Empirical Analyses of the Emergence and the Effect of Inter-municipal Cooperation

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Summary

This dissertation presents four empirical studies on inter-municipal cooperation (IMC). IMC gained prominence lately as alternative to local government reform. As local decision makers grow weary of the political costs of amalgamations and discouraging empirical evidence on the effectiveness of such reforms, IMC promises a more flexible approach to the provision of public goods and services.

What are the factors that drive the emergence of IMC? This question is answered by way of survival analysis, using data of West-German municipalities. The thesis first focusses on factors explaining the emergence of IMC in the field of internal administration. Findings suggest that clusters of shrinking municipalities are more likely to engage in IMC. Furthermore, IMC is more likely to emerge in local election years among fiscally strong municipalities. A second study deals with the establishment of inter-local business parks. Results show that municipalities that set lower (higher) business (land) tax multipliers are more likely to build inter-local business parks. This finding suggests that IMC provides a platform for mitigating local competition for mobile capital. Another finding shows that state support for IMC positively correlates with the emergence of IMC.

Does IMC help improve local economic performance? After introducing inverse probability of treatment weighting to the study of IMC effects, findings for German municipalities suggest that IMC in the field of local business development has a negative impact on unemployment and a long term positive effect on tax revenues. These findings, however, cannot be replicated in a second study on IMC among polish municipalities.

Zusammenfassung

Die vorliegende Dissertationsschrift behandelt das Thema der interkommunalen Zusammenarbeit (IKZ) auf der Grundlage vier empirischer Forschungspapiere. Die IKZ wird als alternatives wirtschaftspolitisches Instrument zu Gebietsreformen angesehen, da sie einen genaueren Zuschnitt auf lokale Bedürfnisse und Verbesserungen in der öffentlichen Leistungserstellung verspricht.

Welche Faktoren treiben die Entstehung von IKZ? Diese Frage wird mithilfe von Verweildaueranalysen und anhand von Daten zu westdeutschen Gemeinden in zwei Bereichen erörtert. Zunächst wird die Entstehung von IKZ im Bereich der allgemeinen Verwaltung untersucht. Die Ergebnisse bestätigen zum einen, dass vor allem Gruppen benachbarter Gemeinden, die Bevölkerungsschwund erleben, zur Zusammenarbeit tendieren. Zum anderen sind Gemeinden mit schwacher finanzieller Basis gerade in Jahren einer Kommunalwahl weniger dazu geneigt eine IKZ zu starten. In der Entstehung im Bereich interkommunaler Gewerbegebiete zeigen die Ergebnisse, dass Gemeinden, die niedrigere (höhere) Gewerbesteuerhebesätze (Grundsteuer B Hebesätze) festlegen mit höherer Wahrscheinlichkeit ein interkommunales Gewerbegebiet gründen; dies weist darauf hin, dass IKZ einen Rahmen bietet um interkommunalen Wettbewerb abzuschwächen. Weiterhin zeigen die Ergebnisse, dass finanzielle Förderung von IKZ durch die Länder die Wahrscheinlich, dass Kooperation stattfindet positiv beeinflusst.

Welche Wirkung hat IKZ? Hier wird anhand von gewichteten ökonometrischen Modellen der Einfluss von Kooperation in der Wirtschaftsförderung auf die lokale Wirtschaftsleistung untersucht. Die Ergebnisse zeigen zum einen, dass solche Kooperationen teilweise geringere Arbeitslosigkeit zur Folge haben und vor allem in der langen Frist zu höheren Steuereinnahmen der Gemeinden führen. Eine Replikation der Untersuchung auf Grundlage polnischer Gemeinden kann diese Ergebnisse allerdings nicht bestätigen.

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List of Abbreviations

CDU	Christian Democratic Union
CIT	Corporate Income Tax
EDP	Electronic Data Processing
EU	European Union
FE	Fixed Effects
FOCJ	Functional Overlapping Competing Jurisdictions
ICA	Institutional Collective Action
IMC	Inter-municipal cooperation
IPTW	Inverse Probability of Treatment Weight
LBD	Local business development
LEP	Local Economic Performance
MSM	Marginal Structural Model
PIT	Personal Income Tax
SPD	Social Democratic Party
US	United States

1 Introduction

Since the second half of the 20th century, many local governments in the developed world have experienced structural reform processes. This means a "reconfiguration" of local government in terms of its territorial boundaries, i.e. amalgamations or mergers. These reforms have been implemented to advance public service delivery, where local government was so fragmented that service provision became very costly or extremely inefficient (cf. Dollery and Robotti, 2008). Larger government units were expected to benefit from economies of scale and scope, and from the internalization of spillovers (e.g., Olson, 1969). With the financial crisis of 2007/2008 and its economic fallout these matters became more pressing as local governments kept struggling to meet provision standards (e.g., Warner and Clifton, 2014).

There is, however, a reason why local governments are fragmented: Local governments' authority over what tasks they fulfill, and how they go about fulfilling them, is vital to local democracy. With increased distance between the local electorate and its representatives, it is harder for large municipalities to cater to their citizens' preferences (e.g., Pennock, 1959; Tullock, 1969). Therefore, local self-government lies at the heart of decentralized public service provision. Successful structural reform needs to account for "responsive", "responsible", and "accountable governance" (cf. Shah, 2006). *Responsive* means that the services provided are in line with citizens' preferences, *responsible* implies that provision is efficient, and *accountable* governance entails that local government answers to their electorate and acts in its interest.

The latest empirical research on the effects of local government reform, however, reports rather grim findings. Blom-Hansen et al. (2016) show for the Danish case, that increasing local government size has no effect on public spending, and that spending reductions in one area, if present, are offset by spending increases in other areas. Blesse and Roesel (2019) confirm this null-effect on spending for the case of county amalgamations in Germany and Austria.

Moreover, they show that local democracy is strained by the reforms, as they find voter turnout decreased and the vote share of right-wing populist parties increased in amalgamated counties.

Given the political costs, local decision makers are eager to find alternatives to amalgamations. Inter-municipal cooperation (IMC) presents such an alternative. It is implemented in many developed countries and supported by state governments (e.g., Hulst and van Montfort, 2007)

Via IMC municipalities have the opportunity to expand public service provision beyond their own borders, while maintaining their own authority. Municipalities decide which services to provide jointly and which services should remain within their own sphere of provision (e.g., Schmidt, 2005). While proponents suggest that local governments can achieve economies of scale and scope through IMC, the coordination between cooperation partners is costly (e.g., Feiock, 2009). Whether benefits outweigh costs is not ex ante clear, and empirical findings on the effects of IMC are mixed (e.g., Bel and Sebő, 2019). This thesis delves into two important questions regarding IMC: Which factors drive municipalities to form IMC agreements? And, does IMC improve municipal economic performance?

