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**Inter-municipal cooperation in administrative tasks–  
the role of population dynamics and elections**

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**Abstract**

We analyze the factors driving the emergence of inter-municipal cooperation (IMC) in tasks of internal administration in West-Germany between 2001 and 2014. In line with the Institutional Collective Action Approach, we find similarities in political ideology to foster cooperation. Cost pressure drives IMC. Given substantial cost hysteresis in administrative tasks, we expect IMC to be more frequent among shrinking municipalities. Our results supports this notion. However, there is no evidence that municipalities make use of complementarities from divergent population dynamics. We apply a hazard model that allows us to analyze the timing of IMC arrangements. We find state subsidies for IMC are an important driving force behind IMC. IMC agreements are less likely to emerge in election years when municipalities face low cost pressure while the opposite is true for municipalities with high cost pressure.

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

JEL. H77, D72

## 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 and Warner, 2016). This paper adds another empirical study to the admittedly large body of literature on IMC emergence.

Our study differs from the existing studies in four distinct features. The first distinction is a methodological one: We argue that the reasoning behind starting the joint provision of public 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. Most 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 allows us to take a closer look at the timing of IMC-arrangements – the second distinctive feature of this study. Specifically, we take a standard Public Choice argument to the analysis of IMC-emergence by asking whether IMC-agreements cluster in certain years of the election cycle. The third distinct feature of our paper is its specific focus on the impact that demographic change has on the emergence of IMC: Does population decline promote IMC?

Finally, our study concentrates on IMC in the field of internal administration (“Allgemeine Verwaltung” – a standing term in Germany) – a task that has received little attention in the literature on IMC so far. This field includes delegated tasks that local jurisdictions carry 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. Moreover, they have to

organize local elections and bear the running costs of a local council. On average, the municipalities in our sample spent 284 Euro per capita in 2013 (12 percent of their running expenditures) on these tasks. These tasks are usually labor-intensive and the local jurisdictions have to meet high standards regarding data security and democratic procedures. In municipalities with declining population, local authorities will find it increasingly difficult to keep up with these high standards at affordable costs. In addition, they face cost hysteresis because dismantling administrative capacities is costly and time-consuming due to strict labor regulation. Thus, we expect shrinking municipalities to be under high pressure to cooperate in the field of internal administration.

Our study builds on data from a survey among municipalities that covers 439 West-German municipalities conducted in 2015. The information from the survey – combined with data from official sources – allows us to cover a time period spanning from 2001 to 2014. In this time span, 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 (see Feiock, 2007), we find IMC to be more likely in constellations where political transaction costs are low. At the same time, high administrative expenditures per capita promote IMC. We find population decline to foster IMC while municipalities do not seem to exploit complementarities resulting from divergent population dynamics. Our results show that municipalities with low cost pressure are less likely to sign IMC agreements in election years while the opposite is true when cost pressure is high. Finally, state subsidies for IMC are found to have a strong positive impact on the emergence of IMC.

The paper proceeds as follows: Section 2 reviews the existing literature. Section 3 presents our hypotheses and the data. Method and results are presented in section 4 and 5 respectively. Section 6 discusses the results and section 7 concludes.

## 2. Review of literature

Over the last 15 years, scholars mostly from public administration have compiled a large body of empirical studies on the emergence of IMC. These studies cover a large variety of different services. Bel and Warner (2016) show that most existing studies do not differentiate between services but rather identify factors that explain why municipalities cooperate at all. Most studies that focus on specific tasks either choose capital-intensive tasks like sewage and waste-disposal, or tasks like regional development or tourism marketing (e.g., Bergholz, 2018). IMC in the obligatory tasks of internal administration has received little attention so far (for an exception, see Blaeschke (2014)).

Many studies analyze the role of municipal characteristics that are expected to shape the expected gains from IMC – showing that especially small and fiscally weak municipalities are more likely to cooperate (e.g., Warner and Hefetz, 2002; Bel et al., 2013; Schoute et al., 2017). Pioneered by Richard Feiock and co-authors, the Institutional Collective Action (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.

Few authors have analyzed IMC from a Public Choice perspective. Garrone et al. (2013) argue that public managers favor IMC to reinforce managerial dominance and limit the influence of elected politicians on public service provision (see also Sørensen, 2007). Di Liddo and Giuranno (2016) provide a theoretical model showing that local governments can impair yardstick competition through IMC. Governments interested in extracting rents are shown to make use of IMC because it increases the amount of extractable rents without reducing the

probability of re-election. The empirical analysis by Bergholz and Bischoff (2018) points in the opposite direction. Using data from a survey among local council members in 60 German municipalities, they provide evidence that German politicians consider IMC a loss in political power. So far, standard questions in the Public Choice literature have not been addressed in the context of IMC – among them the question whether politicians strategically choose certain times within the election cycle to launch IMC arrangements. This question is addressed in the current paper.

