a power index.

Compared with the U.S. centered contributions, quantitative research on intermunicipal cooperation in other countries is still beginning to evolve. Depending on the national context the organizational forms and perceptions on intermunicipal cooperation are subject to significant variation. In Germany, the scientific discussion of intermunicipal cooperation emphasizes core-periphery structures between cities and surrounding municipalities (e.g. Heinz, 2000, 2007). In this context the lines of argument reveal strong parallels to the municipal amalgamation and annexation literature which analyses the feasibility of territorial reforms and the creation of larger local jurisdictions (see Lenk and Falken-Großer, 2008). Compared with the formation of new government bodies intermunicipal cooperation provides a way to pursue common objectives without too much citizen resistance (Hulst et al., 2009). Amalgamations and annexations can be seen as the most severe intervention in municipal autonomy. Intermunicipal cooperation is seen to come at the cost of a lack of transparency and thus a loss of political control by the citizens (e.g. Dafflon, 2012; Heinz, 2007). Academic discussion seems to focus on cooperation of medium and large sized cities with their surrounding municipalities rather than cooperation activities among small sized municipalities.

3   Theoretical considerations

Before turning to the empirical study it is necessary to lay out a theoretical foundation. We adapt and borrow from the ICA literature (see section 2), fiscal federalism and public choice research to assemble the key factors that influence intermunicipal cooperation. The emergence of intermunicipal cooperation determined by municipal cooperation demand, cooperation supply and the level of transaction costs. To illustrate our approach, let us consider the four municipalities in figure 1. The figure depicts a stylized (first-order adjacent) neighbourhood of municipalities ($N1$ to $N3$) surrounding municipality M. Municipality M decides whether to engage in cooperation activities with one or more of its neighbours. For municipality M the cooperation probability is a function of its own cooperation demand, the supply for cooperation in M's geographic location and the transaction cost arising from the interaction with its potential partners and the transaction costs from coordinating internal interests of stakeholders.

3.1   Cooperation demand factors

Cooperation demand factors result from municipality specific factors, i.e. idiosyncratic characteristics of the centrally located municipality M. There is a consensus that intermunicipal cooperation serves to create benefits in terms of efficiency gains of local service provision. There are two types of efficiency gains from cooperation: First, economies of scale and scope in municipal service delivery provide ways to reduce (average) costs.
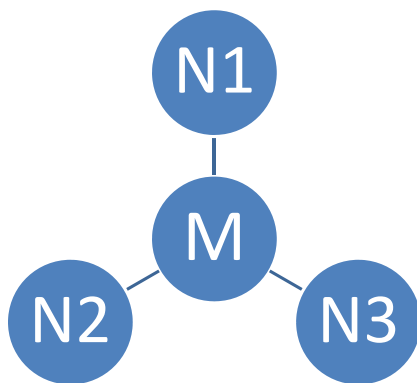
Figure 1: Stylized neighbourhood structure of 4 municipalities

Intermunicipal cooperation is one way to realize such efficiency gains via lower average costs due to economies of scale and/or economies of scope as it extends the number of service users. The scope argument is especially relevant to small sized municipalities: Some services require a minimum number of users to be provided at all. Thus, intermunicipal cooperation can not only help to increase the level of existing services (or produce the current level at lower average cost), but offers the opportunity to provide a larger variety of public services (Bartolini and Fiorillo, 2011). Second, intermunicipal cooperation can be seen as a way to internalize efficiency losses due to free-riding on spatial externalities (spillover effects). The spillover argument can be considered especially important for metropolitan areas and city-periphery settings. In these settings cooperation yields efficiency gains when helps to improve fiscal equivalence (Blume, 2009a; Oates, 1972; Olson, 1969).

If cooperation induces efficiency gains the incentives to cooperate will be higher for "needy" municipalities suffering from strong fiscal burdens. The fiscal situation and past development reflect the municipality's capability of acting. Fiscal stress limits local spending autonomy, especially if the municipality's tax base only allows for limited additional revenue. If – sticking to our thought experiment - municipality M faces a strong fiscal burden because of relatively high structural debt or a low flexibility of improving its own tax base, the demand for cooperation rises - all other things equal.

Another important demand factor is the municipality's demographic situation. First, the municipality size itself affects the need for cooperation activities. Small municipalities have much to gain through the exploitation of scale and scope economies especially if the provided services require a minimum number of users or high initial investments. Large municipalities face opportunities to act as local service providers to surrounding small municipalities. This way they can sell excess capacities of service provision on the one hand and enlarge their political influence in their region on the other hand. Furthermore, some authors argue that large municipalities have a stronger bargaining position and may

therefore realize a larger share of joint gains from intermunicipal cooperation (e.g. Feiock, 2007). Brasington (1999) discusses the size issue for U.S. school districts. He finds that large and small districts are both likely to cooperate whereas for medium sized districts it is unclear whether the loss of political power is compensated through the efficiency gains.

In the light of the demographic development in western European countries, especially in Germany, not only the absolute size, but also the population change will have an effect on the cooperation decision. For shrinking municipalities, population decline may lead to rising per capita costs of local infrastructure. This is especially true for scale sensitive public services. Sewage infrastructure, for example, requires a minimum amount of running water to work. If, due to reasons of demographic decline, this minimum amount is not met the municipal sewage provider will have to flood local sewers with fresh water which in turn creates cost pressures for inhabitants (e.g. rising wastewater fees) and municipal budgets. Fast growing municipalities are required to extend their amounts of services to meet citizen demands. Such municipalities may alleviate this problem by choosing cooperative forms of service provision.

Second an aging population changes the demand patterns for public services. Furthermore aging affects future tax revenues. This leads to several problems for the local level: On the one hand municipalities may have to adjust their scope of public services in order to meet citizens preferences. On the other hand intermunicipal tax competition will intensify as municipalities need to attract businesses and households. Both of these issues are likely to create fiscal stress and thus cooperation demand increases (see Lenk and Falken-Großer, 2008). This is especially the case for small municipalities which may form cooperations for joint public service provision to reduce the costs of adjustment.

3.2 Cooperation supply factors

Intermunicipal cooperation is only likely to occur if it can be expected to be of mutual interest to the municipality and its potential partners. Thus not only M's idiosyncratic characteristics will drive the cooperation decision but also the characteristics of its neighbours and M's spatial location in its respective neighbourhood. Cooperation will be more likely if the neighbouring municipalities also share an interest in the benefits of cooperation. Sticking to the configuration in figure 1 municipality M's propensity to cooperate is affected by the characteristics of the neighbourhood $N1$ to $N3$. The level of cooperation supply depends on the aggregated characteristics of all potential partners for intermunicipal cooperation. It reflects the aggregated need for cooperation of potential partners in a given neighbourhood. Each municipality is located in the middle of a unique set of neighbouring municipalities which may vary regarding number, size and economic conditions.

The use of the neighbourhood to operationalize the concept of potential cooperation partners is justified by empirically observed regularity rather than by theoretical rea-

soning. Indeed some authors argue that adjacency is not a necessary precondition for cooperation activities (e.g. Friesema, 1970). However, our data clearly shows that most cooperations in the field of local public administration involve municipalities who are close neighbours and most projects involve a contiguous area of municipalities with a common border (see section 5 and table 3). The individual neighbour's contribution to cooperation supply decreases with the total number of municipalities in the neighbourhood. E.g., a neighbourhood of five neighbours generates more opportunities for M to form coalitions than a small neighbourhood with only two neighbours. The relevance of adjacency depends on the type of cooperation activity. For physical infrastructure, for example, adjacency is more important due to technical reasons than for regional conferences and planning cooperations.

Cooperation supply will be higher when the potential partners are exposed to tight budget constraints. Consequently, potential cooperation partners will be in higher need to exploit sources of efficiency gains. In the same way as municipality M's individual demographic characteristics affect the cooperation probability we may expect that the demographic development of the neighbourhood will affect the likelihood of cooperation. Cooperation with small potential partners may be more likely through larger mutual benefits from efficiency gains. Demographic change in surrounding municipalities is likely to affect the fiscal and political situation of the center municipality. The shift in local demand for public services through aging and population decline creates externalities within the neighbourhood stimulating the need for cooperative action. An example for such actions is the coordinated handling of doctors shortage in rural areas. Even if the center municipality is not affected by demographic change, it faces strong risks of being exposed to its future consequences if it is located in a shrinking and aging region.

3.3   Transaction costs

The third determinant for intermunicipal cooperation is the barrier of transaction costs. Transaction costs can appear as costs of market transactions such as information costs (including search costs), negotiation costs, enforcement and monitoring costs and as agency costs (e.g. Richter and Furubotn, 1996). As stated by the Coase theorem (Coase, 1960) the potential cooperants could reach Pareto efficient agreements through negotiation if transaction costs were absent and negotiators were fully informed. Scharpf (2000) emphasizes that the Coase result is "highly sensitive to real world departures from these [two] assumptions". Moreover, he states that in real-world situations already the presence of distributional interests creates additional transaction cost problems. Given that a municipality will only cooperate if the expected gains from the cooperative agreement exceed the expected costs (including the transaction costs), the likelihood of cooperation will be higher in low transaction cost setups (see also Feiock, 2007; Feiock and Scholz, 2009). In

the context of intermunicipal cooperation decision making, it is convenient to distinguish two basic categories of transaction costs: Within transaction costs and between transaction costs. Within transaction costs are costs of information, negotiation and agency problems which arise between stakeholders within municipality M. Essentially these are the costs of bringing together the interests of citizens and other local actors which shape the internal decision making process. They apply to both, demand and supply of intermunicipal cooperation. Between transaction costs are bargaining and information costs affecting the interaction between municipality M and its potential partners ($N1$-$N3$).