The First question is addressed in chapter 3 and chapter 4.[1] The emergence of IMC has been subject to extensive research by public administration, as well as public economics scholars (e.g., LeRoux and Carr, 2007; Feiock et al., 2009; Blaeschke, 2014; Bergholz, 2018). In a meta-analysis, Bel and Warner (2016) confirm a series of factors important to the formation of IMC agreements. They find that smaller municipalities (with respect to population size) are more likely to engage in cooperation and that the same is true for municipalities that suffer

[1] Chapter 3 is co-authored with Prof. Dr. Ivo Bischoff, University of Kassel.

Chapter 4 is co-authored with Prof. Dr. Ivo Bischoff, University of Kassel, and Simon Melch.

under fiscal stress. Chapter 3 and 4 contribute to this literature by addressing two important factors that have been neglected so far: Population dynamics and local competition.

Given a widening urban-rural gap in many European countries, population dynamics play a crucial role in the context of IMC. As rural municipalities shrink in population size, they experience a decreasing tax base and have to reduce overcapacities. In chapter 3, we analyze the role of population dynamics, utilizing duration models and survey data on German municipalities. We focus on IMC in the field of internal administration, a labor intensive service, where it is hard for municipalities to adjust capacities to changes in their population base. We find that in clusters of shrinking municipalities, cooperation is more likely to emerge, and that this likelihood increases with the number of shrinking neighbors.

Chapter 4 introduces the role of local competition for mobile capital in conjunction with IMC. While there has been research on the effect of cooperation on local tax setting behavior (cf. Breuillé et al., 2018), there are no studies on whether local competition drives the emergence of IMC. We argue that IMC creates a platform for tax coordination among the cooperation partners, and that municipalities which are facing intense (tax) competition, are more likely to make use of this form of collusion. We use data on inter-local business parks in Germany to explain the emergence of such parks via survival analysis. We find that inter-local business parks are more likely to emerge in clusters of municipalities where competition for mobile capital is high.

The question whether IMC can improve municipal economic performance is addressed in chapter 5 and chapter 6.[2] The literature on IMC effects focuses on whether IMC helps to

[2] Chapter 5 is written in single-authorship.

Chapter 6 is co-authored with Monika Banaszewska and Aneta Kaczyńska, both of the Poznań University of Economics and Business, and Prof. Dr. Ivo Bischoff, University of Kassel

generate cost advantages or increases efficiency (Sørensen, 2007; Bel and Mur, 2009; Bel et al., 2013a; Blåka, 2017; Bel and Sebő, 2019). To this end, a majority of studies looks at a very narrow range of public services, with solid waste services and wastewater management leading the way (e.g., Blaeschke and Haug, 2017), followed by fire protection services (e.g., Blåka, 2017), and tax collection (cf. Allers and Greef, 2017). Bel and Sebő (2019) show in a meta-analysis that cooperation saves costs in small municipalities and that the same is true if tasks are delegated to a higher tier of government. Very little is known about the effects of IMC in the field of local business development; this is where chapter 5 and chapter 6 make important contributions.

In chapter 5, I use panel data on German special purpose associations (Zweckverbände) and introduce a new method to make causal inferences about IMC in local business development. Here, the method is an important contribution to the existing literature. Because municipalities select into cooperation and because cooperation is an ongoing, dynamic process, making causal statements about the effect of cooperation is challenging. The literature has only recently begun to employ counterfactual approaches (e.g., Ferraresi et al., 2018; Luca and Modrego, 2019). By using marginal structural models, I test for the effect of cooperation and the duration of cooperation on municipal economic performance. Results show that long term IMC in local business development has a positive effect on tax revenue and a negative effect on the unemployment rate.

Chapter 6 deals with the effect of IMC in local business development in Polish municipalities. Even though this study is similar to chapter 5 in argumentation and method, it benefits from rich data on the part of the cooperations. We look at municipal unions, formed to provide local business development, and make use of data on union expenditures. This allows us to make statements about the mediating effect of cooperation on the productivity of cooperatively spent resources. Results for the Polish case are less supportive of IMC. While we

find a positive effect of resources spent within the IMC consortium on population growth, we also find a positive effect on the unemployment rate.

This thesis is structured in the following way: Chapter 2 presents an overview of the research literature, pertinent to the topic of IMC, and gives guidance as to how the contributions of the thesis fit into this body of literature. Chapter 3 and 4 include the papers on IMC emergence, and chapter 5 and 6 comprise the papers on IMC effects in the field of local business development. Chapter 7 concludes with a summary and perspectives for future research.

2 Review of Literature

IMC pertains to the joint provision of public goods and services among cooperating municipalities. IMC agreements entail the outsourcing of tasks to other municipalities, division of labor among them, or transferring tasks to new entities that are managing provision (cf. Hulst and van Montfort, 2007). Much of the logic behind the emergence and the effectiveness of such cooperations is rooted in the theories of fiscal federalism and institutional collective action. The following review serves as introduction to key features of the economic as well as the public administration literature. Both are relevant as conceptual and empirical basis for the subsequent chapters.

2.1. Fiscal Federalism

Public goods are characterized by the attributes of non-rivalry and non-exclusivity in consumption, which lead to an under provision of such goods if left to individual decision making (e.g., Samuelson, 1954; Anomaly, 2015). This is why the provision of public goods and services lies within the public sphere. The field of fiscal federalism deals with the question of how to allocate the provision of public goods and services along a "rational pattern of jurisdictional responsibility" (Olson, 1969: 480).

The fiscal federalism literature is characterized by the concepts of the first generation and the second generation literature (cf. Qian and Weingast, 1997; Oates, 2005).

The first generation literature, with works by Mancur Olson, Gordon Tullock and others (e.g., Tiebout, 1961; Musgrave, 1961; Oates, 1972), establishes fiscal federalism as the study of which level of government should provide what kind of public service. The optimal size of a jurisdiction is presented as a trade-off between the internalization of externalities and realizing economies of scale on the one hand, and the satisfaction of citizen preferences on the other hand.

Tullock (1969) reasons that no jurisdiction would ever be too big if all externalities were to be internalized, however that a global agency for street cleaning may not be advisable. He stresses that a large government unit fails to “fit the preference pattern of its citizens” and that limited exchange between the government and its citizens as well as bureaucracy costs point towards a constraint on jurisdictional size.

