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# The Emergence of Inter-Municipal cooperation – A Hazard Model Approach

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# The emergence of inter-municipal cooperation –

# A hazard model approach

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## Abstract

We use a hazard model to identify the factors that drive the emergence of inter-municipal cooperation (IMC). We focus on IMC in tasks of internal administration in West-Germany between 2001 and 2014 – tasks where IMC may generate economies of scale while regional spillovers are negligible. Our results support the homophily-hypothesis and the relevance of political transaction costs. Municipalities situated in clusters of small and shrinking municipalities are more likely to start IMC. At odds with the previous literature, IMC is more likely to emerge among municipalities in fiscally strong clusters. We find no evidence that IMC is more likely in certain phases of the election cycle while state subsidies for IMC are an important driving force behind IMC.

Key-words: Inter-municipal cooperation, hazard model, Germany, survey

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## 1. Introduction

Inter-municipal cooperation (hereafter IMC) is widespread in many industrialized countries ( Hulst and van Montfort, 2007; LeRoux et al., 2010). The question why some municipalities cooperate in public service provision while others do not has received substantial attention (e.g., Feiock, 2007; for a recent review, see Bel et al., 2013b). In this paper, we add another empirical study to the admittedly large body of literature on IMC emergence.

Our study differs from the bulk of the existing studies in a number of distinct features. First, it focuses exclusively on a field of government activities where IMC generates economies of scale and scope while regional spillovers are irrelevant. Most of the existing studies either focus on fields where spillovers play a dominant role or cover numerous fields of IMC – thus mixing fields with and without spillovers. This is a shortcoming because game theory tells us that the problem of collective action differs markedly depending on whether or not spillovers are present. Thus, the factors driving the emergence of IMC are also likely to differ between fields. Second, we argue that the reasoning behind starting a joint provision of public goods and services must not be confused with the reasoning for remaining part of such an agreement. The first year of cooperation thus deserves the primary attention and has to be treated differently than subsequent years of cooperation. The existing studies do not make this clear distinction. We account for the special role of the first year of cooperation by applying a hazard model. This model also allows us to test for the impact of state policies to support IMC and for a possible clustering in the emergence of IMC across the election cycle.

As official data on IMC in Germany is not available, our study builds on data from a survey among municipalities that covers 605 West-German municipalities conducted in 2015. We focus on municipalities in rural areas where the demographic and economic development puts substantial pressure on municipalities to generate efficiency gains. The information from

the survey – combined with data from official sources – allows us to cover a time period spanning from 2001 to 2014. Our study concentrates on IMC in the field of internal administration ("Allgemeine Verwaltung" – a standing term in Germany). This field includes delegated tasks that the local jurisdiction carries out on behalf of the entire public sector (e.g., running a registration office) while most tasks result from the fact that local jurisdictions are formally independent entities with their own budget and locally elected decision making bodies. Thus, they have to engage in book-keeping, human resource management, procurement activities as well as to organize local elections and bear the running costs of a local council. These tasks are usually labor-intensive and the local jurisdictions have to meet high standards regarding data security and democratic procedures. On average, the municipalities in our sample spent 139 Euro per capita and year (13 percent of their running expenditures) on these tasks. As most of the administrative work goes largely unnoticed by the citizens, the local government has little to gain from improved quality. Instead, the main objective is to fulfill administrative tasks at low costs without violating legal standards.

In the time span 2001 – 2014, we observe a steady increase in the number of municipalities that cooperate in the field of internal administration. In line with the theory of Institutional Collective Action (Feiock, 2008), we find IMC to be more likely in constellations where political transaction costs are low. Our results also show that municipalities are more likely to cooperate if their neighbors face a similar workload in administrative tasks – thereby supporting the so-called homophily hypothesis. Municipalities situated in clusters of small and shrinking municipalities are more likely to start IMC. Our results challenge the notion that fiscal pressure drives IMC. We find IMC to be more likely in clusters of fiscally strong municipalities. IMC is not found to be more likely in constellations where municipalities can exploit complementari-

ties resulting from differences in population size or population dynamics. We also find no evidence that IMC agreements cluster in certain phases of the election cycle. On the other hand, state subsidies for IMC are found to have a strong impact on the emergence of IMC.

The paper proceeds as follows: Section 2 reviews the existing literature and explains where the current study adds to it. Section 3 presents our essential hypotheses and the data. Method and results are presented in section 4 and 5 respectively. Section 6 discusses the results und section 7 concludes.

## 2. Review of literature

Over the last 15-20 years, scholars mostly from public administration have compiled a large body of empirical studies on the emergence of IMC. Some studies focus on municipal characteristics and how they shape the expected gains from IMC – showing that especially small and fiscally weak municipalities are more likely to cooperate (e.g., Warner and Hefetz, 2002; Bel et al., 2013b; Schoute et al., 2017). Pioneered by Richard Feiock and co-authors, the Institutional Collective Action (ICA) approach illustrates that negotiating, implementing and controlling IMC-contracts entail substantial transaction costs (e.g., Feiock and Scholz, 2009). Empirical studies following the ICA-logic show that municipalities with similar characteristics are more likely to cooperate (e.g., Feiock et al., 2009). Furthermore, pre-existing political networks are found to promote IMC (e.g., LeRoux et al., 2010). Blaeschke (2014) and Bel and Warner (2016) provide excellent surveys of the relevant literature.

When analyzing the emergence of IMC, it is important to account for differences in the characteristics of the jointly-produced service (e.g., Alesina et al., 2004; Blaeschke, 2014). In particular, a distinction has to be made between services that generate regional spillovers and those that do not. In fields like regional development policies, urban planning or tourism marketing, the benefits from IMC are not contained to the consortium of municipalities that actually

cooperate. Instead, the potential benefits spill over to neighboring municipalities. Overcoming free riding is an important reason for municipalities to seek IMC. At the same time, free riding is one major obstacle in any kind of collective action problem and thus in the emergence of IMC (e.g., Bergholz, 2016). This is different for tasks and services that do not produce spillovers. Here, the aim of cooperation is to generate economies of scale and scope (e.g., waste disposal, sewage, back-office services, construction yard). Cooperative game theory informs us that the main challenge in this case is to divide the benefits and (transaction) costs from IMC in a way that stabilizes the consortium (e.g., Peters, 2008).[1] In other words, the logic of collective action differs between IMC in fields where the benefits are restricted to the consortium of cooperating municipalities and IMC in fields where the benefits spill over to the municipalities outside the consortium. Therefore, the factors that drive the emergence of IMC are also likely to differ.