Let us illustrate the concept of within transaction costs. Even if politicians and mayors act as benevolent representatives of local public interests agency costs may create barriers to pursue the cooperation project: If the composition of population is heterogeneous and therefore citizens attitudes towards cooperation (internal heterogeneity) it will be more costly to cooperate, e.g. because of higher costs of promoting the project ideas to the public. Politicians of homogeneous citizenry are more able to "speak with one voice" as it becomes easier to accomodate citizens' preferences (Oakerson, 2004). Another important factor affecting within transaction costs lies in the degree of geographic dispersion of the municipalities. Dispersed municipalities face higher transaction costs as activities have to be coordinated within the municipalities (i.e. cooperation between the fragmented parts within municipality M). More dispersion leads to a higher diversity of internal stakes and therefore higher coordination costs. When it comes to cooperation decision making or implementation by the local council, within negotiation costs are higher if the local council majorities are narrow. Highly concentrated councils can be expected to reach a solution at lower costs especially if the cooperation is subject to intense debate. This will be likely if the cooperation issue conflicts with feelings of local identity, e.g. if formerly self-provided services will be provided by another municipality. If parties or coalitions have qualified majorities in local councils they are more likely to tackle controversial issues as they do not have to fear large losses of votes in the next election.

We argue that transaction costs between M and its neighbours $N1$ to $N3$ will be lower the higher the degree of homogeneity among the municipalities from the entire neighbourhood. This is in line with the transaction cost hypotheses laid out former studies (see section 2). Thus, the probability of cooperation rises if M is part of a largely homogeneous neighbourhood. Conflicting interests are more likely to occur in heterogeneous neighbourhood setups which lead to higher expected transaction costs of cooperative agreements. Homogeneity among the potential partners reduces the costs of implementing allocation rules. As municipal decision makers act on behalf of their respective municipalities the division of costs and benefits can be expected to be a central issue in the bargaining process. The choice of the sharing rule will lead to similar cost or benefit distributions if the potential cooperating municipalities do not differ significantly. To illustrate this consider a debate about two simple cost sharing rules of the four municipalities in Figure 1. Let

the first rule suggest that each municipality will have to share the same amount of costs (that is total cost/4) for the cooperation project and let the second rule suggest that each municipality's cost share depends on its number of citizens. If the four municipalities are similar in size it will be easier to reach an agreement upon the allocation rule than for heterogeneous municipalities as the result of the sharing rules converge with similarity. Regarding population size Ferris and Graddy (1988) mention a U-shape relationship between size and the likelihood of local service contracting: Small municipalities may benefit from the opportunity to realize scale economies. Large municipalities are more likely to contract out since they have more external options. Brasington (1999) reports this argument for US-school district consolidations. He points out that for small municipalities the benefits of scale economies are likely to outweigh the costs of losing political control. Large municipalities only face few losses of political control when forming cooperation agreements with small municipalities, but they may benefit from exploiting their capacities. It is therefore possible that size heterogeneity in a given neighbourhood could even be positively related to the likelihood of engaging in cooperation activities. In this case the transaction costs of reaching an agreement are outweighed by the potential efficiency gains.

If M is fiscally weak and shares borders with fiscally weak neighbours the likelihood that efficiency gains from cooperation create a win-win situation rises. Consider an asymmetric situation with M being fiscally better off than $N1$ to $N3$: Cooperation will become more difficult on both sides. The political decision makers of municipality M may fear that M will have to contribute more to the cooperation than $N1$ to $N3$ whereas the decision makers in the weaker neighbouring municipalities may fear the danger of being dominated by the stronger municipality. In such asymmetric setups cooperation is entailed with higher transaction cost and thus cooperation probability will be lower than in homogeneous regions. Cooperations intended to cope with the consequences of demographic change will be more likely if the overall region (that is all municipalities M, $N1$ to $N3$) is affected by similar demographic characteristics.

From a party political point of view, we may expect more cooperation between politically close municipalities. Such political closeness may be given by similar party majorities in the local councils or by similar political affiliations of the municipalities' governing mayors. Moreover the duration of professional experience and the existence of political networks of the heads of the local administration will reduce information and bargaining costs as the decision makers of the adjacent municipalities will gain mutual trust (e.g. LeRoux, Brandenburger, and Pandey, 2010). This effect may even countervail the effect of differing party ideologies.

3.4 Public choice aspects

Whereas the preceding theoretical remarks emphasize the traditional normative perspective, it is important to take into account that intermunicipal cooperation decisions ultimately depend on the interests of several local stakeholders, for example politicians and administrative staff. Dropping the assumption of purely benevolent local decision makers the analysis of cooperation decisions enters the public choice sphere (see Mueller, 2008, for an overview). This means that the likelihood of cooperation can be substantially driven by the aims and motivations of local decision makers. Any cooperation requires some degree of compromise between the partners involved. This means that losses of local autonomy will be unavoidable, for citizens, for politicians and for bureaucrats. The consequence are conflicts between individual and public interests. If politicians, for example, expect a loss of power or votes due to their engagement for cooperation, important projects may be delayed or no longer pursued even if they are beneficial to the municipality. Individual stakeholder interests aggravate existing transaction cost problems and therefore raise additional barriers for potential cooperation.

In representative democracies, politicians and mayors do not only represent local citizens but pursue political programmes of their parties. If the field of cooperation activity allows for a privatization alternative (e.g. water supply, public transport or waste disposal), some authors argue that left-wing parties tend to favor cooperation over privatization (see Bel, Fageda, and Mur, 2012). However, if privatization is no option as in many functions related to labor intensive services of local public administration (e.g. cooperation regarding personnel, finance departments) it could be argued that labor unions press left-winged parties to oppose cooperation. Therefore there is no clear ex ante prediction for a party ideology effect, that is whether certain political parties have a general tendency to favor or to oppose intermunicipal cooperation.

In some fields of municipal activity the degree of local identity and the impact of local interest groups will have a strong impact on cooperation demand and on the controversies in the municipal council. Consider for example that two small municipalities M and $N1$ find that their local swimming pools are characterized by high deficits and try to reach an agreement upon a common swimming pool (that is building a new one or just close one of the old ones). It will be likely that in both municipalities the local swimming clubs will press the local government to oppose the cooperation decision if the final location of the pool is in the other municipality. Municipalities with a high degree of local identity may therefore be less likely to cooperate.

It is difficult to make a clear cut between the public choice arguments and the transaction cost arguments. The sphere of public choice is entered when the issues of self interested political agents, bureaucrats and interest groups are concerned. Transaction costs arise even in the case of purely benevolent and welfare maximizing local governments.

It is difficult to separate the two spheres if target conflicts arise: Suppose municipality M is governed by a political majority of party A and municipality $N1$ is governed by a political majority of party B. Then the party differences are likely to reduce the likelihood of cooperation. There are two possible explanations why this is the case: First, the party differences create information costs to determine the potential partners objectives and which make it costly to join a common project. In this case the political effect on cooperation is essentially a question of transaction costs. These costs are present even if both parties were purely benevolent. Second, the politicians of party A (B) may refuse joining a common project with a municipality governed by party B (A) because they fear a loss of party influence or the loss of votes at the next election. In this case the argument is a public choice problem. As long as the politicians motives for or against intermunicipal cooperation cannot be empirically observed we are not able to distinguish these effects.

4   Institutional background

Before turning to the empirical results we give a brief overview of the German federal system.[5] The German federation consists of three tiers: Bund (federation), Länder (states) and municipalities. The municipalities form the lowest level. By the federal constitution municipalities are regarded as part of the political systems of the Länder (see Reissert, 2006). There are intermediate levels called Landkreise (counties) which consist of several municipalities. Counties are mainly funded by contributions of their member municipalities, but they are considered as jurisdictional entities at the municipal level and perform functions which smaller municipalities are not able to fulfill (see Reissert, 2006) or which require centralized coordination between several municipalities. Large cities are typically not a part of the counties, but may carry out county tasks aswell as city tasks. Such cities are called county independent cities ("Kreisfreie Städte"). The fact that municipalities are subject to the Länder authority leads to interstate differences in the laws of municipal organization. In the German political system, municipalities supply several important public goods and services. Here three types of functions can be distinguished: Voluntary functions (e.g. swimming pools, local museums, theaters), mandatory functions (e.g. schools, water and energy supply, waste disposal, sewage treatment, fire services) and mandatory functions executing higher level government tasks (e.g. social assistance, local elections, registrations). Regarding the performance of voluntary functions municipalities have wide autonomy. They may decide upon the level and ways of service provision. Mandatory functions are prescribed by higher level governments. Here municipalities may generally only decide upon the ways of service provision. In the case of transferred

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[5]The following illustrations mainly draw from existing reviews by Baskaran (2012), Hoffmann-Martinot and Wollmann (2006), Reissert (2006), and Zimmermann (2009).

mandatory functions municipalities act as agents of the states or the federation providing services according to state or federal laws.