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, 2018). In sum, the first year of cooperation deserves the primary attention and has to be treated differently than all subsequent years. 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 (2018) uses a similar model to explain the emergence of IMC in the field of tourism marketing among West-German municipalities. He argues that tourism marketing generates benefits that spill over to the municipalities outside the consortium and argues that free riding is an obstacle for the emergence of IMC. This argument does not apply to the field of internal administration because the benefits from IMC in this field result from the economics of scale and scope generated and shared within the consortium.<sup>1</sup> What is more, Bergholz (2018) does not test for the role of population change, the election cycle or state policies to incentivize IMC.

### **3. Hypotheses and data**

#### **3.1 Hypotheses**

##### *a) Population decline*

Our first focus rests on the role of population decline. If a certain municipality  $m$  is shrinking in population size, this automatically means losses in revenues from tax sharing and fiscal equalization. While population decline also implies a loss in workload, the municipality cannot reduce costs of providing internal administrative services at the same pace. Instead, it faces rising per capita costs due to cost hysteresis. These are particularly large in the field of internal administration because of its high labor intensity and the fact that labor regulation prevents short- or medium term adjustment in employment especially in the public sector. Consequently, shrinking municipalities will face high incentives to cooperate in the field of internal administration. Thus, our first hypothesis reads:

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<sup>1</sup> 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).

*H1 Population decline:*

Shrinking municipalities are more likely to cooperate in the field of internal administration than non-shrinking municipalities.

Regardless of the willingness of a certain municipality  $m$  to cooperate with others, cooperation only takes place if two additional conditions apply (cf. Blaeschke, 2014). First, there must be other municipalities nearby interested in cooperation. Second, these potential partners must be a suitable partner for municipality  $m$ . The empirical pattern of IMC in Germany shows that – with a few exceptions – the consortia founded consist of municipalities building a coherent geographical area (e.g., Rosenfeld et al., 2016). Thus, we focus at municipality  $m$ 's direct neighbors when answering the question to which degree the above conditions are satisfied.

With respect to the first condition, it seems straightforward to assume that the factors driving the neighbors' willingness to cooperate are the same as in municipality  $m$ . However, the willingness of municipality  $m$  to cooperate with its neighbors is not necessarily higher just because its neighbors are more willing to cooperate. With respect to population dynamics, two opposing arguments can be made.

The first argument follows the ICA-logic (see section 2). Accordingly, the negotiation about sharing costs and benefits from IMC is less costly if the interests of the cooperating municipalities are aligned. Thus, we arrive at our second hypothesis:

*H2 Aligned interests due to synchronous population dynamics:*

A shrinking municipality is more likely to cooperate the more of its direct neighbors are also shrinking.

The second argument works in the opposite direction: Accordingly, municipality  $m$ 's neighbors are particularly suitable partners if their interests are complementary to those of municipality  $m$ . Complementarities in interests are large in the case of divergent population



dynamics because overcapacities in a shrinking municipality can be used to absorb the increasing workload in a growing municipality. This is beneficial for both municipalities. Thus, we arrive at the following hypothesis:

*H3 Complementarities in population dynamics:*

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

*b) Timing of IMC-agreements in the election cycle*

Our second focus refers to the timing of IMC agreements in 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 (2019) 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:

*H4 Timing:*

Municipalities are less likely to sign the IMC agreements in times near elections.

### **3.2 The role of municipalities in federalist Germany**

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). Municipalities have to fulfill minimum standards set by upper-tier 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 revenues accounting for more than 10 percent of municipal revenues. Municipalities decide about the effective tax 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).

### **3.3 Data**

While there is official data on demographic, fiscal and political characteristics of German municipalities, there is no official data on IMC. This data is generated in a survey sent out to 1970 West-German municipalities in 2015. 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. 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).<sup>2</sup> In total, 439 municipalities responded (response rate = 22 percent).

[Table 1]

Table 1 provides descriptive statistics for these municipalities for the year 2000 and 2013. Municipal population ranges from under 200 to approximately 90,000 inhabitants with a median of approximately 5,800 inhabitants. On average, the population declined by 3.8 percent between 2000 and 2013 though the variation is substantial. The average municipality has roughly 6.3 neighbors. On average, municipalities' tax revenues per capita amount to 695 € in 2000 and 1041 € in 2013. 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 much less dispersed with a high level of spatial correlation. The expenditures per capita on internal administration amount to 286 € on average while the share of administrative expenditure in total running expenditures is 12 percent on average (in 2013). Around 70 per cent of expenditures on internal administration are spent on personnel. Again, the dispersion between municipalities is substantial.