Though the distinction described above is generally acknowledged, its implications for the study of IMC-emergence have received little attention so far (for an exception, see Bergholz, 2016). Bel and Warner (2016) show that most existing studies do not differentiate between different services but rather identify factors that explain why some municipalities cooperate at all. While there are some studies that focus solely on fields with spillovers like regional planning, tourist marketing and urban or regional development (e.g., Feiock et al., 2009), there are only very few studies on fields where spillovers are absent. These studies mostly analyze capital-intensive fields like sewage or solid-waste disposal ( Bel et al., 2013a; Zafra-Gómez et al., 2013; Blaeschke and Haug, 2017) while labor-intensive fields received hardly any attention. Many consortia in these fields were founded decades ago. The limits in availability of data for

[1] Note that spillovers may also be negative. This applies to the cooperation in public safety. Here, criminal activities may be shifted to neighboring non-cooperating municipalities.

the pre-IMC years led scholars to use contemporary data for the driving factors. These studies explain the existence rather than the emergence of IMC and suffer from a simultaneity bias.

Existing empirical studies largely rely on cross-sectional analyses with only one observation per municipality – thereby explaining the *existence* rather than the *emergence* of cooperation. In those studies that use multiple observations per unit, data is either pooled (Mohr et al., 2010) or – as in the most cited work by Warner and Hefetz (2002) – treated as repeated cross-sectional data (see also Warner, 2006; Hefetz et al., 2012). Only Shrestha (2005) and Di Porto et al. (2016) exploit the panel structure of their data and apply panel econometrics. Both repeated cross-sections and panel analyses suffer from two shortcomings. First, they do not differentiate between the first year of cooperation and all subsequent years. Given the stability of IMC-arrangements, the real incident that requires explanation is the switch from non-cooperation to cooperation. The reasoning behind starting a joint provision of public goods and services must not be confused with the reasoning for remaining a part of such an agreement. This difference results from a number of factors, among them sunk costs and the large additional transaction costs from resolving an existing consortium. Second, these analyses suffer from a simultaneity bias because they keep the observations after IMC started – thereby potentially explaining the existence of IMC by factors that may themselves be driven by the fact that municipalities already cooperate (e.g., Bergholz, 2016). In sum, the first year of cooperation deserves the primary attention and has to be treated differently than all subsequent years of cooperation. This is precisely what hazard models – the method we choose in this paper – do.

We are not the first study that applies a hazard model to explain the emergence of IMC. Bergholz (2016) used a similar model to explain the emergence of IMC in the field of tourism marketing. This field is characterized by heavy regional spillovers and thus the logic of IMC

formation is distinctly different to the logic in the field of internal administration.[2] We provide – to the best of our knowledge – the first study that applies hazard analysis explain the emergence of IMC in a field dominated by economies of scale and scope.

## 3. Hypotheses and data

### 3.1 Hypotheses

When analyzing the factors driving IMC, it is helpful to remember a seemingly trivial fact: A certain municipality m can only cooperate with others in public service provision if three conditions apply. First, municipality m itself must be interested in cooperation, i.e. there must be demand for cooperation. Second, neighboring municipalities must be interested in cooperation, i.e. there must be supply of cooperation. Third, these potential partners are suitable for a cooperation with m (e.g. Blaeschke, 2014). Thus, we identify three categories of factors.

*a) municipality m's demand for IMC*

Both the normative and the empirical literature suggests that the demand for IMC is driven by a municipality's population size and fiscal situation (Ferris and Graddy, 1988; Garrone and Marzano, 2015; Di Porto et al., 2016). Thus, we hypothesize:

*H Demand population size (m)*

The smaller municipality m is, the more likely it is to cooperate.

*H Demand fiscal pressure (m)*

The larger the degree of fiscal pressure in municipality m is, the more likely it is to cooperate.

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[2] In an effort to explain contracting out activities of Italian municipalities Garrone and Marzano (2015) utilize a duration model; see also González-Gómez and Guardiola (2009) and Miralles (2008).

*b) m's neighbors' supply for IMC*

The empirical pattern of IMC shows that – with a few exceptions – the consortia founded in Germany consist of municipalities building a coherent geographical area (e.g., Blaeschke, 2014). For this reason, we focus at municipality m's direct neighbors when estimating the supply for IMC facing municipality m. The factors driving the neighbors' supply for IMC are the same as the one's driving municipality m's demand. Thus, we might hypothesize that – other things equal – municipality m is more likely to find a willing cooperation partner the smaller and fiscally weaker its neighbors are. However, the willingness of municipality m to cooperate with its neighbors is not necessarily higher just because its neighbors are more willing to cooperate. Especially if fiscal pressure drives m's neighbors towards cooperation, municipality m may not want to cooperate with them. The reason is that municipality m may expect to have to bear a disproportionately high share of the costs of the collectively produced services. This fear of cross-subsidization may make municipality m more reluctant to cooperate with their fiscally weak neighbors while the neighbors themselves are more willing to cooperate. A similar argument applies to the impact of the neighbor's size (Brasington, 1999). In sum, the neighbor's willingness to cooperate is a poor predictor of the probability of municipality m engaging in IMC.

*c) suitability of available partners*

From municipality m's perspective, there are three reasons why the neighbors may be suitable partners. First, suitable partners are characterizes by tastes for public services that are close to the tastes in municipality m (so-called homophily-hypothesis; e.g. LeRoux and Carr, 2007; Bel and Warner, 2016). When it comes to the field of internal administration, the impact of differences in preferences is less obvious. For the back-office services of internal administration (e.g., bookkeeping), it is difficult to argue in favor of differences in preferences between

citizens of different municipalities. However, there may be differences in workload across municipalities. Differences in workload are expected for services in the registration office where marriages, divorces, births and deaths and changes in place of residence are documented, or for the building authorities where the workload depends on the intensity of private housing activities. As this workload depends largely on the age-structure among local residents, we arrive at the following hypothesis:

*H Homophily: population structure:*

The larger the degree of similarity between municipality m and its neighbors in age structure, the more likely municipality m is to cooperate.