Olson (1969) argues that with "utopian bargaining" local governments could fulfil national tasks, and through "ideal logrolling" a central government could manage local tasks. However, because government tasks involve a large number of parties, such bargaining solutions also suggest high costs. Introducing the most prominent feature of an efficient system of governmental institutions, Olson continues that those who pay for a governmental service (via taxes) should be the sole beneficiaries of such a service, as to avoid externalities. This match of beneficiaries and tax payers is termed “fiscal equivalence”. Following the principle of fiscal equivalence, the number and size of jurisdictions should conform to the provided goods and services.

Tiebout (1956) points out a crucial difference between central and decentral provision: The central government sees its citizens’ preference pattern for public services as given and provides accordingly. On the local level, on the other hand, citizens are considered mobile and can choose the jurisdiction that best fits their preferences for public services. Through this sorting process (the “Tiebout sorting”), citizens reveal their preferences for public services, thereby making it easier for local decision makers to provide services more efficiently.

Brennan and Buchanan (1980) argue that the developed theory of fiscal federalism does not support a federal structure, per se. A benevolent central government could satisfy citizens’ heterogeneous preferences via an administratively decentralized structure. Only the assumption

of a Leviathan state[3], that intends to maximize its tax revenue, would make a politically decentralized government structure desirable. Through decentralization the taxing power of the state would be restraint.

The second generation approach sets up a framework in which government institutions are designed to align interests of politicians with the interests of citizens. Oates (2005) points out two features of the second generation literature: 1) Influenced by the new theory of the firm, the second generation literature examines the behavior of public officials and voters who are both subject to the incentive structures provided by institutions (e.g., Persson and Tabellini, 1996). 2) So far, the setting for the decision making process was one of perfect information. In the second generation literature, politicians as agents, and voters as principals, act in an environment of imperfect information (e.g., Boadway, 1997). The second generation literature weighs the benefits of a federal structure proposed by the first generation fiscal federalism literature against adverse incentives, endogenous to a federal system. Oates (2005) refers to soft budget constraints that would lead local government to exploit the central government. The thesis central to both the first and second generation literature, is the trade-off between decentral governments being able to cater to citizens' preferences and central governments being able to benefit from economies of scale and internalized spillovers. This trade-off motivates the emergence of different solution mechanisms that suggest alternative allocations of the responsibility for the provision of public goods and services.

One type of institution that may not systematically lead to adverse incentive structures is proposed by Frey and Eichenberger (1996). They introduce Functional Overlapping Competing Jurisdictions (FOCJ). FOCJ are formed on the local level and their size and authority conforms to the type of task that is to be performed. They are overlapping in the sense that the fulfilment

[3] As in Hobbes (1651).

of different tasks may take place in the same geographical area and they compete with other FOCJ for their tax base.

IMC is a second type of solution mechanism to adjust the bounds of local provision (cf. Hulst and van Montfort, 2007). Like FOCJ, IMC originates on the local level and is not ordered from a central government. Furthermore, IMC involves the joint fulfilment of tasks which are at the discretion of the local governments, while "FOCJ emerge in response to the geography of problems" (Frey and Eichenberger, 1996: 317). In contrast to FOCJ, IMC agreements do not substitute local governments. Local governments are cooperation partners and some IMC arrangements involve the establishment of a board to direct cooperative actions, however, the governments themselves persist and jointly take responsibility for the provision of public goods.

A third type of solution mechanism to restructure local government is structural local government reform (cf. Dollery and Robotti, 2008). The amalgamation or merging of jurisdictions is a straight forward approach to attain size effects, but larger jurisdictions have to weigh those benefits against the disadvantages of heterogeneous populations (cf. Alesina and Spolaore, 1997). Structural reforms are often met by resistance from citizens who are facing increased distance to their local representatives. Moreover, empirical evidence on such reforms is mixed and it is unclear whether amalgamations do indeed affect economies of scale (cf. Blesse and Roesel, 2019).

2.2. Local Government Reform

In the late 20th and early 21st century, many OECD countries underwent structural government reforms. In large part this restructuring involved decentralization, where certain formerly central tasks were shifted to the local level (cf. Fiorillo and Ermini, 2008). Some countries, e.g. Germany, engaged in merging jurisdictions as well as in a devolution of administrative functions (cf. Lenk and Falken-Großer, 2008). Reforms in this period are structural in the sense

that the number of municipalities, their range of tasks or their physical boundaries are changed. Dollery and Robotti (2008) refer to four types of structural reform: mergers or amalgamations, adjustment of physical boundaries with government units unchanged, joint service delivery through agreements, and service delivery through joint enterprises. They make a clear distinction between mergers and the rest of the reform types, as mergers are "the most intrusive type of structural reform" (Dollery and Robotti, 2008: 5). Mergers entail the establishment of new governments, whereas boundary changes and joint service delivery do not. Moreover, mergers affect every aspect of local public service delivery, while the other types of reform concern specific services.

Empirical findings on the effects of merger reform are inconclusive. Blesse and Rösel (2017) give a comprehensive overview of the empirical literature on merger reform. While some studies suggest that local actors engage in opportunistic behaviour in anticipation of mergers (e.g., Jordahl and Liang, 2010), few contributions point to positive gains. Egger et al. (2017) find a positive net effect of local border reforms on economic activity in German municipalities, and Allers and Geertsema (2016) find reduced spending on administrative services for municipalities in the Netherlands.

A consistent finding is, as Blesse and Rösel (2017) point out, that mergers are taxing on citizens' satisfaction, as distance to local government increases and representation of local preferences decreases. Larssen and Serritzlew (2011) report a decrease in the citizens' sense of internal political efficacy after a municipal reform in Denmark, and Hansen (2013) finds a decrease of citizens' trust in local political institutions.

The methodological approaches used in the literature on mergers/amalgamations encounter problems of endogeneity. As Blom-Hansen et al. (2016) point out, studies on merger reform and scale effects are based on observational data and, therefore, often suffer from the fact that jurisdictional size is not random. It depends on historical developments that in turn influence

how public resources are spent. The decision to merge or secede may also depend on how well certain jurisdictions and districts are faring. Therefore, latest research on merger reforms employs quasi-experimental designs to make causal statements. Moisio and Uusitalo (2013) analyze mergers in Finland and match municipalities that were merged with similar municipalities, which stayed independent. They find on average higher expenditures in the merged municipalities, even a decade after the reform. Blesse and Baskaran (2016) make use of a merger reform in Germany, where, in a first step, municipalities were allowed to merge on their own, provided they followed the guideline of the reform. In a second step, municipalities were forcibly merged. They find no effect for voluntary mergers and a negative effect on administrative expenditures in compulsory mergers. They argue that voluntary mergers may invite opportunistic behavior on the part of local decision makers. Politicians have the opportunity to eliminate local competition and choose merging partners that allow them to elicit higher rents. Blom-Hansen et al. (2016) exploit a merger reform in Denmark, where functions were reassigned across all three levels of the Danish government, involving all municipalities. While some municipalities also experienced mergers, others did not. Blom-Hansen et al. (2016) find no effect of mergers and point out that scale effects in amalgamations have only weak theoretical grounding. They argue that increasing the size of the jurisdiction does not increase the scale of the different public services and that optimal size varies over services.