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<sup>2</sup> 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). We exclude East-German municipalities because East-Germany underwent substantial regional reforms in the time period covered. We also exclude 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.

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 impossible to test for a possible selection bias with respect to the probability to cooperate. On 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 takes less time in 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 439 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**

Given the stability of IMC-arrangements in Germany, 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). 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 2000 to 2014. Most explanatory variables are lagged by one year 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. Following Allison (1982), the discrete-time hazard rate for cooperation is given by

$$P_{mt}(t, X_{mt}) = P(T_m = t | T_m \geq t, X_{mt}) \quad (1)$$

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

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

The non-parametric baseline hazard  $\alpha_t$  reflects the probability of starting a cooperation with the covariates of the explanatory variables equal to zero 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 all variables expected to drive the emergence of IMC.

Out of the 439 responding municipalities, 84 began cooperating before 2001 and 12 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 225 municipalities to include in our analysis, 101 of which started cooperation between 2000 and 2014.

Our first three hypotheses refer to the effect of population dynamics on the emergence of IMC. Figure 2 shows the histogram of the rate of population growth for the municipalities in our sample (two-year average). 60 percent of them are shrinking. The lower third of all municipalities are shrinking by more than 0.5 percent over the two years while the upper 30

percent grow by 0.2 percent or more. Below, we will refer to these two categories as strongly shrinking and strongly growing municipalities respectively. Given the intra-regional correlation in population dynamics, both categories have on average three direct neighbors from the same category and one from the opposing one.

[Figure 2]

To test for the timing of IMC-agreements in the election cycle (hypothesis H4 *Timing*), we make use of the fact that municipal election dates differ across states (see Table 2). We introduce dummy variables to capture municipality  $m$ 's proximity to the next local election.

[Table 2]

We introduce numerous control variables. The impact of municipal size is captured by the logarithm of the total number of citizens. The fiscal capacity is measured by the per capita tax revenue generated by the observed municipality. To capture the specific cost pressure in administrative tasks, we include the expenditures on administrative tasks per inhabitant. We include the spatial lags, more precisely the median value for population size, fiscal capacity and administrative expenditures among municipality  $m$ 's neighbors to account for the situation of municipality  $m$ 's potential cooperation partners.<sup>3</sup> Fiscal and population size measures are expressed in logs (see Table 3).

Some state governments provide systematic support to municipalities that engage in IMC – typically through subsidies for new consortia granted upon application (see Table 4). 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).

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<sup>3</sup> Fiscal variables in prices of 1998.

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. The fear of having to cross-subsidize other municipalities may be an obstacle to cooperation. This fear is lower if potential partners are similar with respect to their tax capacity. Thus, we include the number of neighboring municipalities that have a similar tax capacity as municipality  $m$  (difference by less than 20 percent). The impact of differences in citizens' preferences is not pronounced when it comes to internal administration. 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. If at all, the workload per capita is likely to depend on the age composition of the inhabitants. Thus, we account for the homophily-argument (cf. Alesina et al., 2004) by including the share of neighbors that are similar to municipality  $m$  with regard to the age composition of its population; a neighbor is considered similar to municipality  $m$  if the share of children deviates by less than 10 percent from that in municipality  $m$ . On average, 65 percent of the neighboring municipalities qualify as similar in the share of young inhabitants.

We also include the total number of neighbors, the average distance to  $m$ 's neighbors and a dummy indicating whether municipality  $m$  is located at a county 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 local council using the share of seats held by "local initiatives" (including free voters associations) and by the Christian Democrats.

[Table 3 and 4]

## 5. Results

We use the hazard model described in expression (2) to identify factors driving IMC in the tasks of internal administration. Table 5 reports the results of different specifications using different measures for our central variables and introduces different interactions to test how potential factors moderate each other's effect. It is important to note that we report odds ratios rather than regression coefficients. Odds ratios tell us by what (multiplicative) factor the probability that municipality  $m$  starts cooperating in  $t$  increases when the corresponding factor increases. Odds ratios lower than 1 indicate that a factor retards the formation of a joint business parks while odds ratios above 1 indicate that a factor accelerates it.

The baseline model (model 1) accounts for the rate of population growth in municipality  $m$  and the median rate of population growth among its direct neighbors. The results are only partially in line with hypothesis H1: While the rate of population growth in municipality  $m$  is insignificant, the probability of cooperation decreases in the median rate of population growth among municipality  $m$ 's neighbors. Our results support our *Timing* hypothesis: IMC agreements are less likely in election years.