Second, municipality m's neighbors are suitable partners if their interests are complementary to those of municipality m. Brasington (1999) argues that complementarities may result from differences in size: If municipality m is small and one of its neighbors is big, it can expect substantial economies of scale from IMC with this partner. Thus, we arrive at the complementarity hypothesis:

*H Complementarity: population size:*

A small municipality is more likely to cooperate if one of the direct neighbors is large.

Complementarity may also result from divergent population dynamics: If municipality m is shrinking while one of the neighboring municipalities is growing in population (or vice versa), joining forces may help both municipalities. Thus, we arrive at the second complementarity hypothesis:

*H Complementarity: population dynamics:*

A shrinking (growing) municipality is more likely to cooperate if one of the direct neighbors is growing (shrinking).

Third, high transaction costs may prohibit the emergence of IMC (e.g., Feiock, 2007; Bel and Warner, 2016). The level of political transaction costs depend on the composition of local governments of municipality m and its neighbors. We arrive at the following hypothesis:

H Transaction costs: political majorities:

The larger the degree of similarity between municipality m and its neighbors in the composition of local governments, the more likely municipality m is to cooperate.

*d) timing IMC-agreements – the role of the election cycle*

Following the Public Choice logic, we expect local governments to choose the timing of IMC in a way that helps them get re-elected. Thus, they will sign IMC agreements close to the election if they expect them to increase their popularity. If instead they consider IMC agreements to be unpopular yet necessary, we expect them to sign them early in the election term. Bergholz and Bischoff (2016) provide evidence for 59 municipalities in the German state of Hesse – indicating that less than 50 percent of the inhabitants support a close cooperation between their home municipalities and its neighbors in the field of internal administration. This suggests that IMC is not a suitable instrument to boost local politicians' popularity. In fact, it even bears the danger of evoking public resistance. Consequently, our final hypothesis reads:

*H Timing:*

IMC agreements cluster early in the election cycle.

### 3.2 Data

The data analyzed in this paper is generated in a survey among West-German municipalities because official data on IMC is not available. German municipalities provide important public services like local roads, business parks, cultural infrastructure and pre-school childcare. They account for approximately one quarter of overall government expenditures (Zimmermann,

2009: 93-99). They have to fulfill minimum standards set by supra-ordinate governments. Beyond that, however, they have considerable leeway when choosing quality and quantity of public services. More than 50 percent of municipal revenues come from state grants and vertical tax sharing. The largest part of state grants are unconditional grants distributed through a formula-based fiscal equalization system. It gives more grants per capita to fiscally weak municipalities without fully levelling out differences in fiscal capacity. The local business tax is the most important endogenous source of local revenues accounting for more than 10 percent of municipal revenues. Municipalities decide about the effective rate on the profits of local business establishments. Similarly, they set the rate and receive the revenues from the local land tax (e.g. Bischoff and Krabel, 2017).

An elected mayor is head of the municipal administration. The mayor is responsible to a local council and needs its approval for major decisions including the budget. The local council is elected by the local citizens. Next to political parties active on national level – the largest among them being the conservative Christian Democratic Union (CDU) and the Social Democratic Party (SPD) – so-called Free voter associations play a significant role in local politics. They are not formally connected to any political party active on the national level, nor are they associated with a particular political ideology (e.g., Blaeschke, 2014; Baskaran and Lopes da Fonseca, 2016).

Our survey run in 2015 was sent out to 1970 West-German municipalities. We left the metropolitan regions aside and instead concentrated on rural regions where demographic change and intensified interregional competition forces many municipalities to increase efficiency in public service production. The sample excludes municipalities organized in a so-called “Amt”, “Verbandsgemeinde” – special-purpose jurisdictions running all administrative tasks on their member-municipalities’ behalf. These jurisdictions were generated top-down and most municipalities are forced to join them. Thus, cooperation is not voluntary. Among those

municipalities not organized in these special-purpose jurisdictions, the survey asked whether they cooperate with other municipalities in the field of internal administration. If so, we ask them for the legal form and the founding year of the cooperation (among other things). [3] In total, 605 municipalities responded (response rate = 23 percent).

[Table 1]

Table 1 provides descriptive statistics for these municipalities for the year 2000 and 2013. Municipal population ranges from less than 200 to approximately 90,000 inhabitants with a median of approximately 5,700 inhabitants. On average, the population declined by 3.1 percent between 2000 and 2013 though the variation is substantial. The average municipality has roughly 4.5 neighbors. On average, municipalities' tax revenues per capita amount to 702 € in 2000 and 829 € in 2013. An average of 30 percent of all expenditures is spent on personnel. We observe substantial variation in these fiscal variables not only across regions but also between directly neighboring municipalities. The same holds for demographic and political variables. At the same time, per capita income is less dispersed with a high level of spatial correlation. The expenditures per capita on internal administration amount to 139€ on average while the share of administrative expenditure in total running expenditures is 13 percent on average (in 2000) while the dispersion between municipalities is substantial.

Comparing these figures to the corresponding figures of the 1970 municipalities that received the questionnaire, we find the differences to be negligible. Beyond that, it is largely impossible to test for a possible selection bias with respect to the probability to cooperate. On

[3] The data was generated in a larger survey covering more than 6,700 municipalities from all German states and asking for IMC in other fields (e.g. construction yard or tourism marketing). For the current paper, East-German municipalities were excluded because East-Germany underwent substantial regional reforms in the time period covered.

the one hand, IMC is increasingly regarded as politically desirable. This may cause representatives of cooperating municipalities to be more prone to start answering the questionnaire. On the other hand, filling in the questionnaire is much faster for municipalities that do not cooperate. Furthermore, representatives of municipalities that do not cooperate will never have to look up any information to continue the questionnaire. Thus, the probability of finishing the questionnaire is higher for non-cooperating municipalities. The net effect is unclear.

Figure 1 depicts the pattern of IMC emergence in the field of internal administration. Some 18 percent already cooperate in the field of internal administration in 2000. By 2015, this share has risen to 57 percent (see figure 1). It is important to note that a consortium – once founded – is usually not resolved. Among the 605 municipalities that responded to our survey, only 18 report that they were part of an IMC-consortium in the field of internal administration in the past but are no longer part of it in 2015.