2.3. Institutional Collective Action

Mergers often are imposed on jurisdictions (top-down), whereas IMC, as a type of joint delivery reform, is endogenous (bottom-up). The emergence and effect of IMC is, thus, concerned with the coordination of local actors and relates to the theory of collective action.

In his seminal work on collective action, Olson (1965) reasons that groups do not necessarily act to further their common interests. If group members cannot be excluded from the provision of a collective good, the incentive to contribute to that good is decreased. Olson

derives different propositions concerning group size and composition, e.g. that in larger groups provision levels will be lower than in smaller groups, and that large members will be exploited by small members. Following Olson (1965) and the collective action literature, Richard Feiock introduced the Institutional Collective Action (ICA) framework (e.g., Feiock, 2004, 2007, 2013). The ICA framework extends the propositions of collective action theory towards government units, and further draws on theories of transaction costs and local public economies to explain joint government service production.

Transaction costs are of central importance to the ICA framework, as they drive the emergence as well as the efficacy of ICA solution mechanisms, like IMC. Building on Coase (1937), organization scholars take into account that firms face costs stemming from uncertainty and information asymmetry. To which extend a service is best produced within the firm and to which extend it should be outsourced is expressed in terms of asset specificity. Firms will produce internally if investments to produce a service or a good are highly specialized, and they will contract via markets if asset specificity is low. (cf. Coase, 1937; Williamson, 1981, 2010).

Public administration scholars have built on the logic of the organization literature to explain government service provision under uncertainty and information asymmetry. DeHoog (1997) notes that while governments may provide services to the public they do not have to produce them on their own. Alternative provision modes include contracting out the service to private agencies or jointly providing the service with other government units. Brown and Potoski (2003) relate asset specificity to government production and further stress service measurability as important influence on transaction costs. If outcomes or performance cannot be accurately measured, outsourcing production is less feasible as monitoring is costly. With respect to joint provision, transaction costs comprise not only monitoring and enforcement costs but also coordination costs (e.g., Sørensen, 2007; Feiock, 2013). Transaction costs, therefore, play a crucial role when it comes to the formation of collective action on the local level.

The ICA framework highlights the interdependencies in local government service provision and the mechanisms by which coordinated provision comes by. Feiock and co-authors normatively classify coordination mechanisms by making use of examples from the US and European context (cf. Feiock, 2013; Tavares and Feiock, 2018). As discussed in this thesis in the section on fiscal federalism (2.1), centralized governments can reap benefits from economies of scale and scope, and the internalization of spillovers, while decentralized governments can better represent heterogeneous local preferences. It is a trade-off between technical efficiency and allocative efficiency (cf. Feiock, 2009; Tavares and Feiock, 2018). In decentralized systems decisions about local government service provision may impact neighboring jurisdictions and can lead to collective action dilemmas where individual governments' decisions do not further collective interests. Within this setting of local government interactions, the ICA framework does three things: It describes the problems of scale and externalities for local governments, it categorizes the instruments to address those problems, and lists the factors that may influence local governments' choice of instrument.

Feiock terms problems arising in local government interactions "ICA dilemmas" (e.g., Feiock, 2009). They are problems with varying degrees of complexity. Coordination among service providers to deliver services more efficiently is described as a simple problem, next to coordination to achieve economies of scale. Yet, the scale of the cooperative agenda makes such problems more difficult. If cooperation efforts involve large investments, the government that is providing the service for others depends on their commitment to pay. Even more difficult are solution mechanisms for problems of negative externalities. Here the conflict in incentives for affected governments and externality producing governments may call for delegation to a regional authority.

The risk of cooperation partners exiting an agreement and the degree of complexity in arranging service provision is central to the choice of solution mechanism. Solution mechanisms for ICA dilemmas can be characterized along two dimensions: 1) complexity, as to the number of parties involved in decision making and the nature of the issue (narrow/intermediate/encompassing), and 2) autonomy, as to the participants' ability to enter or exit agreements (see Figure 2.1).

Encompassing Complex/ Collective	Multiplex Self-organizing Systems	Councils of Governments/ MPOs	Regional Authorities	Externally Imposed Authority/ Annexation
Intermediate/ Multilateral	Working Groups	Partnerships/ Multilateral ILAs	Multi-Purpose Districts	Imposed or Managed Network
Narrow Single Issue/ Bilateral	Informal Networks	Service Contracts	Single Purpose Special Districts	Imposed District/ Mandated Agreements
	Embeddedness	Contracts	Delegated Authority	Imposed Authority

Figure 2.1: Mechanisms for integrating ICA Problems

Source: Author's illustration, based on Feiock (2013:404)

Transaction costs involved in the depicted mechanisms are lowest in the bottom left corner and highest in the top right corner (depicted in light to dark shades). An agreement on a narrow issue among few participants entails relatively low transactions costs. The more complex the area of cooperation becomes and the more parties are involved, the higher are the ensuing transactions costs, because coordination and the distribution of costs among parties becomes more difficult. Feiock further argues that certain solution mechanisms, with the transaction costs they entail, warrant more binding contracts. As the risk of defection increases, more binding agreements emerge.

The choice of cooperative mechanism depends on the transaction costs involved and the expected benefits from cooperation. Even though in practice mechanisms vary from country to country, the ICA framework provides a taxonomy for different institutional settings. This is why it has been applied in many empirical studies on IMC (overview in Bel and Warner (2016)), in order to give a conceptual basis for local government interaction.

2.4. Inter-municipal Cooperation

IMC is one of the voluntary ICA solution mechanisms presented within the ICA framework, where municipalities mutually agree to jointly provide certain public services. This means, within the consortium, municipalities come to terms over the fulfilment of tasks, and the distribution of the costs and benefits. IMC addresses the tradeoff, central to fiscal federalism, by 1) widening the scope of local public service provision, making it possible to gain size effects, and 2) maintaining municipal autonomy in tasks that are not included in the cooperation agreement. At the same time, potential cooperation partners face transaction costs due to coordination and distribution of costs. The higher the expected transaction costs are, the lower are the expected net-benefits from cooperation.

Empirical research on the emergence of IMC agreements focusses on two broad categories of determining factors. On the one hand, factors that reflect the expected benefits from economies of scale and scope, as well as benefits from internalized spillovers. On the other hand, factors that comprise transaction costs pertinent to the decision to cooperate.