Among the control variables, neither the population size nor the fiscal indicators of municipality  $m$  yield significant coefficient estimators. At the same time, we find a negative impact of the neighborhood median of the population size and a positive impact for the neighborhood median administrative expenditures per capita. IMC is less likely in counties with high unemployment rates. The number of neighbors having the same strongest party in the municipal council is positively related to the emergence of IMC – supporting the relevance of political transaction costs. Financial incentives to start IMC by state governments have a positive impact on IMC-emergence. We find a negative coefficient of the share of Christian Democratic politicians in the local council as well as for the average distance to  $m$ 's neighbors. All other variables are insignificant.



The baseline model reveals a striking regularity: Comparing the performance of fiscal and population-related indicators, it is the neighbors' characteristics that turn out to be significant while the corresponding characteristics of municipality  $m$  itself are insignificant. We explore this regularity in the second regression model. It tests 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). To this end, we drop the fiscal and population-related measures and replace them by the median in the corresponding variables for  $m$  and its neighbors combined (hereafter local cluster). The higher the median indicator for population growth, the larger the rate of population growth among municipality  $m$  and its neighbors. The analogous holds for the other measures. The results of model 2 show that municipalities in small and shrinking clusters are more likely to engage in IMC. Similarly, IMC is more likely in clusters with high administrative costs per capita while fiscal capacity remains insignificant. All other variables perform like they do in the baseline model.

To test H2 and H3, we replace the variables capturing population growth in  $m$  and its neighbors by the dummies for a strongly shrinking or strongly growing municipality  $m$  (definition, see section 4). In model 3, we interact the dummy for strongly shrinking municipalities with a) the number of neighboring municipalities from the same category and b) the number of municipalities from the opposite category. In model 4, the analogous interactions are built using the dummy for strongly growing municipalities. We do not find a significant effect for any of these interactions as is illustrated in figure 3, and cannot confirm neither H2, nor H3.

In model 5 and 6, we test whether the effect of the timing of cooperation w.r.t. local elections relates to the administrative expenditures or the own tax revenues. To this end, we interact the tax capacity p.c. with the election and the pre-election year dummy. In model 6, we interact administrative expenditures p.c. with the election dummies. In both models we find a

significant negative effect for the election year which is moderated by increasing tax revenues or increasing administrative expenditures (see Figure 4, panel a) and b)).

Looking at the size of the odds ratios, we find a number of variables to have sizeable effects on the probability of municipality  $m$  to start IMC<sup>4</sup>: An increase in the neighborhood median rate of population growth by 1 percentage point is associated with a 48 per cent decrease in the probability of starting IMC<sup>5</sup>. In model 2, roughly the same sized effect is found for the neighborhood median (including  $m$ ), namely a 53 per cent decrease, indicating that shrinking neighborhoods tend to start cooperating more than others. A ten percent increase in the median population size of the neighborhood cluster is associated with a 7.2 percent decrease in the probability to start cooperating. This effect size is comparable with the effect sizes of the spatial lags of population size in the other models. Furthermore, for each additional neighbor that is similar to  $m$  with respect to the strongest party in its municipal council the odds of starting IMC are 1.12 times higher. Regarding our control variables, municipalities with access to IMC support at state level are nine times more likely to start IMC compared to municipalities that

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<sup>4</sup> 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.

<sup>5</sup> Note that changes in the probability to start IMC can be gathered from the odds ratios reported in Table 5. E.g. a coefficient of 0.584 for the spatial lag of population size corresponds to a decrease in probability to start IMC of  $(1-0.584)100 \approx 42$  per cent per unit increase in population size. Since our measure for population size is log-transformed, a 10 per cent increase in neighbourhood median population size corresponds to a  $(1 - e^{(0.095 * -0.538)})100 = 4.98$  per cent decrease in probability to start IMC.

are located in regions without IMC support, and an increase in the county's unemployment rate by one percentage point relates to a 53 percent decrease in probability to start IMC.

## **6. Discussion**

In line with previous studies, we find IMC to be more likely to emerge in clusters of small municipalities. Our analysis also confirms the key conclusion of the ICA-approach: Low transaction costs have a positive effect on the probability to start IMC. When it comes to the impact of fiscal variables, our results are less aligned with the existing literature. While we find high cost pressure in the specific task analyzed (namely administrative tasks) to foster IMC, our results do not support the notion that fiscally weak municipalities – i.e. municipalities with low revenue-raising capacities – are more likely to cooperate. While fiscal capacity itself is insignificant, it makes a difference in election years. Here, fiscally strong municipalities are more likely to cooperate while the opposite is true for fiscally weak ones. Furthermore, we find high unemployment rates to go along with less likely IMC.