[Figure 1]

## 4. Empirical Analysis

We utilize survival analysis to explain the emergence of IMC. Essentially, it provides estimates about how covariates influence the time that passes before the municipalities in our sample change their status from not-cooperating to cooperating. The estimates inform us whether factors prolong or reduce the time before the change in status (or are neutral in this respect). Time-prolonging factors hinder the emergence of IMC while time-reducing factors promote it. Since the decision to cooperate can only depend on factors observed in the pre-cooperation period, the event of cooperation marks the end of our observation of municipality m. We use yearly data from 1998 to 2014. For all fiscal and demographic variables, we construct lagged three-year averages to account for the fact that it usually takes time to reach an agreement and then actualize IMC. This leaves us with an observation period from 2001 to

2014 and 14 discrete time intervals. All municipalities that do not already cooperate in 2000 enter the analysis in time interval one (2001). From then on, they are "at risk" of starting cooperation. After Allison (1982) the discrete-time hazard rate for cooperation is given by

$$P_{mt}(t, X_{mt}) = P(T_m = t \mid T_m \geq t, X_{mt})$$

The empirical model builds on a complementary log-log function (Jenkins, 2005):

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

The non-parametric baseline hazard $\alpha_t$ reflects the probability of starting a cooperation with the covariates of the explanatory variables equal to zero. It constitutes a piece-wise constant for each time interval and thereby acts like year-fixed effects. Thus, common shocks and any general selection bias in favor or against cooperating municipalities is controlled for (see section 3.2), while allowing for a different baseline hazard in each year. Matrix $X$ includes variables capturing demand and supply for IMC as well as variables accounting for suitability of neighbors as cooperation partners and the phase of the election cycle.

Out of the 605 responding municipalities, 126 began cooperating before 2001 and 51 delegated tasks to private firms or to their county before 2001. These municipalities are dropped from our sample, as well as those ones that did report to have started a cooperation between 2001 and 2014 but did not give us a starting date or gave heavily inconsistent answers. Given missing values for a few municipalities in fiscal indicators, we are left with 242 municipalities to include in our analysis.

We capture the impact of municipal size by including the natural logarithm of the total number of citizens (hypothesis *Demand population size*). A dummy for municipalities larger than 20,000 inhabitants is included to account for a possible non-linear effect of population size. We use two fiscal indicators (hypothesis *Demand fiscal pressure*). The degree of fiscal stress is

measured by the share of staffing expenditures in the total running expenditures while we measure fiscal capacity by per capita tax income generated by the observed municipality. For the supply side, we include the spatial lags, more precisely the median value for population size, fiscal stress and fiscal capacity among municipality m's neighbors. All above-mentioned measures are three-year averages, lagged by one year.

We address hypothesis *Homophily* by including the share of neighbors that are similar to municipality m with regard to the number of inhabitants who are under 18 years old; a neighbor is considered similar to municipality m if the corresponding population share deviates by less than 10 percent from that in municipality m. On average, 75 percent of the neighboring municipalities qualify as similar in the share of young inhabitants. We concentrate on this age group because it best reflects a demand on the services of internal administration which are most visible, involving registration of births or marriages and services of the construction authorities for young families. The number of neighbors with the same majority party in the municipal council as m is used to capture the impact of political transaction costs (hypothesis *Transaction costs*).

To test for the timing of IMC-agreements in the election cycle (hypothesis *Timing*), we introduce a dummy capturing the early phase in the election cycle. It is 1 for the first two years following the last local council election (0 else). Election years are marked with a separate dummy.

Some state governments also provide systematic support to municipalities that engage in IMC – typically through subsidies for new consortia granted upon application (see Table 3). We test for the influence of this state policy by introducing a dummy variable that is 1 for all state-year-combinations with an active IMC-promotion policy (0 else).

As controls, we include the municipal area, the share of people younger than 18 and the rate of population growth – again calculated as lagged three-year average. In addition, we use the total

number of neighbors, the average distance to m's neighbors and dummies indicating whether municipality m is located at a county border or a state border. State dummies are used to control for institutional differences, e.g. in the degree of decentralization and in the fiscal equalization system. Finally, we control for differences in the council majority party, with the share of right wing seats and the share of seats held by "local initiatives" (including free voters associations).

[Table 2 and 3]

## 5. Results

The baseline model (Table 3, model 1) uses all variables described above. Neither the population size nor the fiscal indicators of municipality m yield significant coefficient estimators – thus providing no support for our two *Demand* hypotheses. At the same time, we find a negative impact of the neighborhood median of the population size and a positive sign for the neighborhood median of per capita tax revenue. We find confirming results regarding the *Homophily* hypothesis, where the number of neighbors with a similar share of population under 18 years has a significantly positive effect. The same holds for the number of neighbors having the same strongest party in the municipal council – supporting our *Transaction cost* hypothesis. The dummy capturing the early phase of the election cycle is insignificant – thus lending no support to our *Timing* hypothesis. Financial incentives to start IMC by state governments have a positive impact on IMC-emergence.

Among the control variables, we find a negative effect of population growth on the supply side, implying that municipalities with shrinking neighbors cooperate with a higher probability. We find a positive impact of the size of municipal area. The share of people under 18 years old has a negative sign. The same holds for the fact of being situated at a state border. All other variables are insignificant.

The baseline model reveals a striking regularity: Comparing demand and supply factors w.r.t. fiscal capacity, population size and population dynamics, it is always the neighbors' characteristics (supply) that turn out to be significant while the corresponding characteristics of municipality m itself are never significant. The latter become significant once we drop the supply side factors – with the sign the supply side variables had before. We do not report these results here because we consider the corresponding models to be mis-specified. Instead, we test whether the emergence of IMC is driven by the characteristics of the cluster of municipalities municipality m is situated in (consisting of m and its direct neighbors). This is done separately for fiscal factors (model 2), population size (model 3) and population growth (model 4).