Hypotheses about the efficacy of IMC are often based on economies of scale and IMC is argued to be a feasible alternative to comprehensive merger reform. The empirical literature on the efficacy of IMC, however, finds mixed results when it comes to the realization of size effects.

Moreover, little research has been conducted on the acceptance of IMC among citizens and local decision makers. Bergholz and Bischoff (2018) find that local council members' self-interest leads them to oppose IMC and that their support for IMC depends on how much authority they are likely to lose via a cooperation with other municipalities. From the perspective of the citizens, Bergholz and Bischoff (2019) report that citizens who identify strongly with their locale and are active in local politics are skeptical about IMC. Because IMC is a voluntary solution mechanism, the recognition of its potential is vital to its implementation.

The following two sections present the current state of research on the emergence as well as the effects of IMC. The expected benefits (mostly in the form of economies of scale) and the expected costs (transaction costs, as well as frustration costs (cf. Pennock, 1959)) are important factors in the decision to start IMC; while the actual net-benefits are the focus of research on the efficacy of IMC.

2.4.1 IMC-Emergence

The literature on IMC- emergence is shaped by public administration scholars and the question of a suitable service delivery mode on the local level. The decision for IMC is framed as a decision between alternative service delivery options, like contracting-out to the private sector or to other governments. The production choice decision, as Ferris and Graddy (1988) point out, takes into account a trade-off between potential costs advantages and loss of control over the service delivery process. The more recent literature is reviewed by Bel and Warner (2016) in a meta-analysis. They refer to four main factors that drive the decision to cooperate prevalent in the research literature: Cost savings, fiscal pressure, governance considerations, and transaction costs.

Potential cost savings are in a majority of studies attributed to economies of scale; these are, in turn, driven by the particularities of the service in question or characteristics of the

municipality. Bel and Warner's analysis provides partial evidence that population size is negatively correlated with cooperation activity (e.g., Bel et al., 2013b; Schoute et al., 2018).

They also report that a majority of studies find a positive relationship between fiscal stress and engaging in IMC, where fiscal stress is measured as high debt per capita, low own revenues per capita, or limiting laws on taxation or debt (e.g., Bel et al., 2013b; Blaeschke, 2014).

Governance considerations in the decision to cooperate are primarily an area of interest in public administration in the US, as studies on US metropolitan service delivery often discuss whether cities employ city managers or mayors. Here, the finding prevails that the manager style of governance is positively correlated with IMC activities (e.g., Feiock et al., 2009; Feiock et al., 2012).

Bel and Warner point out that only a few studies include measures for transaction costs. Although theoretical works present a clear argument for the importance of transaction costs in the decision to engage in IMC (see chapter 2.3.2. on the ICA framework), it appears difficult to find appropriate measures to empirically test their relevance. Feiock et al. (2009) use survey data on US cities to investigate the influence of different types of transaction costs on the likelihood of local governments entering joint ventures. They find that in more heterogeneous regions, with respect to income levels, cities are less likely to start partnerships. They argue that division costs are high among dissimilar partners, as they encounter problems in dividing up cooperation benefits. They further find that greater homogeneity reduces agency costs for mayors or city managers to overcome in negotiating an agreement. Furthermore, they suggest that the number of neighbors would have a positive effect on the likelihood of partnership formation, as the opportunity-set for a city that is willing to cooperate is larger in larger neighborhoods. As neighbors are forced to interact with each other more often than non-contiguous jurisdictions, Feiock et al. (2009) suggest that information costs are lower for cities with many neighbors.

Latest research on IMC-emergence focusses on the notion that "Inter-governmental contracting represents a public market of cooperating governments" (Warner, 2011: 424). Empirical approaches by Blaeschke (2014), Di Porto et al. (2016), and Bergholz (2018) include not only the observed municipality's characteristics but also characteristics of its potential cooperation partners. Local governments are most likely to cooperate with other governments that are geographically close by. Therefore, the latest approaches take into account demographic and fiscal characteristics of those neighboring potential cooperation partners, in addition to the observed government's own characteristics. Furthermore, a methodological advancement is the use of duration models in explaining the formation of cooperative agreements (cf. Bergholz, 2018) (see chapter 2.5.1. on survival analysis).

While the findings presented here shed light on the drivers of IMC, there are still distinct research gaps. Especially the role of inter-local competition in the formation of IMC-agreements has been given very little attention, so far. Di Liddo and Giuranno (2016) present a theoretical model in which local politicians circumvent political yardstick competition and maximize their extractable rents by engaging in IMC. In the context of local competition for mobile capital, IMC can be viewed as a form of collusion. A study by Breuillé et al. (2018) supports this argument, as they find that IMC leads to increases in tax rates within the cooperating municipalities. The focus on the role of collusion in the formation of IMC-agreements is a central contribution of chapter 4 in this thesis.

2.4.2 IMC-Effects

The literature on IMC-effects is dominated by studies focusing on service costs. Because their main objective is to analyze whether IMC has advantageous effects on provision costs, a majority of studies focusses on the field of waste collection. In this field, IMC is very common, expectations about economies of scale are clear, and service output and service costs are measurable and accessible (e.g., Blaeschke and Haug, 2017). Only in recent years did research

extend to a wider array of public services. In their meta-analysis, Bel and Sebő (2019) include 18 IMC effect studies, 12 of which cover the field of waste services, the others comprise tax collection, fire services, and cooperation in multiple fields, like administrative services.
Bel and Sebő (2019) highlight three important factors that determine the effect of IMC on cost advantages in service delivery: economies of scale, transaction costs, and governance of cooperation.

Studies exploring scale economies employ population size or service output as proxy for scale. Largely they do confirm that IMC among small municipalities can achieve cost reductions through economies of scale. Bel and Costas (2006) and Bel et al. (2013a) find cost reductions through IMC in small (smaller than 20,000 inhabitants and on average 5,000 inhabitants, respectively) Spanish municipalities. Niaounakis and Blank (2017) analyze Dutch municipalities and find IMC to be associated with lower costs. They estimate cost reductions for different production scales and find that benefits from IMC are largely exhausted at a scale of 60,000 inhabitants.

Transaction costs are generally found to impede the efficiency of IMC agreements. Sørensen (2007) reports efficiency losses for dispersed public ownership in refuse collection in Norway, and Blaeschke and Haug (2017) find lower technical efficiency in cooperating municipalities in Germany. Both attribute their findings to transaction costs stemming from difficulties in coordination. In a study on IMC in the field of fire services in Norway, Blåka (2017) looks at the costs that come with the number of cooperation partners. She finds that the number of cooperation partners is negatively linked to the cost advantages generated through IMC. Bel and Sebő (2019) test for service characteristics, specifically asset specificity and ease of measurement, in their meta-analysis but do not find robust results for the influence of such kinds of service related transaction costs on cost advantages.