A main focus of our analysis rests on the role of population dynamics. In line with Hypothesis H1, we find IMC to be more likely in clusters with shrinking municipalities. We also hypothesized that IMC may be especially promising in cases where the needs of the municipalities are complementary. If municipalities with declining population cooperate with growing municipalities, they can prevent rising costs from over-capacities and investments in new capacities, respectively. However, we find no evidence that potential complementarities promote IMC. At the same time, having neighbors with the same direction in population dynamics does not foster IMC either. Thus, our results do not support hypotheses H2 and H3.

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 are less likely to start IMC in times near elections. Our results clearly support the corresponding

hypothesis H4. IMC-arrangements are less likely in election years in municipalities with high cost pressure and fiscal capacity while the opposite is true for municipalities with low cost pressure and fiscal capacity. 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).<sup>6</sup> 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 to analyze the factors driving the emergence of IMC in the field of internal administration. Given the substantial cost hysteresis in administrative tasks, we expect IMC to be more likely in municipalities with shrinking population size. Our results strongly support this notion. At the same time, we find no evidence that IMC is a tool by which shrinking and growing municipalities join forces and exploit complementarities.

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<sup>6</sup> 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.

Most existing studies use methods that pay little attention to the timing of IMC arrangements and thus explain the existence rather than the emergence of IMC. We avoid these shortcomings by using 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. It enabled us to analyze the timing of IMC arrangement and thus investigate the role of two factors that have not been addressed in previous studies. Our results show that Public Choice considerations influence the timing of IMC arrangements. Furthermore, it shows that state policies to support IMC have a large impact. Measured by its odds ratio, this factor is much more important than the other factors.

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 not more prone to IMC and seemingly obvious complementarities between shrinking and growing municipalities 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 fiscally weak municipalities and among 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 (cf. Bel and Sebo, 2018). These studies suggest that the cost-savings from IMC exist in capital intensive tasks like sewage and waste disposal while there is mixed evidence regarding the effects of IMC in other fields of government policies (e.g., Blaeschke and Haug, 2017). 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	9906.18	12771.75	172	91801
	2013	9585.34	12236.11	197	88953
Population change 2000 - 2013		-0.04	0.07	-0.25	0.15
Number of neighbors with opposite population dynamic	2013	0.56	1.06	0	7
Number of neighbors with the same population dynamic	2013	2.78	1.67	0	9
Own tax revenues per capita	2000	695.21	311.21	307.67	3371.16
	2013	1042.89	421.53	451.77	4274.33
Staff costs in internal administration expenditures	2000	0.76	0.05	0.52	0.87
	2013	0.72	0.10	0.25	0.88
Expenditures on internal administration per capita in total running expenditures	2013	284.47	95.15	81.93	753.96
		0.12	0.04	0.02	0.31
Number of direct neighbors		6.31	2.04	0	13
Mean distance to neighbors (km)		7.89	2.27	2.65	14.88

Table 2: Years of municipal council elections in the West-German states

State	Year													
	01	02	03	04	05	06	07	08	09	10	11	12	13	14
Schleswig Holstein			X					X					X	
Lower Saxony	X					X					X			
Northrhein- Westphalia				X					X					X
Hesse	X					X					X			
Rhineland Palatinate				X					X					X
Baden- Württemberg				X					X					X
Bavaria		X						X						X
Saarland				X					X					X

Table 3: Variables and their description

Variable	Measure
Population Size	Natural log of the total number of citizens, lagged by one year
Population Growth	One year growth rate of the population, lagged by one year
Tax Capacity	Natural log of tax income (in thous.) per capita, lagged by one year
Administrative Expenditures	Expenditures in the administrative budget, excluding interest spending
Unemployment Rate	Unemployment rate on county level
Election Year	Dummy=1 in year of municipal council election
Election Year -1	Dummy=1 one year before a municipal council election
Election Year -2	Dummy=1 two years before a municipal council election
Num Sim Tax Capacity	Number of neighbors similar to m's per capita tax income, lagged by one year
Num Sim Share Under 18	Number of neighbors similar to m's number of people under 18 years old, lagged by one year
Same Strongest Party	Number of neighbors with the same majority party in the municipal council as m.
Share Christian Democrats	Share of seats in municipal council held by Christian Democrats
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
Doppik	Dummy=1 if m engages in double-entry bookkeeping in t
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
State Dummies	Dummy=1 if municipality m is located in state X
Spatial lags	Neighbourhood median (without m) of measure X
Neighbourhood+m	Median of measure X of m and its neighbours
Strongly Growing/Shrinking	Dummy=1 if municipality m grew by more than 0.2 per cent over the last two years/ Dummy=1 if municipality m shrank by more than 0.5 per cent over the last two years
Opposite/Same	Number of neighbors with the opposite/same category of strongly growing or strongly shrinking population