In model 2, we drop the fiscal measures on the demand and supply side while including the median of the fiscal measures for m and its neighbors combined. The higher the median indicator for fiscal stress, the larger the fiscal stress among municipality m and its neighbors. The analogous holds for fiscal capacity. In addition, we introduce the relative position of municipality m on the range of fiscal measures among its neighbors. For fiscal capacity, the corresponding variable is calculated as follows:

$$RP(\,fiscal\_capacity) = \frac{\text{taxes p.c. of m - smallest taxes p.c. among m and pot. partners}}{\text{range of taxes p.c. in group of m and potential partners}}$$

It is a continuous variable normalized to the interval [0,1]. It takes on the maximum value of 1 if municipality m is the fiscally strongest municipality among itself and its neighbors and the minimum value of 0 if it is the fiscally weakest. The variable RP (fiscal_stress) is calculated accordingly. These alternative indicators help us to differentiate between the fiscal situation of the nearer area municipality m is situated in and the question whether municipality m is fiscally strong or weak – relative to its neighbors. The results of model 2 show that municipalities in fiscally strong clusters (in terms of tax revenues per capita) are more likely to engage in IMC. The RP-variables do not show a significant effect. In other words, the probability of cooperation

being started is higher in fiscally stronger neighborhoods. Compared to the baseline model, the average distance to the neighbors becomes significantly negative. Apart from that, all other variables perform like they do in the baseline model. This supports the notion that it is the fiscal situation of the nearer area around municipality m that drives the emergence of IMC rather than the isolated situation of municipality m or its neighbors.

Model 3 turns to the role of population size of municipality m and its neighbors. Starting from the baseline model, we drop population size and its spatial lag and replace it by relative position RP (population size) and the median population size of m and its neighbors. We find a negative effect of the median population size (neighborhood + m) and no effect for the relative position. Thus, neighborhoods with smaller municipalities are more likely to start IMC while the (relative) size of municipality m is insignificant.

Model 4 follows the same procedure for population growth. Again starting from the baseline model, we drop population growth on the demand and supply side and replace them by the combined neighborhood median and m's relative position with respect to population change. The model shows us that the probability of cooperation being started is higher in neighborhoods that are shrinking on average while the specific population dynamics in municipality m are of minor importance. The results of the baseline model hold.

The final two models test the relevance of complementarities. Model 5 turns to Brasington's argument for complementarities in size. We define small municipalities to be smaller than 3600 inhabitants (lowest quartile) and large municipalities to have more than 12000 inhabitants (highest quartile). We include a dummy taking the value of 1 if municipality m is large and has at least one small neighbor (M Big – Neighbor Small), and a dummy taking the value of 1 if m is small and has at least one big neighbor (M Small – Big Neighbor). To achieve a clear identification of these interaction effects, we introduce dummies controlling for municipality m being small or big and for the existence of small and/or big neighbors while dropping the continuous

variables for population size to reduce collinearity. Neither of the two interaction terms is significant, while we find the existence of a big neighbor to reduce the probability that municipality engages in IMC. All other variables perform like they do in the baseline model.

Model 6 refers to our second complementarity hypothesis. It argues that divergent population dynamics between municipality m and its neighbors may foster IMC. We introduce a dummy variable taking the value of 1 if municipality m is shrinking and its neighbors are growing (M Shrink – Neighbors Grow). A second dummy takes on the value 1 if municipality m is growing while its neighbors are shrinking (M Grow – Neighbors Shrink). Again, we drop the continuous variables for population growth and introduce dummies for the direction of population dynamics in m and its neighbors to isolate the effect of the above interaction terms. We find no significant effect for municipalities that are shrinking while their neighbors are growing, and no effect for the opposite constellation. Compared to the previous models, population size becomes significant and negative. All other variables perform like they do in the baseline model.

The statistical significance of the coefficient estimators is crucial yet says little about the magnitude of the factors' impact on the emergence of IMC. Calculating the odds ratios, we find some sizeable effects[4]: An increase in the spatial lag of per capita tax revenues by 10 percent is

[4] Although hazard ratios have a ready interpretation when it comes to binary explanatory variables, the interpretation of continuous variables needs to be cautiously considered, since changes in the probability to start IMC are relative and not absolute, and the unit change in the explanatory variable may not reflect a meaningful change in economic terms if, e.g., the one unit change refers to a change in the natural logarithm of an indicator.

associated with an 83 per cent increase in the probability of starting IMC [5]. In model 2, roughly the same sized effect is found for the neighborhood median (including m), namely an 85 per cent increase, indicating that fiscally stronger neighborhoods tend to start cooperating more. An increase in population size by 10 per cent in m's neighborhood three year average median is associated with a decrease in the probability of starting IMC by 8 per cent. In model 3, we find that a 10 per cent increase in the neighborhood median population size (including m) corresponds to an 11 percent decrease in the probability to start IMC. Furthermore, if m is gaining a neighbor that is similar to m with respect to the number of people under 18 years old, the probability of m starting IMC increases by 23 per cent; and gaining a neighbor that is similar to m with respect to the strongest party in its municipal council is associated with a 17 per cent higher probability to start IMC. Municipalities that have at least one neighbor with more than 12000 inhabitants are 75 per cent less likely to start IMC than municipalities with no big neighbors. Regarding our control variables, municipalities with access to IMC support at state level are ten times more likely to start IMC compared to municipalities that are located in states without IMC support. Municipalities located at a state border have 53 per cent lower probability of starting IMC than municipalities not located at a state border, underlining the significant differences in institutional arrangement between the German states.

5 Note that changes in the probability to start IMC can be gathered from the hazard ratios which are the exponentiated coefficients reported in Table 3. E.g. a coefficient of -0.867 for the spatial lag of population size gives us a hazard ratio of $e^{-0.867} = 0.420$ which corresponds to a decrease in probability to start IMC of (1-0.420)100 = 58 per cent per unit increase in population size. Since our measure for population size is log-transformed, a 10 per cent increase in population size corresponds to a $(1 - e^{(0.095 * -0.867)})100 = 7.9$ per cent decrease in probability to start IMC.

## 6. Discussion

In line with previous studies, our analysis provides strong support for the homophily hypothesis: Municipalities with a greater number of similar neighbors (with respect to age structure) start IMC with a higher probability. Our results confirm the key conclusion of the ICA-approach: Low transaction costs have a positive effect on the probability to start IMC.