As Bel and Sebő (2019) point out, the form of governance arrangement is prudent in multilateral agreements. Monitoring and coordination can be transferred to a higher level governance body to manage the joint interests. They find supporting evidence that the delegation to another governing body, like an association or a union, yields costs advantages. Soukopová and Vaceková (2018), e.g., find that voluntary municipal unions in the Czech Republic generate higher cost advantages than cooperations based on a contractual basis. In line with the ICA framework, they argue that more institutionalized forms of IMC are especially effective in more heterogeneous settings, in order to overcome differences between the municipalities.

In this thesis, Chapter 5 and 6 advance our understanding of the efficacy of IMC in the field of local business development. As the focus of research, so far, has been IMC-effects on service delivery costs in a very narrow range of services, local business development presents the opportunity to study the broader impact of IMC on municipal economic performance. Because IMC is voluntary, making causal inferences about its impact on municipal outcomes is a great challenge and will be discussed in the next section of methodological remarks.

2.5. Analyzing Inter-municipal Cooperation

Two methodological approaches are presented in this section. The first one, survival analysis, addresses the empirical challenges that come with the analysis of emerging cooperation on the local level. Chapter 3 and 4 both incorporate survival models to test which factors advance and which factors retard the duration until cooperation. The second approach, marginal structural models, lets us make causal inferences about IMC, even if confronted with selection into treatment and time-varying confounding. This approach is utilized in chapters 5 and 6.

2.5.1 Survival Analysis

Survival analysis has its roots in the field of medicine, where the impact of certain factors on the duration of survival is of interest. Economists adapted survival analysis, for example, in the life cycle analysis of firms and market structures to explain the duration of firms' survival until market exit (e.g., Klepper, 2002). More recently the approach has been applied in the context of public service delivery choice. Here, researchers test for the influence of different factors on the duration of local government in-house production until privatization or joint production (e.g., Miralles, 2009; Chen et al., 2016; Bergholz, 2018).

Survival analysis involves modelling transition data, i.e. we follow observations over time that are transitioning from one state to another (cf. Jenkins, 2005). This is true for firms that are active in a market for a while until they exit the market and enter an inactive state, or municipalities that are providing services by themselves until they decide to engage in IMC and enter a state of cooperation. The duration spent in one state, or the time-to-event, is influenced by different factors so that the probability of transition, P_{it}, for observation i in each point in time t is modelled to be dependent on these factors.

In survival analysis, time is often assumed to be continuous although transition points in time may be discrete. In the case of IMC, data on whether a cooperation went into effect is only available on a yearly, maybe monthly, basis. Moreover, most municipal level data on population

characteristics, fiscal and political variables are only available in year intervals. This is why the survival models employed in the later chapters of this thesis are discrete and of the following form:

$$P_{it} = 1 - \exp[-\exp(\alpha_t + \beta' x_{it})] \tag{2.1}$$

Equation 2.1 is called the discrete-time hazard function. The equation is log(-log) transformed and called complementary log-log or cloglog model (cf. Allison, 1982; Jenkins, 2005). The discrete-time hazard function can be solved to give us the complementary loglog function:

$$\log[-\log(1 - P_{it})] = \alpha_t + \beta' x_{it} \tag{2.2}$$

In (2.2) α_t is a piecewise constant, giving us the baseline hazard rate, i.e. the probability of exit, for each interval *t*. x_{it} is a vector of explanatory variables that influence the duration until the event of interest, and β is the vector of effects corresponding to the explanatory variables.

While earlier research on the emergence of IMC relies on methods that explain the existence of cooperation rather than the *start* of cooperation (e.g., Campbell and Glynn, 1990; LeRoux and Carr, 2007; Bel et al., 2013b), more recent works have addressed the issue of transitioning from one state to another. Chen et al. (2016), for example, study the effects of regional partnerships in US metropolitan areas. They use Cox regression to estimate the hazard ratio of engaging in regional economic development partnerships, before analyzing the impact of such partnerships. Bergholz (2018) analyses the emergence of IMC agreements in German municipalities. He employs a discrete-time hazard model to explain municipalities starting cooperation in tourism marketing projects. He states that conventional panel-data approaches include periods after IMC had taken place; these periods would not contribute to explaining why the decision was made in the first place. Indeed, employing panel-data might even

introduce post-treatment bias and distort results. This is where chapter 3 and 4 contribute to reinforce the use of survival models in the analysis of IMC emergence. We use discrete-time hazard models to investigate factors that influence the start of cooperation in the field of internal administration (chapter 3) and business parks (chapter 4).

2.5.2 Causal Inference

The approach for causal inference about IMC stems from the field of epidemiology. The use of marginal structural models (MSMs) in combination with inverse probability of treatment weights (IPTW), introduced by Robins et al. (2000), spread to other disciplines where empirics mostly rely on observational rather than experimental data. This method has been adopted in criminology, as well as the political sciences, and sociology, where the empirical set-up is one of dynamic processes (e.g., Sampson et al., 2006; Blackwell, 2013; Bacak and Kennedy, 2015).

The fundamental problem of causal inference is missing counterfactuals. Analyzing binary treatment A, one cannot observe a subject getting treatment A=1 and not getting treatment A=0 at the same time. Subjects can either experience outcome $Y_{A=1}$ or outcome $Y_{A=0}$. The mechanism that determines which outcome is actualized is the treatment assignment. If treatment assignment is truly random, then the distribution of potential outcomes does not differ from the distribution of observed outcomes, which is why randomized experimental settings are the gold standard for causal inference (cf. Rubin, 1978). However, in many disciplines experimental data is hard to generate; often it is ethically questionable. Therefore, empirics rely on observational data where treatment assignment is not random but dependent on different factors. If those factors are observable, we can control for them and correct our analysis in such a way that the distribution of observed outcomes is, again, equal to the distribution of potential outcomes (cf. Robins et al., 2000). We can then make a causal statement about the treatment effect. In the case of IMC, treatment is not random. In fact, municipalities deliberately select into the treatment IMC. Fortunately, the factors that drive municipalities to cooperate have been

studied thoroughly (i.a. in chapter 3 and 4 of this thesis) and data on municipal characteristics is of good quality so that treatment assignment can be modelled exhaustively.

However, non-random treatment assignment is not the only empirical challenge in analyzing IMC. A second one is the dynamic process that, over time, shapes cooperation activities and, subsequently, their outcome. As studies on time-varying treatment and covariates highlight (e.g., Robins et al., 2000; Blackwell, 2013; Imai and Ratkovic, 2015), controlling for time-varying covariates when modelling outcome can induce post-treatment bias.