Table 4: 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 municipalities < 18k inhabitants municipalities < 30k inhabitants all municipalities	2004 – 2007 2008 – 2010 since 2011
Rhineland Palatinate	No explicit Funding	-
Baden-Württemberg	No explicit Funding	-
Bavaria	Funding for IMC for economically underdeveloped areas adjacent to East German states all municipalities	2012  since 2015
Saarland	No explicit Funding	-

Table 5: Results for the discrete time hazard model

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Population Size	0.781*		0.747**	0.752**	0.798*	0.842
	(0.114)		(0.107)	(0.106)	(0.109)	(0.128)
Population Size (spatial lag)	0.584***		0.469***	0.461***	0.630**	0.572***
	(0.119)		(0.0917)	(0.0865)	(0.124)	(0.118)
Population Growth	0.883				0.895	0.878
	(0.101)				(0.105)	(0.105)
Population Growth (spatial lag)	0.518***				0.467***	0.489***
	(0.119)				(0.116)	(0.114)
Tax Capacity	0.693		0.687	0.694	0.707	0.481
	(0.234)		(0.231)	(0.237)	(0.243)	(0.215)
Tax Capacity (spatial lag)	1.438		1.733	1.626	1.414	1.947
	(0.590)		(0.699)	(0.668)	(0.596)	(0.934)
Administrative Expenditures	0.971		1.110	1.153	0.818	1.007
	(0.216)		(0.251)	(0.269)	(0.235)	(0.235)
Administrative Expenditures (spatial lag)	1.748**		1.983**	1.973**	1.631*	1.633*
	(0.482)		(0.528)	(0.528)	(0.462)	(0.452)
Population Size (Neighborhood+m)		0.456***				
		(0.107)				
Population Growth (Neighborhood+m)		0.466***				
		(0.116)				
Tax Capacity (Neighborhood+m)		0.984				
		(0.259)				
Admin. Expenditures (Neighborhood+m)		1.760**				
		(0.469)				
Strongly Shrinking			0.968	1.241		
			(0.567)	(0.403)		
Strongly Growing			0.503	1.023		
			(0.254)	(0.786)		
Opposite Category			0.963	0.749*		
			(0.189)	(0.117)		
Same Category			0.895	0.972		
			(0.0953)	(0.0856)		
Strongly shrinking # Opposite Category			0.800			
			(0.206)			
Strongly shrinking # Same Category			1.096			
			(0.173)			
Strongly growing # Opposite Category				1.154		
				(0.307)		
Strongly growing # Same Category				0.784		
				(0.161)		
Election Year # Tax Capacity					5.470***	
					(3.596)	
Election Year-1 # Tax Capacity					0.467	
					(0.444)	
Election Year # Admin. Expenditures						13.20***
						(10.27)
Election Year-1 # Admin. Expenditures						0.854
						(0.275)

Table 5 cont.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Unemployment Rate	0.467*** (0.0357)	0.458*** (0.0369)	0.455*** (0.0374)	0.467*** (0.0340)	0.470*** (0.0350)	0.475*** (0.0365)
Election Year	0.518** (0.157)	0.514** (0.153)	0.465** (0.143)	0.471** (0.148)	6.58e-06*** (2.81e-05)	4.80e-07*** (2.01e-06)
Election Year -1	0.762 (0.224)	0.744 (0.218)	0.775 (0.236)	0.792 (0.246)	107.5 (660.2)	1.730 (2.907)
Election Year -2	0.801 (0.256)	0.760 (0.241)	0.789 (0.260)	0.795 (0.262)	0.817 (0.262)	0.825 (0.265)
Num Sim Tax Capacity	1.011 (0.0952)	1.039 (0.0881)	1.017 (0.102)	1.027 (0.105)	1.019 (0.0989)	1.016 (0.1000)
Num Sim Share Under 18	1.044 (0.0590)	1.043 (0.0564)	1.062 (0.0591)	1.056 (0.0578)	1.059 (0.0611)	1.042 (0.0572)
Same Strongest Party	1.122** (0.0622)	1.143** (0.0622)	1.144** (0.0621)	1.135** (0.0590)	1.126** (0.0610)	1.102* (0.0595)
Share Christian Democrats	0.985** (0.00710)	0.984** (0.00634)	0.984** (0.00635)	0.984** (0.00679)	0.988 (0.00754)	0.988* (0.00718)
Share Local Initiative	0.994 (0.00370)	0.994 (0.00376)	0.994 (0.00372)	0.994 (0.00354)	0.996 (0.00362)	0.995 (0.00365)
IMC Support	9.055*** (3.465)	11.15*** (4.329)	11.34*** (4.560)	9.753*** (3.788)	8.965*** (3.434)	8.843*** (3.117)
Doppik	5.298*** (1.460)	6.086*** (1.819)	6.163*** (1.840)	4.741*** (1.221)	5.526*** (1.488)	5.436*** (1.490)
Num Neighbours	0.975 (0.0693)	0.968 (0.0755)	0.972 (0.0759)	0.909 (0.0569)	0.953 (0.0710)	1.005 (0.0724)
Avg. Distance	0.965** (0.0143)	0.996 (0.0289)	0.996 (0.0248)	0.979 (0.0326)	0.963** (0.0145)	0.963** (0.0151)
Border County	0.723** (0.117)	0.711** (0.110)	0.718** (0.111)	0.765* (0.121)	0.755* (0.124)	0.715** (0.113)
State Dummies	YES	YES	YES	YES	YES	YES
Observations	3,154	3,158	3,213	3,213	3,154	3,154