German municipalities are entitled to several sources of revenue such as taxes, user fees and intergovernmental transfers from the municipal equalization system. They receive a 15% share of income and value-added taxes collected within their jurisdiction. Although these tax-shares account for a large proportion of the municipal budget the municipalities cannot influence the tax rates. With regard to municipal autonomy the most important taxes are the local business tax (Gewerbesteuer) and property taxes (Grundsteuer A and B). Here municipalities may determine the effective tax rate levels autonomously by choosing a tax multiplier. Aside from the business tax and the property tax the municipalities have taxing autonomy for some smaller local taxes (e.g. dog tax) (Zimmermann, 2009). Heinz (2007) argues that the present system of local finances leads to competition between core cities and their environs which complicates cooperative relationships.

Aside from taxes and user fees municipalities also receive intergovernmental transfers from the state government. Two general types can be distinguished: General transfers ("Schlüsselzuweisungen") and earmarked conditional grants. General transfers are based on the municipalities difference between a fiscal need measure and a fiscal capacity measure. The grant system reduces inequality between municipalities, but leaves the ranking largely intact (see Bischoff et al., 2013, for further details).

The state of Hessen is located in the center of Germany. Hessen's federal structure encompasses 426 municipalities including 5 county independent cities and 21 counties. The state is divided into three administrative regions ("Regierungsbezirke"). Municipal council elections take place every five years. The council acts as local legislative body. The main local parties are the christian democrats (CDU), the social democrats (SPD), the green party and the free democrats (FDP) who also act at the state and federal levels. In council elections the strongest group aside from the main parties are the free voter associations who do not represent a specific program or ideology but reflect the political commitment of the municipal citizens aside from an institutionalized party structure. Moreover, there are numerous local parties with specific local election programs. The mayor is directly elected (usually in separate elections). He leads the magistrate, the governing board of the municipal administration. In magistrate decisions the mayors vote is counted as "primus inter paris" (first among equals). This means that the mayors vote finally decides when magistrate votes are undetermined (Dreßler, 2010).

Hessian intermunicipal cooperations are subject to a state wide cooperation law (KGG[6]). The cooperation law allows for cooperations under public law and under private law. Public law cooperations include intermunicipal agreements and task forces as weakly formalized forms of cooperation (Fuchs and Abel, 2004; Schmidt, 2005). Single purpose associations ("Zweckverbände") are a strong form of intermunicipal cooperation subject

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[6]Gesetz über die kommunale Gemeinschaftsarbeit.

to the state's legal supervision (Blume, 2009b; Heinz, 2007). They act as own legal entities with funded by contributions of their member municipalities. Such cooperations perform specifically defined services. Single purpose cooperations are most frequently formed for cooperative provision of capital-intensive public infrastructure (water, sewer, waste disposal). Private law forms of cooperation largely take the form of limited liability companies (Fuchs and Abel, 2004). They apply to public services which benefit from fast decision making processes and yield gains from outsourcing. Therefore private forms rather deal with subjects of technical infrastructure than administrative services (Blume, 2009b; Heinz, 2007).

5   Data

Although intermunicipal cooperation is an important issue in Germany and Hessen there is no systematic official data on existing cooperations and intermunicipal relations. An exception are single purpose associations under public law. Other forms such as intermunicipal agreements, treaties do not show up in official statistics. To obtain valid information, we therefore conducted a survey among all 426 municipalities in Hessen during autumn 2011. The questionnaire was sent to the mayors of all 426 municipalities. In order to increase the rate of participation the survey was sent in printed pen and paper format with an optional link to an (identical) online version. All answers have finally been pooled to one dataset. The survey was supported by Hessen's municipal associations, "Hessischer Städte- und Gemeindebund" and "Hessischer Städtetag". Letters of recommendation of both association have been enclosed.[7]

The questionnaire consisted of four parts. Parts I, II and III involved an identical series of questions on voluntary intermunicipal cooperation referring to prespecified fields of municipal activity.[8] For each of the three fields the respondents were asked whether their municipality is currently involved in intermunicipal cooperation or whether there are plans to cooperate in near future. Cooperation was defined as the voluntary performance of municipal tasks between at least two municipalities with long-term horizon. The remaining questions asked for the total number of cooperating municipalities (across all cooperation projects), the names of the cooperants, the number of cooperation projects, the initiator, year of establishment. Furthermore we used Likert type questions to ask for the reasons of cooperation in the specified field. For each of the three fields the respondents were asked to name the – from their perspective – most important cooperation and describe its key objective, members, the organizational form and the reason(s) why this

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[7]The "Städte- und Gemeindebund" represents the interests of small to medium sized municipalities and cities whereas the "Städtetag" represents the interests of medium sized to large cities. Some municipalities or cities are members in both associations.

[8]The complete questionnaire is available upon request.

cooperation has been chosen. Part IV consisted of several Likert type questions on the general perception and obstacles to intermunicipal cooperation.

The main concern of this study lies on cooperation activities in general local public administration as this field regards mandatory municipal functions. Here the municipalities cannot opt against service provision, but they have freedom to decide upon the ways and means of organizing provision (e.g., by means of cooperation). Subjects in this field encompass all back office activities of local government which perform services for other municipal departments or relate to preparation of democratic decision making. Institutions involved regard, for example, municipal management, accounting departments, administrative centers (Hauptverwaltung), municipal finance, but also certain mandatory citizen services such as civil registry offices. Operating expenditures in the field of general local public administration represent approximately 10% of the total municipal budget on average (see figure 2).[9] The share is slightly higher for small municipalities. The largest block of expenditures in this field regards the administrative centers (37% to 46%[10]) and the second largest block regards financial administration. Expenditure shares related to institutions of democratic decision making are negatively correlated with population size. On average these shares are lowest for large cities (10%) and highest for small municipalities (31%). We expect that cost reduction arguments will be a dominant reason for cooperation in this field.[11]

The survey response rate amounts to roughly 43%. Interestingly 56.6% of the respondents answered the pen and paper version of the questionnaire. The returned questionnaires divide across the 3 administrative state districts of Hessen as follows: State district of Darmstadt: 80 municipalities (44%), state district of Gießen: 34 municipalities (18.7%), state district of Kassel: 68 municipalities (37.4%). Large cities tend to be underrepresented.

A large number (62.4%) of the responding municipalities reports to cooperate in the field of local public administration by the year 2011. Most cooperation projects reported involve partners which share a contiguous area. Only 3 cooperation projects have an island municipality. Of these 3 exceptions 2 involve second order neighbours (this means that one must pass at least one municipality to get from municipality A to municipality B) and the other one involves a third order neighbour. All other cooperations share a contiguous area up to second order neighbours. There are 6 exceptions which involve cooperations with third and fourth order neighbours (see table 3). This indicates that first and second order neighbours are most likely to be potential cooperation partners.

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[9] All numbers reported in this paragraph have been calculated from the 2006 municipal budgets of Hessen's municipalities (Jahresrechnungsstatistik) supplied by the Statistical office of Hessen.

[10] The shares are negatively correlated with population size.

[11] We also asked for two voluntary fields of municipal activity: "cultural activities" and "sports and recreation". However, these fields were not of major concern to our research objective and the number of responses was too small to allow for deeper analysis.

In addition to the survey we use official data. Table 5 gives a summary of the data sources used. Information regarding the economic and demographic situation (e.g. population size, area, tax revenues, debt) of the municipalities have been taken from Hessen's municipality statistics (Hessische Gemeindestatistik). Political variables have been calculated from official council and direct election data. Moreover we accounted for data on county contributions (Kreisumlage) supplied by Hessen's statistical office. Geospatial data has been provided by the Hessian office of geoinformation ("Hessisches Amt für Bodenmanagement und Geoinformation").

6   Estimation design

6.1   Dependent Variables and Estimation Method

We model the probability of cooperation as a function of cooperation demand, supply and transaction cost factors. We use a multivariate probit equation which is estimated via standard maximum likelihood. The explanatory variables contain spatially lagged regressors which characterize the spatial cross-regressive approach where maximum-likelihood estimation yields consistent parameter estimates, given the exogeneity of the spatial regressors (Anselin, 1988).

The dependent variable takes a value of one if the observed municipality reports having started cooperation activities in the field of general public administration in the course of the years 2007 to 2011.[12] The value is zero if the municipality did not start cooperation activities or if cooperation activities already started before 2007. The period of 2007 to 2011 has been chosen according to the election period 2006 to 2011. The election year 2006 represents the constitutive year for the newly elected council, so we attribute cooperation decisions during this year to the former council. The mayors have been directly elected at independent and municipality specific election dates.[13] Therefore we focus on the council elections.

We restrict our analysis to small municipalities and cities below 50,000 inhabitants. For technical reasons we excluded the small municipality of *Reinhardshagen* from the sample because it does not have any neighbouring municipalities in Hessen which would cause the spatial lag calculations to fail. Finally, we excluded municipalities who already cooperated before the observed cooperation period. This way we are able to compare municipalities who reported having started a cooperation during the cooperation period with those who did not report having started a cooperation during the period or before.

From the 112 sample municipalities 42 (37.5%) reported having started their cooperation activities during the years 2007 to 2011. The remaining municipalities have not

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[12]We focus on cooperations in field I only, as fields II and III lack a sufficient number of relevant observations.

[13]In several, but not all cases, the dates correspond.

started cooperation activities. The sample municipalities roughly distribute according to the spatial pattern of the total responding municipalities: 47.3% from the state district of Darmstadt, 33.0% from the state district of Kassel and 19.6% from the state district of Gießen.