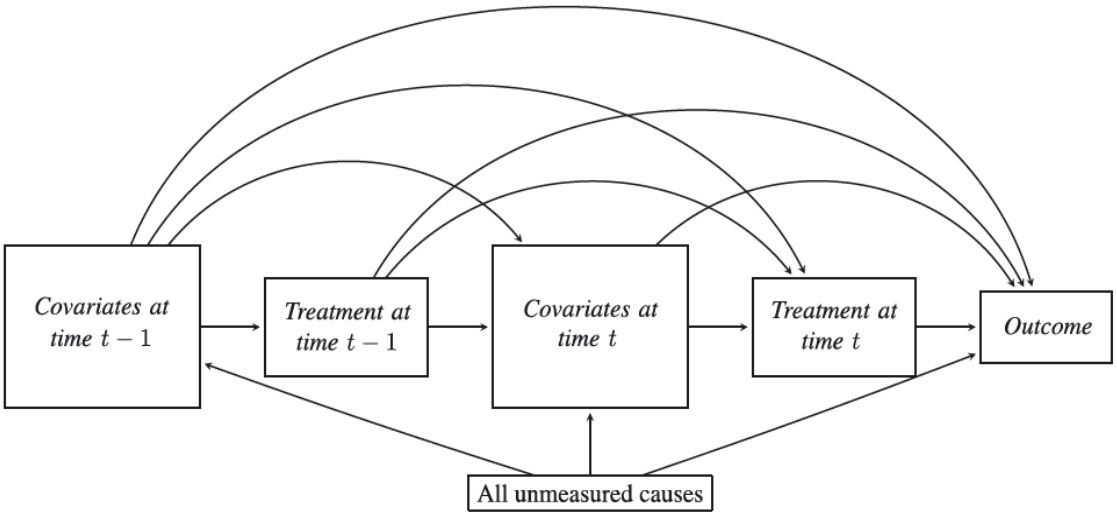

Figure 2.2: Time-varying treatment and covariates

Source: Author's illustration, based on Bacak and Kennedy (2015:117)

Observed and unobserved confounders determine the treatment assignment at each point in time as well as the outcome Y. At the same time, the outcome also depends on past treatments (see Figure 2.2). The dependency between cooperation activity and covariates over time leads to post-treatment bias when explaining an outcome. Since time-varying confounders determine treatment and outcome, including them in an outcome model would bias results. Leaving them out would clearly induce omitted variable bias.

Robins et al. (2000) propose a two-step approach, similar to Heckman's selection models (cf. Heckman, 1979) called marginal structural models (MSMs). In Heckman selection models,

the selection into treatment depends on unobservable factors and subsequently instruments are used to proxy those factors. In Robins et al. (2000), selection is on observable factors. In modelling treatment assignment as a function of covariate and treatment history for each point in time, MSMs also allow for dynamic causal inference.

In step one, treatment assignment is modelled as probability to be treated in each point in time, conditional on past treatment $\overline{A}_{it-1}$ and past covariates $\overline{X}_{it-1}$, as well as on baseline values of time-varying and time invariant covariates X_0. $\Pr(A_{it} \mid \overline{A}_{it-1}, X_0)$ is the numerator for the inverse probability of treatment weights (IPTWs) which are used to weight observations in step two, the outcome model (cf. Robins et al., 2000; Cole and Hernán, 2008; Blackwell, 2013). The IPTWs are stabilized via a second estimation for the denominator. Here, the probability to be treated in each point in time is estimated, conditional only on past treatment and baseline covariates (see 2.3)

$$SW_m = \prod_{t=1}^{T} \frac{\Pr(A_{it} \mid \overline{A}_{it-1}, X_0)}{\Pr(A_{it} \mid \overline{A}_{it-1}, \overline{X}_{it-1}, X_0)} \tag{2.3}$$

In the weighted outcome model, the outcome Y at the end of the observation period is explained by the treatment and baseline covariates. Weighting the observations via IPTWs creates a pseudo population where treatment assignment is assumed to be random. This come with two distinct model assumptions: 1) sequential ignorability and 2) positivity. Sequential ignorability means that treatment assignment is independent of potential outcomes conditional on observed treatment and covariate history; it implies that there is no unmeasured confounding. Positivity is very similar to the common support assumption in matching procedures (cf. Heckman et al., 1996). It assumes that observations are sufficiently similar with respect to their probability to get treated. If observations are categorically excluded from ever being treated, or are always very likely to be treated, then they are not comparable to other observations.

Nonetheless, the use of marginal structural models and IPTW has spread from epidemiology to the social sciences, where the lack of experimental data prevails in many instances. For the political sciences, Blackwell (2013) studies the effect of negative campaigning on democratic vote share. In sociology Sharkey and Elwert (2011) as well as Wodtke et al. (2011) look at how a neighborhood affects cognitive ability and high school performance in children, respectively. Furthermore, Sampson et al. (2006) investigate the effect of marriage on crime, while Bacak and Kennedy (2015) look at the effect of incarceration on the probability to get married.

In chapter 5 and 6 MSMs are utilized to investigate effects of IMC in the field of economic development in Germany and Poland, respectively.

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

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Abstract

We use a hazard model to identify the factors that drive the emergence of inter-municipal cooperation (IMC) in tasks of internal administration in West-Germany between 2003 and 2014. Our first focus rests on the role of population decline. The results show that municipalities situated in clusters of shrinking municipalities are more likely to start IMC. Second, we test for political cycles in the timing of IMC-arrangements. There is no direct effect of the proximity to elections yet IMC in election years is more (less) likely among municipalities characterized by high (low) fiscal capacity and administrative expenditures. In addition, state subsidies for IMC are found to have a strong positive impact on the emergence of IMC.

Key-words: Inter-municipal cooperation, population decline, political cycles, hazard model, Germany, survey

JEL. H77, D72

3.1 Introduction

While metropolitan areas have been growing steadily in recent decades, municipalities aside these metropolitan areas experience a continuous decline in population. Population decline poses a threat to municipalities' long-term fiscal balance. Reducing amenities and service quality is one way to accommodate population decline. There are, however, important obligatory tasks where such adjustments are infeasible. Here, contracting out and inter-municipal cooperation (IMC) may help to preserve fiscal balance. Surprisingly, the abundant literature on contracting out and IMC has not investigated the role of population decline. This is where our paper comes in.