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

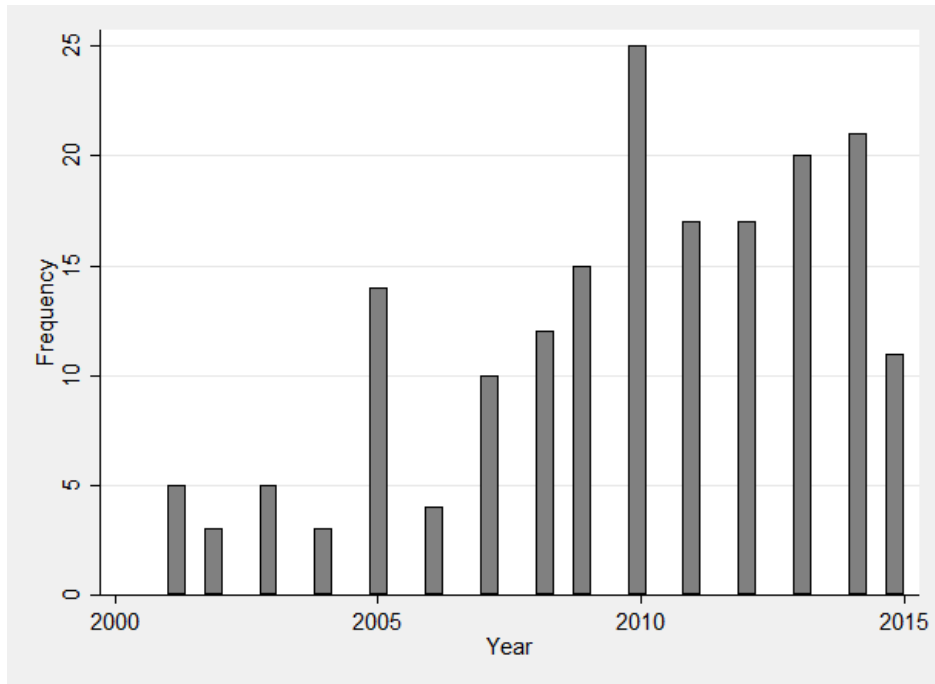


Figure 2: Population growth rates in sample municipalities

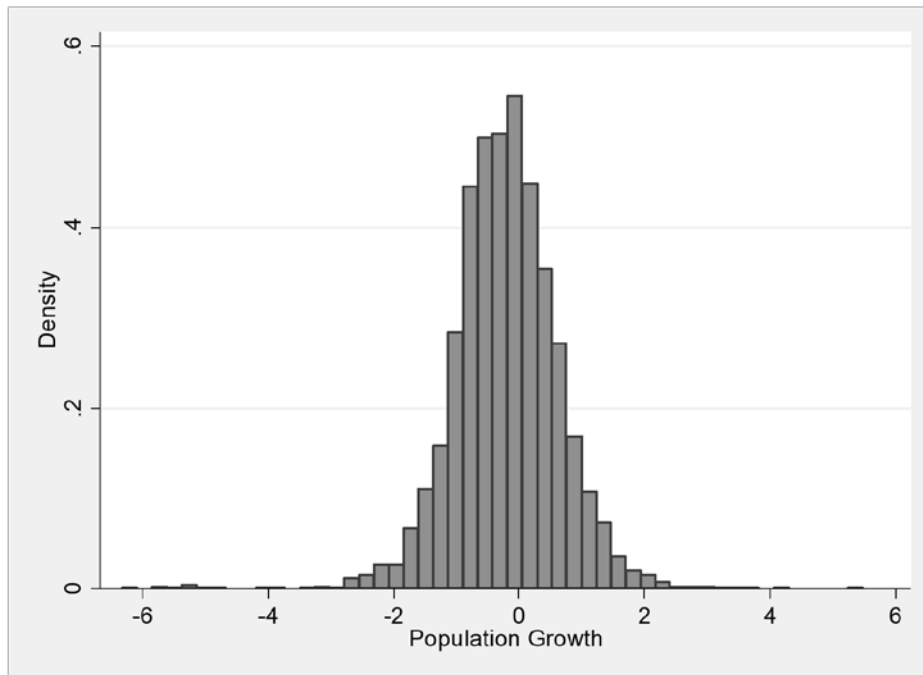




Figure 3: Marginal effects of population growth on starting IMC over the number of neighbors with the opposite/same category