6.2   Independent Variables

We divide the independent variables into four main categories. The main categories divide into cooperation demand related variables including variables related to internal transaction costs, supply related variables and variables related to intermunicipal (between) transaction costs. In addition we employ a set of several control variables. Table 1 and table 2 provide an overview over our conceptualizations and summary statistics. Time-variant level variables have been calculated as five-year averages to avoid a time volatility bias. This approach is in line with our estimation strategy because we presume cooperation decisions to have a long- or mid-term horizon. Five-year growth rates refer to the same period as five year-averages. This means, for example, that fiscal stress is calculated as average of the years 2002 to 2006. Correspondingly, population growth and aging have been calculated as five-year growth rates. Political variables such as seat-shares and power concentration are time-invariant since the legislation period is fixed.

6.2.1   Demand variables

The first set of variables reflects the potential gains of cooperation through the fiscal and demographic situation. Fiscal stress is measured by the ratio of total debt and total revenues from administrative and capital budget. The total revenues including vertical transfers reflect the municipalities ability to finance its tasks. High local revenues therefore imply lower fiscal pressure. Debt on the other hand reflects accumulated financial commitments of the municipality. Municipalities with high debt will have to spend larger amounts of their revenues for debt service which will then not be available to finance current needs. The ratio of total debt and total revenue so far has therefore been used to proxy the municipalities' freedom of scope (see Blume, 2009b). At high values municipalities are confronted with stronger fiscal limitations, at low values municipalities enjoy a higher degree of fiscal autonomy. As laid out in the former sections, higher fiscal stress is expected to induce cooperation in order to realize efficiency gains.

Size effects are captured by the natural log of the municipal population size. We use the five-year growth rate of the share of elderly citizens to capture potential demographic change effects regarding local preferences. It is defined as the population share at age above 64. Given that demographic change becomes more and more intense, the cooperation impact of aging can be expected to gain relevance in future years. Since the underlying dataset is cross-sectional we can only capture a static snapshot of this

Table 1: Conceptualization and measurement

Category	Variable	Measure
Demand	Fiscal stress	Ratio of total debt to total revenues, five-year average
	Log population size	Total number of citizens, natural log, five-year average
	Population growth	Growth rate of municipal population, five-year growth rate
	Aging	Growth rate of population share at age above 65, five-year growth rate
	Power concentration	Banzhaf-index of the strongest party in council 2006
	Share of non-Germans	Share of non-German population, five-year average
	Number of municipal parts	Number of municipal parts or suburbs, count
Supply	Number of neighbours	Number of first-order contiguous neighbours
	Fiscal stress	Ratio of total debt to total revenues, five-year average, spatial lag
	Log population size	Total number of citizens, natural log, five-year average, spatial lag
	Population growth	Growth rate of municipal population, five-year growth rate, spatial lag
	Aging	Growth rate of population share at age above 65, five-year growth rate, spatial lag
	Power concentration	Banzhaf-index of the strongest party in council, spatial lag
	Share of non-Germans	Share of non-German population, five-year average, spatial lag
	Number of municipal parts	Number of municipal parts or suburbs, count, spatial lag
Transaction costs	Fiscal heterogeneity	Relative distance to the median ratio of total debt to total revenues across neighbours and observed municipality
	Population heterogeneity	Relative distance to the median total number of citizens across neighbours and observed municipality
	Mayor's tenure in office	Relative distance to the median number of years in office of the municipal mayors
Controls	State border location	Dummy variable, 1 if the municipality is located at the state border
	Central place functions	Dummy variable, 1 if the municipality is considered as middle-order center
	County contributions	County contribution rate, constant across municipalities within the same county
	Area	Total municipal area in square km

Table 2: Summary statistics

Variable	Mean	Std. Dev.	N
Demand			
Fiscal stress	0.476	0.335	112
Log population size	8.968	0.76	112
Population growth	-0.012	0.030	112
Aging	0.144	0.046	112
Power concentration	0.640	0.295	112
Share of non-Germans	6.426	4.358	112
Number of municipal parts	6.259	3.929	112
Supply			
Number of neighbours	5.286	1.668	112
Fiscal stress	0.480	0.193	112
Log population size	9.156	0.673	112
Population growth	-0.012	0.021	112
Aging	0.140	0.028	112
Power concentration	0.609	0.171	112
Share of non-Germans	6.831	3.733	112
Number of municipal parts	9.147	6.602	112
Transaction costs			
Fiscal heterogeneity	0.361	0.396	112
Population heterogeneity	0.488	0.706	112
Mayor's tenure in office	0.325	0.505	112
Controls			
State border location	0.339	0.476	112
Central place functions	0.223	0.418	112
County contributions	45.246	4.263	112
Area	47.868	30.168	112

effect. Furthermore, we include the five-year population growth rate to account for effects of growing or shrinking populations. This variable captures local population dynamics. Growing municipalities will have to meet additional demand for public services. To reduce the strains of initial investment growing municipalities may cooperate with other municipalities or engage in agreements with larger center municipalities.

6.2.2 Within transaction costs

Within transaction costs are incorporated in our estimation using measures of internal heterogeneity. In line with the metropolitan governance literature (e.g. Feiock, Steinacker, and Park, 2009; Kwon and Feiock, 2010; Morgan and Hirlinger, 1991) we use the share of non-German population to proxy for internal population heterogeneity.[14] Municipalities with a high share of non-German citizens should display a greater diversity of interests. This diversity can be expected to increase internal coordination costs and thus reduce the likelihood of cooperation.

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[14]The cited studies (US focus) do not use the share of foreigners but rather the share of black population or the share of non-hispanic white population. Since racial and ethnic variation is not as applicable for Germany the use of the share of foreigners will be more appropriate. This variable is only a crude replacement as the sample average amounts to only 6.4%.

Another indicator of internal coordination costs is the number of municipal parts (e.g. suburbs in cities or villages belonging to one municipality). During the years of German territorial reforms in the 1970s, many small municipalities have been merged to larger units. Consequently small and rural municipalities consist of numerous fragmented villages spread across the municipal area. We expect this fragmentation to raise internal coordination costs. Bel, Fageda, and Mur (2013) have used a similar measure (number of population centers within a municipality) to account for a negative dispersion effect on cooperation or private provision. In the estimation sample municipal parts vary between numbers of 1 and 17. The mean municipality of our sample consists of about 6 municipal parts (see table 2).

Finally, we use the Banzhaf-index of the strongest party in council (i.e. the highest Banzhaf-Index value of the council parties) as a measure of political monopolization in the local council (Banzhaf, 1965; Penrose, 1946). The index is constructed from the number of coalitions where a party's vote is pivotal for a given number of critical votes to decide upon a proposal. The index may range from 0 to 1 where 0 characterizes a party with no power and 1 characterizes a party with maximum power.[15] We opted for the use of the Banzhaf-index since we are unable to identify fixed coalitions on the German local council level. Several municipalities are governed by varying coalitions. The Banzhaf-index of the strongest party is highly correlated with the seat share of the strongest party and the total number of parties holding seats in the council.[16] A high index value suggests a high degree of monopolization which speeds up political decision-making processes within the council and thus reduces internal political transaction costs. Municipalities with highly monopolized councils can be expected to be more likely to engage in intermunicipal cooperation activities.

6.2.3 Supply variables

As explained in the theory section cooperation between municipalities we expect a strong impact from cooperation supply. We account for the number of potential cooperation partners using the number of all neighbouring municipalities. The number of potential cooperation partners is expected to be positively related to the likelihood of cooperation. We incorporate cooperation supply variables into the model using spatial lags which mirror the demand and within transaction cost variables. More precisely, we use neighbourhood averages of fiscal stress, log of municipal population, population growth and aging. Moreover, we replicate internal transaction costs by including the spatially

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[15]The power index can be calculated for different majority rules given by the minimum number of votes needed. For our analysis we have used an absolute majority rule (50%+1 votes). This means that if a party in a council holds more than 50% of the seats, the council is seen as strongly monopolized and this party will display a Banzhaf-index of 1.

[16]We have tested for these variables, but the results do not change. We keep using the Banzhaf-index as a more accurate measure of political strength

lagged share of non German population and the spatially lagged degree of council monopolization. The spatial lags are calculated as average variables of the neighbouring municipalities. The neighbourhood definition used is based on first-order contiguity. This means that municipality N is considered to be a neighbour of municipality M if both municipalities share a common border.This specification follows the literature suggesting that intermunicipal cooperations frequently involve contiguous relationships even though this condition is not absolutely necessary (e.g. Dye et al., 1963; Friesema, 1970). In the estimation sample 92% of our observed cooperation projects involve a closed area of up to third order adjacent municipalities. Only three projects do not involve a closed area. Still the municipalities involved in these projects are at maximum third order contiguous. This means that there is still some sort of geographical proximity. Through spatial lags we use information about the true neighbourhood regardless of survey participation. I.e. if municipality M participated in the survey whereas its neighbours did not, we can still use the neighbourhood information as regressors although the neighbours themselves will not show up as observations in the estimation sample.