Regarding the demand and supply of IMC, our results are surprising. While the characteristics of municipality m (population size, population growth, fiscal indicators) are never significant, we find the corresponding characteristics of municipality m's direct neighbors to be significant. In further regression models, we introduced the joint median for characteristics of the local clusters consisting of municipality m and its neighbors and a second set of variables indicating municipality m's relative position in this cluster. The relative position is never found to be significant while the cluster's characteristics are always significant. Thus, we conclude that IMC is more likely for municipalities that are part of a cluster of municipalities that are small in population size, declining in population yet fiscally strong. Compared to the existing literature on IMC-emergence this result is noteworthy in two respects. First, it stresses the importance of the neighboring municipalities as potential partners for the question whether municipality m cooperates in public service provision (e.g., Blaeschke, 2014). Second, this result does not support the notion that fiscal pressure promotes IMC. On the contrary, our results indicate that fiscally strong rather than fiscally weak clusters are more likely to see the emergence of IMC. In our opinion, this results should not be taken as an indication that the logic of IMC is different in Germany than it is in the countries analyzed in previous studies. Instead, we are convinced that this result is driven by the fact that the fear of having to cross-subsidize the future cooperation partner is particularly strong in the case of IMC in administrative tasks. This fear is justified if IMC in this field is more difficult to dissolve than in other fields. In addition, IMC in this field may be seen as a first step in a process towards a municipal association (Amt,

Verbandsgemeinde etc.) or even a municipal merger. In this case, the cooperation implies a long-term commitment that is difficult to reverse in the future and thus the prospect of cross-subsidization is even more repelling.

In section 3, we argued that IMC may be especially promising in cases where the needs of the municipalities are complementary. Following Brasington (1999), complementarities may exist in cases where small municipalities have large municipalities as direct neighbors. Similarly, complementarities may result from divergent population dynamics: If municipalities with declining population cooperate with growing municipalities, they can prevent rising costs from over-capacities and investments in new capacities, respectively. We find no evidence that potential complementarities promote IMC.

By accounting for the time dimension of IMC emergence, our hazard model enables us to explore two potential driving factors that received little attention in the IMC literature so far. First, we hypothesized that IMC may be unpopular among citizens and thus local governments try to start IMC in the early phase of the election cycle. Our results do not support this notion. Second, we investigate the role of IMC-promoting state policies. These are found to have a strong impact on the emergence of IMC.

Our study suffers from a number of shortcomings. The shortcomings mainly result from the fact that the data was collected in a survey because official data on IMC is not available. Therefore, we cannot exclude the possibility that there is a selection bias in favor of or against cooperating municipalities. However, as long as the selection bias is a general upward (or downward) bias, it is absorbed by the baseline probability and the duration dummies without leading

to biased coefficient estimators (and odds ratios).[6] One of the main benefits of using survey data is that our analysis also covers less formalized forms of cooperation. Studies based on official data cannot account for these forms of cooperation.

## 7. Conclusion

We used data from a survey among West-German municipalities aside the metropolitan areas to analyze the factors driving the emergence of IMC in the field of internal administration. Most existing studies paid little attention to the exact time structure of the process and thus explained mainly the existence rather than the emergence of IMC. Moreover, they did not differentiate between different fields of cooperation but mostly mix public services that produce regional spillovers to non-cooperating municipalities with services without such spillovers even though the game-theoretic logic of IMC differs substantially between these services. The existing empirical studies have rarely analyzed in isolation the emergence of IMC in fields where regional spillovers are absent. We address both shortcomings and restrict the focus to IMC in the field of internal administration. To capture the timing of IMC-emergence, we use a hazard model. Starting with a pool of non-cooperating municipalities, the hazard model differentiates factors that make municipalities start IMC earlier from factors that retard IMC.

The hazard model proves to be a fruitful approach. Our results are in line with the existing literature when it comes to the role of transaction costs and homogeneity between potential cooperation partners. At the same time, the fact that we find IMC to emerge among fiscally strong rather than fiscally weak municipalities is at odds with the existing empirical studies. It

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6 Another shortcoming of using survey data is that our data does not provide reliable information regarding the partners cooperating municipalities choose when they cooperate. While this is an interesting question, it is not the main focus of our study.

indicates that the drivers of IMC are likely to differ across fields. This calls for a re-assessment of the existing empirical studies.

When it comes to possible policy implications, we have to be very careful at this point in time. We observe that fiscally weak municipalities are less likely to start IMC and seemingly obvious complementarities are not exploited even though the theoretical literature clearly suggests that the potential efficiency gains are significant. At the same time, we find subsidizing IMC-arrangements in their start-up phase to be a very effective tool by which upper-tier governments can promote IMC. So why not subsidize IMC among small municipalities and municipalities with complementarities? Unfortunately, we know very little about the net benefits of IMC. While the theoretical literature sees the potential to generate economies of scale and scope, there are only very few studies that analyze the economic effects of IMC. These studies suggest that the cost-savings from IMC are small if existent at all (e.g., Blaeschke and Haug, forthcoming). Thus, promoting IMC through subsidies may not be welfare-enhancing after all. We need more research on the question whether IMC really generates the proclaimed benefits.

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## Figures and Tables

Table 1: Descriptive statistics of the sample of municipalities

| | Year | Mean | Std. dev. | min | max |
|---|---|---|---|---|---|
| population | | | | | |
| | 2000 | 10485.62 | 14314.97 | 172.00 | 99825.00 |
| | 2013 | 10161.69 | 13836.63 | 197.00 | 97162.00 |
| population change 2000 - 2013 | | -0.03 | 0.07 | -0.34 | 0.28 |
| own tax revenues per capita | | | | | |
| | 2000 | 705.76 | 387.78 | 201.45 | 3925.77 |
| | 2013 | 829.81 | 346.32 | 358.24 | 3459.04 |
| fiscal stress | | | | | |
| | 2000 | 1.35 | 0.30 | 0.51 | 3.53 |
| | 2013 | 1.25 | 0.28 | 0.60 | 3.23 |
| expenditures on internal administration | 2000 | | | | |
| per capita | | 138.91 | 36.30 | 19.10 | 322.43 |
| in total running expenditures | | 0.13 | 0.06 | 0.03 | 0.70 |
| number of direct neighbors | | 4.41 | 2.08 | 0.00 | 13.00 |
| mean distance to neighbors (km) | | 7.94 | 2.27 | 2.34 | 17.22 |