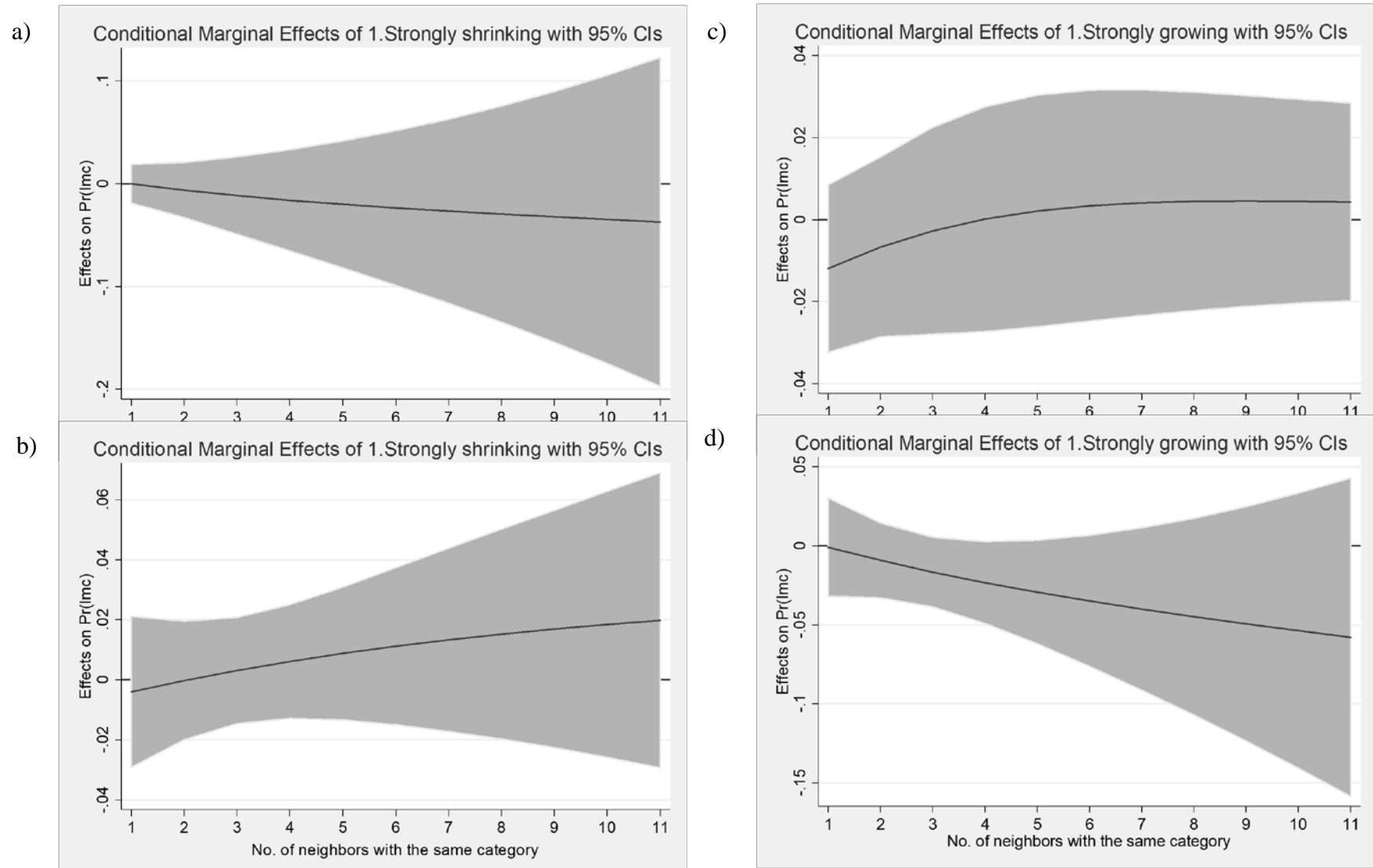


Figure 4: Marginal effects of election year/pre-election year on starting IMC over the log. administrative expenditures/tax capacity