6.2.4 Transaction cost variables

Transaction costs are difficult to capture as they are not directly measurable in monetary terms. A high degree of heterogeneity between the potential partners is associated with higher transaction costs. We operationalize this concept by calculating the observed municipality's relative distance to the group median for selected municipal characteristics. These are fiscal stress and population size to measure fiscal heterogeneity and population heterogeneity between the potential cooperation partners. The group of municipalities included in the heterogeneity measure consists of the observed municipality and its adjacent neighbours. Equation 1 illustrates our calculations where x denotes the value of the attribute of interest, i denotes the observed municipality and *med* denotes the group median:[17]

$$RDMD_i = \left| \frac{x_i - x_{med}}{x_{med}} \right| \tag{1}$$

A large value of $RDMD_i$ reflects that there is a large difference (high degree of heterogeneity) between the observed municipality to the median neighbour of its neighbourhood.[18] If heterogeneity raises of transaction costs, the coefficients should reveal a negative sign. As discussed in the theoretical considerations however transaction costs from size differences for example may be outweighed by potential efficiency gains. In this case a positive coefficient of size heterogeneity may indicate that cooperation is seen as a

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[17]Note that the calculation of this heterogeneity variable is only valid for strictly positive values of the x variables.

[18]Due to the use of absolute values the specification in equation 1 only informs about heterogeneity or homogeneity, but not the direction of dissimilarity - e.g., if municipality M is smaller or larger than the median municipality.

win-win-arrangement between large municipalities and their neighbours This also implies that if cooperation is more likely to be driven by large municipalities with central place functions, the result of the population heterogeneity coefficient will be positive rather than negative. A positive coefficient could also indicate that small municipalities may engage in joint activities to raise competitiveness with the service level of a large neighbour municipality.

Since we do not have access to explicit political network variables we use the $RDMD$ of the incumbent mayors' years of tenure in office since their first election to proxy for the differences in political experience. Strong differences in political experience should be associated with weaker network ties and consequently reduce the likelihood of cooperation.

6.2.5   Controls

We use dummy variables to control for central place functions and border location. Since we only focus on the state of Hessen it is necessary to capture the effect of municipalities who are located at the state border. Cross border cooperations are entailed with higher coordination costs due to potential differences in state regulations. The border location thus effectively reduces the number of potential cooperation partners.

From the estimation sample 22.3% of the municipalities can be considered as middle-order centres. Middle-order centres are medium category municipalities in the German central-place system of spatial planning which perform key functions associated with benefits to their surrounding area (e.g. hospitals, shopping opportunities etc.).[19] The definition of central places primarily relates to local population an density. But the functionality is finally assigned by state government discretion.[20]

Furthermore we control for the level of total county contributions per capita. High contributions per capita suggest that the county has a high relative importance to its municipalities. If this is the case, intermunicipal cooperation activities are likely to be substituted by transferring tasks to the county level (see Hulst and Montfort, 2007b).

7   Results

7.1   Baseline model

Table 6 reports the estimation results for the cooperation period between 2007 and 2011 in the field of municipal administration. The column *base* shows the results of the baseline

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[19]The spatial planning system also defines high order centres. These large cities are above the threshold of 50,000 inhabitants and are therefore excluded from the sample. Therefore only middle-order centres are controlled for.

[20]Please refer to Hessisches Ministerium für Wirtschaft, Verkehr und Landesentwicklung, 2000, 2000, 15th October 2013.

specification. Unless indicated otherwise, results discussed refer to the baseline specification. In the subsequent columns of table 6 we present some model variations by systematically omitting blocks of explanatory variables to reflect the sensitivity of model changes. The blocks have been omitted according to the underlying variable categories. For example, in the *nosupply* specification cooperation supply variables have been omitted. The other models are estimated without between transaction cost variables (*nobtc* and *nowbtc*), without within transaction cost variables (*nowbtc, nodemwtc*) and without cooperation demand variables (*nodemand,nodemwtc*)

[Table 6 about here]

The McFadden pseudo-R^2 amounts to 0.28. The overall specification is significant. The other specifications *nosupply, nobtc* and *nodemand* are also significant, but display a much lower pseudo-R^2 than the baseline model. The specifications *nowbtc* and *nodemwtc* are not significant. This indicates that the main explanatory contribution derives from demand and transaction cost factors. Some degree of the differences between the estimation results may come from the pseudo-R^2 sensitivity for the number of parameters. The pseudo-R^2 values should not be overinterpreted due to the relatively small number of observations. Comparing the results of the significant parameter estimates across the reduced equations there are no severe deviations from the baseline specification. This indicates that our findings hold overall, even if several other key variables are omitted. For a threshold probability of 0.5 the baseline specification classifies 76.8% (count-R^2) of the observations correctly. The model sensitivity (i.e. the probability of positive classification of an observed value of 1) amounts to 64.3%. The specificity (i.e. the probability of negative classification of an observed value of 0) amounts to 84.3%. The higher performance of negative prediction is not surprising given the higher share of zeros in terms of the dependent variable.

The baseline model estimation is characterized by significant impacts of the cooperation demand variables. We observe significant and positive coefficients for the fiscal stress measure (debt-revenues ratio) and population growth. The coefficients of log population size and of the growth-rate of the elderly population share are not significant. Regarding the within transaction cost factors the coefficients for internal fragmentation and population diversity (share of non-German population) reveal the expected negative sign and are significant and persist across the blockwise specifications. The power concentration measure does not exhibit a statistically significant effect although the estimates yield the expected positive sign.

The results show no significant coefficients for the cooperation supply variables. There are only weakly significant effects of fiscal stress and population diversity which seem to be sensitive to the model specification. In the no-demand specification, for example, fiscal

stress turns out to be highly significant. The remaining coefficients of the spatially lagged variables do not significantly differ from 0.

Looking at the between transaction costs measures which account for heterogeneity between the observed municipality and its neighbours there is a positive impact of population size heterogeneity and a negative but insignificant impact of fiscal heterogeneity. The latter holds for the no supply and the no demand specifications. The control variables exhibit no significant coefficients in the baseline model.

7.2 Sensitivity Analysis

The ICA theory has laid out convincing theoretical justifications why heterogeneity between potential partners plays an important role in intermunicipal cooperation decision making. However, the choice of an appropriate (between) heterogeneity measure is not trivial and does not directly follow from theory. The choice of a heterogeneity measure involves two considerations: First, the reference group has to be determined. This means: Which municipalities should be included for the comparison? Second, how should the measure be specified and what concept of heterogeneity should be used? Existing studies tend to rely on absolute or relative differences to county averages or county median (e.g. Kwon and Feiock, 2010). For our purpose the the approach of using county comparisons is inappropriate if the average or median municipality is not a potential partner of the observed municipality (e.g. because of large distance). The advantage of using county medians or county averages as reference measures is that in a given county the reference group for heterogeneity is constant for across municipalities. Neighbourhood related measures imply varying reference groups. We opted for the neighbourhood based approach since the county based definition ignores the existence potential spatial clusters of similar municipalities. In our baseline model we specify heterogeneity as the relative distance from the neighbourhood median value. Alternatively we have tested for heterogeneity measures based on neighbourhood variation coefficients, that is $\frac{s_i}{\bar{x}_i}$ where i denotes the neighbourhood including the observed municipality. Sticking to the simple neighbourhood configuration in figure 1, the relative distance to the median neighbour approach focuses on heterogeneity solely between M and the median-neighbour (including M itself). The measure therefore provides an answer to the question "How different am I from the others?". The variation coefficient approach on the other hand measures information on heterogeneity of the total neighbourhood. I.e. it addresses the question "Am I located in a heterogeneous environment of neighbours?". Replacing the heterogeneity measures by variation coefficients all heterogeneity impacts have turned out to be insignificant (table 8, appendix). Still, the predictive power and the other results remain the same. This can be seen as an indication, that the overall results of the baseline specification are stable

with respect to changes in the heterogeneity definition whereas the heterogeneity variables should be considered more carefully.

As in many applications of spatial data analysis the choice of the neighbourhood definition may affect estimation results. There are numerous ways of how to specify neighbourhood matrices (see Anselin, 1988; LeSage and Pace, 2004, for an overview). Given that almost all of our observed cooperation projects involve some degree of adjacency our neighbourhood definition seems reasonable. The baseline specification uses first order contiguity. However, we have tested for two alternative specifications of the neighbourhood: Since several cooperation projects also involve partners who are second order contiguous - i.e., "neighbours of neighbours" - we have performed estimations based on second order contiguity. Changing the neighbourhood definition leads to changes in the supply related variables on the one hand and in the transaction cost related variables on the other. Neighbourhood averages relate to a larger group of neighbours, which implies a lower share of each individual neighbour. Heterogeneity measures refer to the relative distance to the median neighbour of a larger geographic cluster. Two alternative second order contiguity matrices have been tested: First, all first and second order neighbours are treated as equal with identical spatial weights. Second, first order neighbours are treated with asymmetric weights with double emphasis in comparison to the second order neighbours' weights. The latter option implies that the closer neighbours' characteristics matter more for the cooperation decision.

The results of the alternative spatial specifications are shown in table 7 (appendix). Column *base* replicates the baseline specification. The other specifications are based on second order contiguity using equally weighted (column two) and asymmetrically weighted neighbours (column three). All contiguity weights have been row normalized. All estimations turn out to be significant. The second order neighbourhood equations show the same results for the demand and internal transaction cost factors as the baseline specification. This indicates that these major results are robust regardless of the neighbourhood definition. Between transaction costs are no longer significant whereas there are slight changes in the p-values of the supply variables. Overall the evidence supports the robustness of our baseline results despite the relatively small number of observations: The enlargement of the neighbourhood definition does not completely alter the main results, even for the between heterogeneity variables based on the larger neighbourhood. There are no major differences between the two second order contiguity results. Asymmetric weights yield similar results as symmetric weights. The choice of the second order neighbourhood adds some imprecision in identifying the range of potential partners. We suppose that a significant proportion of second-order neighbours is not relevant for the cooperation decision because they are not considered as potential partners.