Table 2: Demand, supply, homophily and transaction costs factors

| Category | Variable | Measure |
|---|---|---|
| Demand | Population Size | Natural log of the total number of citizens, lagged three year average |
| | Over 20k | Dummy=1 if population is larger than 20,000 |
| | Population Growth | One year growth rate of the population, lagged three year average |
| | Fiscal Stress | Share of staffing expenditures in total expenditures, lagged three year average |
| | Fiscal Capacity | Natural log of tax income (in thous.) per capita, lagged three year average |
| Supply | Population Size | Natural log of the total number of citizens, lagged three year average, spatial lags |
| | Population Growth | One year growth rate of the population, lagged three year average, spatial lags |
| | Fiscal Stress | Expenditures over revenues, lagged three year average, spatial lags |
| | Fiscal Capacity | Natural log of tax income (in thous.) per capita, lagged three year average, spatial lags |
| Homophily | Num Sim Under 18 | Number of neighbors similar to m's number of people under 18 years old, lagged three year average |
| Transaction Costs | Same Strongest Party | Number of neighbors with the same majority party in the municipal council as m. |
| Controls | Share Right | Share of right wing seats in municipal council |
| | Share Local Initiative | Share of seats in municipal council held by parties such as the free voters association |
| | IMC Support | Dummy=1 in year and state where the state government systematically promotes IMC |
| | Share under 18 | Share of people younger than 18 in the total population, lagged three year average |
| | Num Neighbors | Total number of neighbors |
| | Avg Distance | Average distance to m's neighbors |
| | Border County | Dummy=1 if m is located at county border |
| | Border State | Dummy=1 if m is located at state border |
| | Area | Municipal area in square kilometers |
| | Election Year | Dummy=1 in year of municipal council election |
| | Early Term | Dummy=1 in year 1 and 2 after a municipal council election |
| | State Dummies | Dummy=1 if municipality m is located in state X |

Table 3: Support for IMC at state level

| State | Form of Support | Year |
|---|---|---|
| Schleswig Holstein | No explicit funding | - |
| Lower Saxony | Directive for the promotion of intermunicipal mergers and intermunicipal cooperation | 2007 - 2010 |
| Northrhein-Westphalia | No explicit funding | - |
| Hesse | Funding for IMC for<br>municipalities < 18k inhabitants<br>municipalities < 30k inhabitants<br>all municipalities | <br>2004 – 2007<br>2008 – 2010<br>since 2011 |
| Rhineland Palatinate | No explicit Funding | - |
| Baden-Württemberg | No explicit Funding | - |
| Bavaria | Funding for IMC for<br>economically underdeveloped areas adjacent to East German states<br>all municipalities | <br>2012<br>since 2015 |
| Saarland | No explicit Funding | - |

Table 4: Results for the discrete time hazard model

| CATEGORY | VARIABLES | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|---|
| DEMAND | Population Size | -0.354 | -0.396* | | -0.337 | | -0.451** |
| | | (0.223) | (0.220) | | (0.228) | | (0.220) |
| | Over 20k | 0.532 | 0.558 | 0.258 | 0.488 | 0.0617 | 0.532 |
| | | (0.499) | (0.561) | (0.476) | (0.515) | (0.450) | (0.510) |
| | Population Growth | -0.0346 | -0.0173 | -0.0226 | | -0.0780 | |
| | | (0.0847) | (0.0899) | (0.0849) | | (0.0978) | |
| | Fiscal Stress | 1.910 | | 1.616 | 1.680 | 0.607 | 2.406 |
| | | (1.455) | | (1.449) | (1.458) | (1.544) | (1.471) |
| | Fiscal Capacity | 0.355 | | 0.343 | 0.411 | 0.357 | 0.363 |
| | | (0.449) | | (0.414) | (0.449) | (0.491) | (0.429) |
| SUPPLY | Population Size (spatial lag) | -0.867*** | -0.715*** | | -0.849*** | | -0.902*** |
| | | (0.248) | (0.241) | | (0.255) | | (0.252) |
| | Population Growth (spatial lag) | -0.812*** | -0.870*** | -0.861*** | | -0.825*** | |
| | | (0.245) | (0.239) | (0.245) | | (0.263) | |
| | Fiscal Stress (spatial lag) | -3.312 | | -3.344 | -2.950 | -5.830** | -3.934 |
| | | (2.635) | | (2.685) | (2.691) | (2.737) | (2.668) |
| | Fiscal Capacity (spatial lag) | 6.340*** | | 6.486*** | 6.364*** | 6.586*** | 6.162*** |
| | | (0.853) | | (0.809) | (0.861) | (0.950) | (0.823) |
| HOMOPHILY | Num Sim Under 18 | 0.209*** | 0.212*** | 0.207*** | 0.206*** | 0.225*** | 0.233*** |
| | | (0.0612) | (0.0603) | (0.0595) | (0.0612) | (0.0779) | (0.0653) |
| TRANSACTION COSTS | Same Strongest Party | 0.155*** | 0.165*** | 0.159*** | 0.156*** | 0.163*** | 0.160*** |
| | | (0.0563) | (0.0618) | (0.0564) | (0.0547) | (0.0609) | (0.0564) |
| TIMING | Election Year | 0.171 | 0.194 | 0.183 | 0.190 | 0.157 | 0.135 |
| | | (0.287) | (0.286) | (0.284) | (0.288) | (0.285) | (0.287) |
| | Early Term | -0.0328 | -0.0424 | -0.0421 | -0.0433 | -0.0661 | 0.0281 |
| | | (0.247) | (0.254) | (0.246) | (0.249) | (0.249) | (0.254) |
| VARIATION | Fiscal Stress (Neighborhood+m) | | -1.592 | | | | |
| | | | (2.988) | | | | |
| | Fiscal Capacity (Neighburhood+m) | | 6.436*** | | | | |
| | | | (0.698) | | | | |
| | Population Size (Neighborhood+m) | | | -1.246*** | | | |
| | | | | (0.250) | | | |
| | Population Growth (Neighborhood+m) | | | | -0.998*** | | |
| | | | | | (0.264) | | |
| | RP (fiscal_stress) | | 0.183 | | | | |
| | | | (0.265) | | | | |
| | RP (fiscal_capacity) | | -0.659* | | | | |
| | | | (0.364) | | | | |
| | RP (population size) | | | -0.204 | | | |
| | | | | (0.403) | | | |
| | RP (population_growth) | | | | 0.196 | | |
| | | | | | (0.295) | | |
| | M Big - Small Neighbor | | | | | -0.414 | |
| | | | | | | (0.614) | |
| | M Small - Big Neighbor | | | | | 0.809* | |
| | | | | | | (0.456) | |
| | M Big | | | | | 0.745 | |
| | | | | | | (0.624) | |
| | M Small | | | | | 0.374 | |
| | | | | | | (0.319) | |
| | Big Neighbor | | | | | -1.369*** | |
| | | | | | | (0.391) | |
| | Small Neighbor | | | | | 0.102 | |
| | | | | | | (0.308) | |
| | M Shrink – Neighbor Grow | | | | | | 1.236 |
| | | | | | | | (3.331) |
| | M Grow - Neighbor Shrink | | | | | | -1.496 |
| | | | | | | | (3.288) |
| | M shrink | | | | | | -1.497 |
| | | | | | | | (3.257) |
| | Neighbor Grow | | | | | | -1.712 |
| | | | | | | | (3.427) |