For our empirical setup it has been convenient to use contiguity related spatial weights rather than distance based spatial weights. Rather than the distance between area cen-

troids the concept of adjacency is an appropriate way to model cooperation decisions. Distance based neighbourhoods require a theoretically justified distance cutoff which we cannot derive from our theory. An arbitrarily chosen cutoff, however, may lead to severe distortions and neglects, that for rural areas distances to neighbours may be larger than for urban areas. Existing studies from the tax competition literature use population based spatial weights (e.g. Buettner, 2003). This is inappropriate for the theory of cooperation decision making as it is unclear ex ante whether the population weight should be positively or negatively related to size.

Table 10 (appendix) shows alternative specifications controlling for political ideology. The specifications include party share variables (left-wing parties, christian democrats (conservative), social democrats, social democrats+ christian democrats and free voter associations) have been tested. All party-share coefficients turn out to be insignificant or weakly significant whereas the major results of the baseline estimation remain unchanged. We therefore conclude that the estimations provide no evidence for a party ideology related effect on cooperation decision making.

Measuring a municipalities fiscal situation properly is in fact highly complex (see Hendrick, 2004). Most empirical studies on intermunicipal cooperation rely on some sort of fiscal health or capacity measure based on municipal debt, revenues and/or expenditures (Andrew, 2009). We tested for alternative fiscal stress measures such as the ratio of debt to total expenditures, the ratio of operating expenditures to operating revenues and debt per capita (see table 9, appendix). Changing the fiscal stress measure affects the overall model performance. The debt-revenue ratio (baseline specification) and the debt-expenditure ratio are highly correlated and therefore do not yield strong differences in the estimation results (column *deex*). Using the ratio of operating expenditures to operating revenues (column *exrev_vw*) the estimation becomes insignificant over the constant-only model. Interestingly, if we use municipal debt per capita (column *debt_pc*) the fiscal stress effect switches from the demand side to the supply side. These results show that the analysis is sensitive to changes in the fiscal stress measure. We believe that the debt-revenue ratio, as used in the baseline model, is the best compromise to reflect the municipalities' fiscal situation as it is most stable over time and incorporates two dimensions of local fiscal health.

8   Discussion

The empirical results suggest a strong impact of demand variables related to potential gains, demographic factors and internal agency costs. Fiscal stress is positively related to the emergence of intermunicipal cooperation. The cooperation enhancing effect confirms the results of former contributions which view fiscal stress as a key motivation for local governments to engage in cooperation activities (see section 2). High fiscal pressure creates

a strong need for cost reduction. This applies especially to mandatory fields of municipal activity. Therefore municipalities under strong fiscal stress are more likely to cooperate than municipalities with loose budget constraints. It is important to note that the effect is sensitive to the way the fiscal stress measure is specified. In the baseline specification we have opted for using the ratio of total municipal debt to total revenues as it has been done by previous studies in this field (e.g. Bel, Fageda, and Mur, 2013). As noted by Andrew (2009), it is unclear whether this proxy is actually an accurate measure of the financial condition of a municipality.[21]

The positive coefficient of the population growth coefficient indicates that intermunicipal cooperation activities help municipalities to adapt to a growing demand for local public services. Cooperative public service provision can be seen as a solution to this problem through cost sharing or service agreements with larger municipalities which already provide the required services. To our knowledge only few studies explicitly account for population growth. Our estimated growth coefficient contrasts the negative population growth effect reported by Kwon and Feiock, 2010. The result indicates that there is no dominant effect of population decline in the selected field of labor intensive services. There is also a positive, but insignificant, effect from aging. In the light of these results, it seems that cooperation activities in the field of local public administration are not (yet) to be seen as a reaction on the problem of demographic change, but rather as a reaction to changes in local demand patterns. The reason for this is unclear. Possibly, during the period of 2002 to 2007 local politicians did not value the long-term pressures of demographic change as strong as the short-term pressures of other local issues such as dealing with tight budgets. This again leads to an interesting question for further research: How do local politicians value the issues of demographic change against other problems of local politics?

Surprisingly, all presumed supply effects turn out to be only weakly or insignificant. At a first glance it would seem that neighbourhood characteristics do not have an impact on the decision to engage in cooperation activities. This does not necessarily have to be the case. The insignificant supply coefficients could also result from the specification strategy: The use of several variables of the same type, for example using fiscal stress in supply measures, demand measures and transaction costs measures creates dependencies between the explanatory variables which weaken the explanatory power of the individual factors. In the baseline estimation, the supply variables have been calculated as weighted neighbourhood means. This implies that we valued each neighbour as being "equally important" to the observed municipality. It is likely that the true neighbourhood relationships are not symmetric and the local decision makers may treat some neighbours rather as "friends" whereas other neighbours may be seen as "rivals". There may be nu-

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[21]The reader may refer to Hendrick (2004) for an in-depth discussion how to assess and measure the fiscal health of municipalities.

merous ways why this may be the case, such as county boundaries, historical and cultural reasons and political networks. There is therefore more need for further research to answer the question of what actually makes a municipality a suitable cooperation partner. An approach to tackle this problem would be to investigate each pair of potential cooperation partners seperately and investigate how the differences in the pairs affect whether two municipalities will cooperate or not.

The significant negative coefficient of the share of non-German population supports the hypothesis that within transaction costs matter. The costs arising from population diversity seem to affect the cooperation decision. As hypothesized, there is a negative effect from population diversity. This means that politicians who act as representatives of a heterogeneous population have to face higher costs of promoting the cooperation idea to the public. This result is in line with the reasoning and findings of the metropolitan governance studies, even though our measure is based on nationality rather than race rendering our proxy more imprecise (see section 6). Municipal dispersion also seems to reduce the likelihood of starting cooperation activities. The effect is only weakly significant.

In line with former research the baseline model accounts for fiscal heterogeneity and population heterogeneity. In contrast to former research the heterogeneity measures refer to the neighbouring municipalities. The estimators of the fiscal heterogeneity coefficient displays the predicted negative sign. Interestingly there is a positive population heterogeneity measure. The positive and weakly significant impact of the population size heterogeneity measure indicates that municipalities located in a neighbourhood of heterogeneous municipality sizes are more likely to cooperate. There are two possible interpretations: First, some authors emphasize that star networks play an important role for the existence of cooperation activities. This means that a larger city located in the center of a number of smaller municipalities may take a leader position and act as service provider to its surrounding municipalities (e.g. Feiock and Scholz, 2009). In this sense our positive population heterogeneity coefficient captures the potential of a win-win-situation between unequal partners. Large cities may exploit their capacities whereas smaller municipalities can save the expenditures of high initial investments. The result suggests an inverted U-shape relationship between size and the cooperation probability (Brasington, 1999; Ferris and Graddy, 1988). Given that our heterogeneity variable merely captures neighbours and not the true final cooperation partners, there is a second possible explanation: Small municipalities who are adjacent to a central city may find themselves under a stronger risk of falling behind and therefore use means of intermunicipal cooperation to ally with other surrounding municipalities who share this pressure. Both explanations are plausible given that the estimation results show no significant impact for the population size variable, which would indicate that there was a size bias. With our data, we cannot finally decide between these two explanations.

The empirical approach of this study is entailed with a few limitations. First, intermunicipal cooperation decisions are by nature dynamic processes. Given the cross-sectional nature of our data our results can only capture static effects. We do not observe the decision making process itself, but merely the outcome which manifests in engaging in a cooperation or not. Our results should be therefore interpreted as building block rather than a complete story of intermunicipal cooperation behaviour. Moreover our approach relies on assumptions regarding the time when the cooperation decision was made and when it was implemented. Here we focused on the legislative period of the municipal council. A panel data approach on our question would possibly yield deeper insights into the cooperation factors and processes, but here we face a lack of data availability.

A second limitation is the small number of observations used in our estimations. Thus, generalizations of our findings should be treated with some caution. A larger number of observations would have strengthened the robustness of our model due to more degrees of freedom. The relatively small number is caused by missing responses and some self-imposed restrictions which have been necessary to develop an appropriate specification. The first issue is a matter of resources, whereas the second is a matter of survey design. Future research could address this issue by explicitly asking for dynamic developments of intermunicipal cooperation activities.

Regarding the estimation technique, we believe that spatial econometric modelling leads to additional insights. In this study neighbourhood characteristics have been explicitly taken into account. Through our data limitations we are restricted to use the most simple spatial cross-regressive implementation. This means that spatial interrelations are assumed as exogenous and neighbours are conceptualized as potential partners. More advanced spatial econometric methods (spatial lag, spatial error models) explicitly account for spatial autocorrelation by using spatially lagged dependent variables and/or spatial error correlations (for further reading see LeSage and Pace, 2008; LeSage and Pace, 2004). By modelling spatial lag structures it should be possible to find additional explanations such as answers to the question: Why does municipality A cooperate with neighbour B, but not with neighbour C? Such an approach would require a complete sample in terms of the dependent variable and is beyond the scope of our study.

9   Conclusion

This study has investigated the factors that promote intermunicipal cooperation. The central question asks for the reasons why some municipalities cooperate in the provision of public services whereas others do not. Focusing on a unique survey on intermunicipal cooperation among small German municipalities we explain the likelihood of starting intermunicipal cooperation activities in the field of local public administration. Building on the insights from the institutional collective action framework of the US metropoli-

tan governance literature, we have estimated a model with spatially lagged regressors to identify the key influences of intermunicipal cooperation. Former studies have discussed and analyzed the impact of factors related to potential gains from cooperation (cooperation demand), regional characteristics and various forms of transaction costs within and between municipalities. A majority of these empirical studies have analyzed these determinants for cities in US metropolitan areas.

This study contributes to this field of research in three ways: First, we explicitly take into account that the characteristics of potential cooperation partners actually affect the decision to start cooperation activities. Here, the key impacts result from the spatial neighbourhood structure and municipality characteristics. The empirical evidence does not support that cooperation supply has a major impact on starting cooperation activities. This does not mean that the spatial dimension is irrelevant. Possibly, the simple neighbourhood definition by first order adjacency only does not capture whether or not another municipality is a suitable potential partner. Here, further theoretical reasoning is needed to identify which sets of municipality could work well together or not.

Second, the heterogeneity measures used in this study account for the individual spatial location and refer only to the adjacent (potential) partners as reference group. The impact of transaction cost factors and heterogeneity has been extensively studied in the literature. So far, heterogeneity measures used in quantitative studies have been based on deviations from county values. Our results strengthen the evidence that municipalities with large size differences from the median neighbour tend to be more prone to engage in cooperation. We have not been able to fully distinguish whether this effect relates to central city service provision (e.g. cooperation between large and small cities) or to strategic coalition formation (e.g. cooperative alliances of small cities to compete large neighbours).

Third, the study provides empirical evidence for small municipalities in the German state of Hessen which so far have not been subject to quantitative empirical research on cooperation activities. It applies key insights from the institutional collective action framework to a sample of municipalities in European countries. Compared with the US centered contributions there is still more need for empirical and quantitative studies investigating country specific cooperation decision making.

Our empirical evidence supports the results found by previous studies that fiscal stress creates incentives to improve efficiency by cooperative service provision. Given that we focused on mandatory tasks subject to scale and/or scope economies this result has been expected. Moreover there seems to be a positive relationship between population growth and the probability to cooperate. It has also been tested whether political power concentration and party ideology affect the cooperation decision. Power concentration has been measured by the Banzhaf-Index which so far has not been accounted for in former studies on intermunicipal cooperation decision making. In the investigated field of administrational tasks party ideologies and power concentration do not seem to play a crucial

role. This can be taken as evidence that intermunicipal cooperation is not as controversial as other local policy issues. Cooperation decisions therefore seem to be made from a pragmatic point of view.

In the course of the empirical analysis we focused on cooperations in the field of local administration services related to management tasks of head offices, personnel, accounting and finance departments and corresponding activities. This field is ideally suited for our analysis because it consists of mandatory municipal tasks. It is likely that some cooperation impacts such as fiscal pressure are stronger in this field because municipalities do not have the option to opt out from task performance. It is important to note that intermunicipal cooperation activities do not confine to these task, but are also present in other fields of local activity. An interesting avenue for future research would thus be to investigate whether voluntary fields of municipal activity (e.g. culture, tourism) are characterized by different cooperation patterns than those suggested by our results. It is likely that for voluntary fields of local public service provision efficiency or cost arguments are less important whereas strategic considerations may play a stronger role.

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10   Appendix

Table 3: Spatial structure of observed cooperation activities in the field of local public administration . The table shows that in only three cases municipalities are not connected through a contiguous area.

Maximum order of neighbours	Contiguous border	
	No	Yes
1	0	21
2	2	12
3	1	5
4	0	1
Total	3	39

Table 4: Starting year of cooperation activities in the field of local public administration

Starting year	Frequency	Percent
<2000	23	20.4
2000	8	7.1
2001	6	5.3
2002	2	1.8
2003	6	5.3
2004	3	2.7
2005	5	4.4
2006	13	11.5
2007	5	4.4
2008	13	11.5
2009	10	8.9
2010	14	12.4
2011	5	4.4

Shares of total and operating expenditures in the field of local public administration
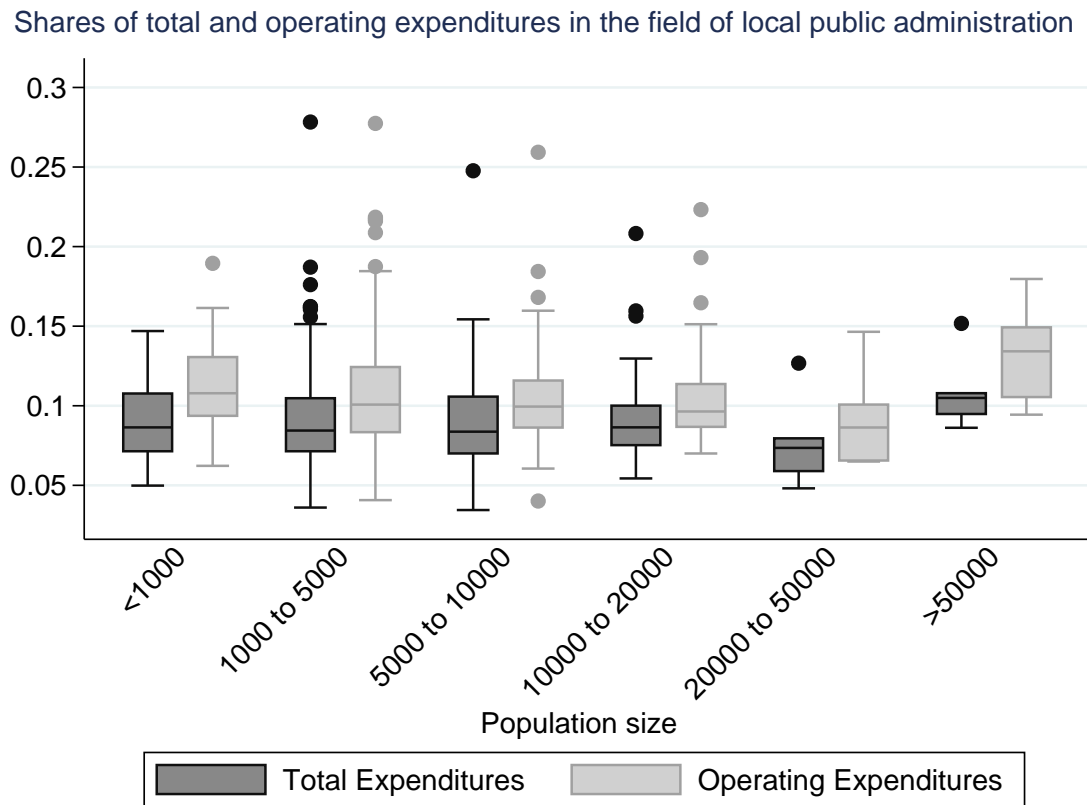
Figure 2: Boxplots of expenditure shares. Authors' own calculations based on municipal budget data 2006, Statistical office of Hessen. The figure depicts the shares of total and operating expenditures of the field of local public administration relative to the total municipal budget for alternative municipality sizes.

Table 5: Data sources

Source	Variables
Intermunicipal cooperation survey, author's own data collection	Cooperation variables
Hessische Gemeindestatistik, Statistical office of Hessen	Demographic, fiscal and area variables
Council and direct elections, Statistical office of Hessen	Party shares, mayor information
Statistical office of Hessen	County contributions
Spatial development plan, Office of spatial planning	Border information, central place functions
Hessisches Amt für Bodenmanagement und Geoinformation	ESRI shape file
Statistical office of Hessen	Municipal parts

Table 6: Estimation results using probit estimation. Model *base* represents the baseline specification.

Category	Variable	base	nosupply	nobtc	nowbtc	nodemand	nodemwtc
Demand	Fiscal stress	1.280**	1.622***	0.935**	0.789		
	Log population size	-0.290	-0.335	-0.297	-0.698**		
	Population growth	16.904**	15.758***	17.417**	16.421**		
	Aging	6.794	5.646	6.137	5.513		
	Power concentration	0.590	0.721	0.529		0.271	
	Share of non-Germans	-0.160**	-0.102**	-0.098*		-0.144***	
	Number of municipal parts	-0.169*	-0.163*	-0.146*		-0.170**	
Supply	Number of neighbours	0.020		0.063	0.096	0.054	0.028
	Fiscal stress	1.938*		1.610	1.788	2.757***	2.707***
	Log population size	-0.627		-0.729	-0.527	-0.597	-0.525
	Population growth	12.873		3.519	6.727	24.831**	17.125
	Aging	-3.052		-0.426	1.306	1.479	2.609
	Power concentration	-0.163		-0.673	-0.605	-0.002	-0.167
	Share of non-Germans	0.132*		0.088	0.048	0.097	0.034
	Number of municipal parts	-0.008		0.012	0.002	0.005	-0.004
Transaction costs	Fiscal heterogeneity	-0.034	-0.354			0.132	0.012
	Population heterogeneity	0.697**	0.540**			0.600**	0.395
	Mayor's tenure in office	-0.690	-0.596			-0.473	-0.532
Controls	State border location	-0.589	-0.481	-0.353	-0.126	-0.442	-0.258
	Central place functions	0.502	0.697	0.912*	0.963**	0.262	0.045
	County contributions	0.051	0.058*	0.051	0.066**	0.044	0.054**
	Area	0.008	0.010	0.009	-0.002	0.006	-0.008
	Constant	4.209	-0.719	4.831	5.237	2.198	0.693
	N	112	112	112	112	112	112
	k	23	15	20	17	19	16
	χ^2	40.155	32.821	31.171	18.444	31.655	16.922
	p-value	0.010	0.003	0.039	0.299	0.024	0.324
	Pseudo-R^2	0.284	0.234	0.229	0.180	0.211	0.140
	AIC	152.16	143.48	154.31	155.47	154.91	159.49

***, ** and * denote statistical significance at 1%, 5% and 10%. Huber-White robust standard errors have been used through all estimations.