Table 4 cont.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CONTROLS | Share Right | 0.0196* | 0.0180 | 0.0174 | 0.0193* | 0.0223** | 0.0187 |
| | | (0.0110) | (0.0121) | (0.0114) | (0.0112) | (0.0112) | (0.0117) |
| | Share Local Initiative | 0.0134* | 0.0139 | 0.0105 | 0.0138* | 0.0171** | 0.0117 |
| | | (0.00800) | (0.00847) | (0.00823) | (0.00810) | (0.00859) | (0.00860) |
| | IMC Support | 2.260*** | 2.151*** | 2.392*** | 2.223*** | 2.418*** | 2.492*** |
| | | (0.368) | (0.371) | (0.389) | (0.355) | (0.356) | (0.430) |
| | Share under 18 | -0.289*** | -0.321*** | -0.272*** | -0.271*** | -0.326*** | -0.344*** |
| | | (0.0699) | (0.0694) | (0.0744) | (0.0720) | (0.0584) | (0.0713) |
| | Num Neighbors | -0.170** | -0.139 | -0.182** | -0.158* | -0.209** | -0.152 |
| | | (0.0852) | (0.0863) | (0.0796) | (0.0835) | (0.0907) | (0.0961) |
| | Avg. Distance | -0.152* | -0.190** | -0.115 | -0.166* | -0.202** | -0.161* |
| | | (0.0865) | (0.0868) | (0.0799) | (0.0877) | (0.0886) | (0.0907) |
| | Border County | 0.00860 | -0.0541 | 0.0633 | 0.00130 | -0.394* | 0.101 |
| | | (0.233) | (0.231) | (0.236) | (0.235) | (0.236) | (0.236) |
| | Border State | -0.760*** | -0.723*** | -0.826*** | -0.778*** | -0.961*** | -0.754*** |
| | | (0.240) | (0.239) | (0.272) | (0.243) | (0.267) | (0.253) |
| | Area | 1.34e-05** | 1.45e-05** | 1.17e-05** | 1.37e-05** | 2.02e-05*** | 1.28e-05** |
| | | (5.82e-06) | (5.81e-06) | (5.40e-06) | (5.94e-06) | (5.57e-06) | (5.96e-06) |
| | State FE | YES | YES | YES | YES | YES | YES |
| | Observations | 3,112 | 3,112 | 3,112 | 3,112 | 3,111 | 3,114 |

Robust standard errors in parentheses (clustered on municipal level) *** p<0.01, ** p<0.05, * p<0.1

Figure 1: Number of newly founded IMC-agreements by year interval (2001-2015)

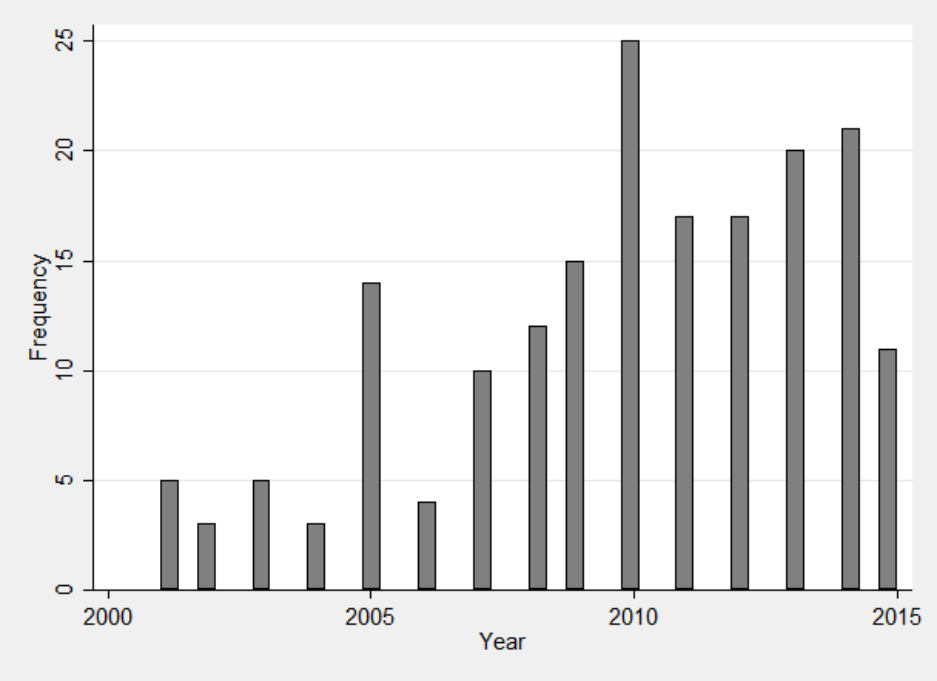


Figure 2: Number of municipalities by population size (2001)