Table 7: Alternative neighbourhood specifications. Model *base* represents the baseline specification. The other columns represent the estimations with unweighted and weighted second order contiguity neighbourhood definitions.

Category	Variable	base	2nd order, unweighted	2nd order, weighted
Demand	Fiscal stress	1.280**	1.283**	1.231**
	Log population size	-0.290	-0.067	-0.068
	Population growth	16.904**	20.865***	20.314***
	Aging	6.794	4.686	5.106
	Power concentration	0.590	0.580	0.589
	Share of non-Germans	-0.160**	-0.143**	-0.135**
	Number of municipal parts	-0.169*	-0.178**	-0.185**
	Number of neighbours (1st order)	0.020	0.126	0.114
	Number of neighbours (2nd order)		-0.011	-0.015
Supply	Fiscal stress	1.938*	-1.03	-0.096
	Log population size	-0.627	-0.615	-0.722
	Population growth	12.873	-38.357*	-24.252
	Ageing	-3.052	-5.490	-6.003
	Power concentration	-0.163	0.101	0.063
	Share of non-Germans	0.132*	0.212*	0.189*
	Number of municipal parts	-0.008	0.133*	0.086
Transaction costs	Fiscal heterogeneity	-0.034	0.057	0.064
	Population heterogeneity	0.697**	0.376	0.352
	Mayor's tenure in office	-0.690	-0.354	-0.349
Controls	State border location	-0.589	0.057	-0.101
	Central place functions	0.502	0.619	0.627
	County contributions	0.051	0.091***	0.071**
	Area	0.008	0.000	0.003
	Constant	4.209	-0.302	1.945
	N	112	112	112
	k	23	24	24
	χ^2	40.155	43.137	42.283
	p-value	0.010	0.007	0.008
	Pseudo-R^2	0.284	0.252	0.238
	AIC	152.16	158.79	160.95

***, ** and * denote statistical significance at 1%, 5% and 10%. Huber-White robust standard errors have been used through all estimations.

Table 8:   Alternative between transaction costs specifications. Model *hetlk* specifies county based transaction cost measures. Model *hetvc* specifies variation coefficient based transaction cost measures.

Category	Variable	base	hetlk	hetvc
Demand	Fiscal stress	1.280**	1.033*	1.016**
	Log population size	-0.290	-0.282	-0.262
	Population growth	16.904**	16.358**	15.132**
	Aging	6.794	7.316*	5.988
	Power concentration	0.590	0.400	0.551
	Share of non-Germans	-0.160**	-0.130**	-0.112**
	Number of municipal parts	-0.169*	-0.171**	-0.142*
Supply	Number of neighbours	0.020	0.117	0.043
	Fiscal stress	1.938*	2.225*	1.432
	Log population size	-0.627	-0.957*	-0.580
	Population growth	12.873	10.934	6.306
	Aging	-3.052	-0.334	0.992
	Power concentration	-0.163	-0.308	-0.682
	Share of non-Germans	0.132*	0.148*	0.071
	Number of municipal parts	-0.008	0.009	-0.019
Transaction costs	Fiscal heterogeneity	-0.034	0.697	-0.753
	Population heterogeneity	0.697**	0.532**	0.512
	Mayor's tenure in office	-0.690	-0.619	-0.329
Controls	State border location	-0.589	-0.256	-0.441
	Central place functions	0.502	0.552	0.881*
	County contributions	0.051	0.054	0.052
	Area	0.008	0.005	0.011
	Constant	4.209	5.543	3.613
	N	112	112	112
	k	23	23	23
	χ^2	40.155	36.314	31.849
	p-value	0.010	0.028	0.08
	Pseudo-R^2	0.284	0.266	0.242
	AIC	152.16	154.74	158.37

***, ** and * denote statistical significance at 1%, 5% and 10%. Huber-White robust standard errors have been used through all estimations.

Table 9:   Estimation results with alternative fiscal stress measures. Model *base* represents the baseline specification. The subsequent columns use the debt-expenditure ratio (*deex*), operating expenditures-operating revenues ratio (*exrev_vw*) and debt per capita (*debtpc*).

Category	Variable	base	deex	exrev_vw	debtpc
Demand	Fiscal stress	1.280**	1.260**	-0.142	0.001
	Log population size	-0.290	-0.278	-0.305	-0.211
	Population growth	16.904**	16.809**	14.069*	13.76*
	Aging	6.794	6.712	6.372	7.272*
	Power concentration	0.590	0.536	0.400	0.352
	Share of non-Germans	-0.160**	-0.165**	-0.151***	-0.182***
	Number of municipal parts	-0.169*	-0.175*	-0.150*	-0.174*
Supply	Number of neighbours	0.020	0.027	0.065	0.046
	Fiscal stress	1.938*	2.121*	8.500	0.001**
	Log population size	-0.627	-0.690	-0.798	-0.772
	Population growth	12.873	13.131	-0.955	15.059
	Aging	-3.052	-2.202	-3.188	-2.327
	Power concentration	-0.16327	-0.146	-0.619	-0.287
	Share of non-Germans	0.13208*	0.137*	0.118	0.117
	Number of municipal parts	-0.008	-0.002	0.032	-0.014
Transaction costs	Fiscal heterogeneity	-0.034	0.191	0.827	-0.026
	Population heterogeneity	0.697**	0.720***	0.490*	0.687**
	Mayor's tenure in office	-0.690	-0.682	-0.237	-0.715
Controls	State border location	-0.589	-0.527	-0.412	-0.596
	Central place functions	0.502	0.445	0.785*	0.539
	County contributions	0.051	0.0560*	0.034	0.050
	Area	0.008	0.007	0.004	0.005
	Constant	4.209	4.206	-0.569	5.309
	N	112	112	112	112
	k	23	23	23	23
	χ^2	40.155	41.894	31.73	41.948
	p-value	0.010	0.006	0.082	0.006
	Pseudo-R^2	0.284	0.286	0.196	0.285
	AIC	152.16	151.86	165.12	152.02

***, ** and * denote statistical significance at 1%, 5% and 10%. Huber-White robust standard errors have been used through all estimations.

Table 10: Model *base* represents the baseline specification. The other specifications include the seat shares of selected parties.

Category	Variable	base	left	spd	cdu	cdu& spd	fw
Demand	Fiscal stress	1.280**	1.274**	1.255**	1.337**	1.292**	1.355**
	Log population size	-0.290	-0.335	-0.344	-0.388	-0.491	-0.515
	Population growth	16.904**	17.064**	17.172**	15.928**	16.655**	15.630**
	Aging	6.794	6.654	6.604	5.607	5.292	4.905
	Power concentration	0.590	0.570	0.534	0.690	0.564	0.635
	Share of non-Germans	-0.160**	-0.161**	-0.158**	-0.167**	-0.160**	-0.171**
	Number of municipal parts	-0.169*	-0.173*	-0.177*	-0.185**	-0.199**	-0.189**
	Number of neighbours	0.020	0.018	0.019	0.050	0.047	0.051
Supply	Fiscal stress	1.938*	1.884	1.891	2.030*	1.897	1.715
	Log population size	-0.627	-0.672	-0.704	-0.609	-0.776	-0.819
	Population growth	12.873	13.426	13.917	12.223	14.331	17.938
	Aging	-3.052	-2.895	-2.553	-2.146	-1.084	-0.714
	Power concentration	-0.163	-0.119	-0.122	-0.257	-0.167	-0.176
	Share of non-Germans	0.132*	0.140*	0.144*	0.123	0.147*	0.153*
	Number of municipal parts	-0.008	-0.005	-0.002	-0.011	0.002	0.001
Transaction costs	Fiscal heterogeneity	-0.034	-0.025	-0.015	-0.039	-0.012	0.034
	Population heterogeneity	0.697***	0.691**	0.688**	0.713**	0.683**	0.705**
	Mayor's tenure in office	-0.690	-0.675	-0.659	-0.875	-0.785	-0.873
Controls	State border location	-0.589	-0.578	-0.577	-0.534	-0.506	-0.451
	Central place functions	0.502	0.549	0.577	0.476	0.652	0.570
	County contributions	0.051	0.051	0.052	0.062*	0.062*	0.061*
	Area	0.008	0.009	0.009	0.008	0.010	0.011
	Constant	4.209	-0.719	4.831	5.237	2.198	0.693
Seat shares	Seat share left-wing		0.486				
	Seat share spd			0.740			
	Seat share cdu				1.787		
	Seat share cdu & spd					1.640*	
	Seat share free voters						-1.622*
	N	112	112	112	112	112	112
	k	23	15	20	17	19	16
	χ^2	40.155	32.821	31.171	18.444	31.655	16.922
	p-value	0.010	0.003	0.039	0.299	0.024	0.324
	Pseudo-R^2	0.284	0.234	0.229	0.180	0.211	0.140
	AIC	152.16	143.48	154.31	155.47	154.91	159.49

***, ** and * denote statistical significance at 1%, 5% and 10%. Huber-White robust standard errors have been used through all estimations.