We analyze the impact of population decline on the emergence of IMC using data from a survey conducted in 2015 and covering 515 West-German municipalities. Combined with data from official sources, this data allows us to analyze a time period spanning from 2003 to 2014. Our study concentrates on IMC in the field of internal administration ("Allgemeine Verwaltung" – a standing term in Germany). This field covers a number of obligatory tasks including running a registration office, book-keeping, human resource management, procurement activities, running a local council and organizing local and upper-tier elections. In our period of observation (2003 – 2014), the municipalities in our sample spent on average 170 Euro per capita and year (15 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 find it increasingly difficult to keep up with these high standards at affordable costs. In addition, they face cost "stickiness" (cf. Anderson et al., 2003) because dismantling administrative capacities is costly and time-consuming due to strict labor regulation. IMC is one way through which municipalities can cope with these challenges.

The contribution of the current analysis is twofold. We provide – to the best of our knowledge – the first analysis that tests whether population decline promotes IMC. We follow (e.g., Bergholz, 2018) in using a hazard-model that accounts for the fact that IMC-arrangements are – once founded – very stable. This method allows us to take a closer look at the timing of IMC-arrangements and thereby leads to our second contribution. We take a standard Public Choice argument to the analysis of IMC-emergence and test whether IMC-agreements cluster in certain years of the election cycle. Just like population decline, this aspect has received little attention in the IMC-emergence literature so far.

Our results show that population decline fosters IMC. A closer look reveals that this effect is primarily driven by the population dynamics of the cluster of municipalities surrounding a certain municipality rather than the latter's individual population dynamics. Our results show that municipalities with high fiscal capacity and administrative expenditures per capita are more likely to sign IMC agreements in election years while the opposite is true when fiscal capacity and administrative expenditures per capita are low. At the same time, we do not find any evidence that IMC-arrangements are generally avoided in election years. One side-effect is noteworthy: 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.

3.2 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 alternative public provision modes. IMC, as alternative to privatization (i.e. contracting out), has been recognized to be especially attractive for smaller,

rural municipalities that have lower contracting capabilities and where private enterprises encounter higher costs of sparsity (e.g., Bel and Costas, 2006; Bel and Fageda, 2017), while privatization is associated with larger municipalities. The existing studies on the emergence of both provision modes reach largely similar conclusions. For instance, they show that especially fiscally weak municipalities are more likely to cooperate (e.g., Warner and Hefetz, 2002; Bel et al., 2013; Schoute et al., 2018) and contract out service provision (cf. Bel and Fageda, 2007, 2017). While accelerated population growth is associated with lower per capita spending and declining service quality (cf. Ladd, 1994), neither the literature on IMC-emergence, nor the literature on contracting out reports informative results on the influence of population growth. The current paper foremost contributes insights about the relationship between population growth and IMC-emergence.

Pioneered by Richard Feiock and co-authors, the Institutional Collective Action (ICA) approach illustrates that negotiating, implementing and controlling collaborative-contracts entail substantial transaction costs (e.g., Feiock and Scholz, 2009). Asset specificity and service measurability are argued to have great influence over whether a service is contracted out or provided in cooperation with other governments (e.g., Feiock, 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).

The question whether political interests influence the choice of provision mode has been addressed in the privatization literature. In their summary of the literature, Bel and Fageda (2017) point at studies analyzing whether interest groups influence the decision to privatize services. Research supports this notion, finding that wealthier municipalities are positively linked to privatization activities. In addition, Bel and Fageda (2008) find a positive influence of a conservative ruling party on the decision to privatize while Bel and Costas (2006) argue

that opportunistic office holders might pivot towards alternatives, like IMC, under the "threat" of privatization.

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 suggesting 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 IMC-emergence 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)).

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. To accommodate this fact, we follow Bergholz (2018) and apply a hazard model.

3.3 Hypotheses and data

3.3.1 Hypotheses

Our first focus rests on the role of population decline for the emergence of IMC. In the long-term perspective, a declining population reduces demand for public services and thus requires a reduction in public employment. A shrinking administration is less capable of generating economies of scale and scope (e.g., Andrews and Boyne, 2009). IMC is a suitable way to keep up efficiency. In the medium-term perspective, shrinking municipalities face additional challenges that can be addressed through IMC. Financially, a decline in population 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. Cost stickiness is particularly severe 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 offer administrative services to other municipalities. Thus, our first hypothesis reads:

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 there are suitable municipalities nearby (cf. Blaeschke, 2014). 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 whether there are suitable cooperation partners.

With respect to the long-term perspective, the central logic of the ICA-framework applies (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. This argument suggest that a shrinking municipality is more likely to cooperate the more of its direct neighbors are also shrinking. In the medium-term perspective, however, other shrinking municipalities are highly unsuitable partners because they also aim at generating additional workload for their own administrative staff. Towards this end, neighboring municipalities are particularly suitable partners if their interests are complementary to those of the shrinking municipality. 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 reduces cost-pressure in the shrinking municipalities and

simultaneously dissolves a bottleneck in the growing municipality. Thus, in the medium perspective, a shrinking municipality is more likely to cooperate if one or more of the direct neighbors is growing. The net effect is unclear ex ante.

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 second hypothesis reads:

H2 Timing:

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

3.3.2 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).

3.3.3 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. The survey focused on municipalities aside from the metropolitan regions[4] and asked whether they cooperate with other municipalities in one or more tasks of internal administration. The tasks were personnel administration, running a registry office, electronic data processing (EDP), procurement, and financial administrative services. We further asked for the legal form and the founding year of the cooperation (among other things). In Germany, IMC can be organized by forming working groups, signing agreements or forming a new entity, e.g., a special purpose association. Thus, IMC does not

[4] Metropolitan areas are defined as cities with more than 250,000 inhabitants and surrounding municipalities with strong commuter flows towards the cities (cf. Rosenfeld et al., 2016).

generally imply that one municipality provides services to others. A detailed description of the survey design, the structure of respondents and forms of IMC is provided in the supplementary appendix A. In total, 515 municipalities responded (response rate = 26 percent). 41 municipalities report to cooperate in all five tasks, 25 in four, 34 in three, 60 in two, and 114 in one of the tasks. Among the 114 municipalities cooperating in only one task, the majority (48) are jointly running a registry office.

We exclude 8 municipalities that transferred internal administration tasks to their county and 92 municipalities that started cooperation before our observation period 2003-2014. Another 51 municipalities are excluded due to incomplete or inconsistent answers. Typically, incomplete answers involved missing data on the starting date of a cooperation. Finally, we exclude 23 municipalities because of missing data points on the characteristics of their neighbors – a particularly important driver of IMC we account for by calculating spatial lags.

Table 3.1: Descriptive statistics of the sample of municipalities, averages over 2003-2014

	No cooperation in internal admin.				Starting to cooperate in internal admin.			
Variables	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Population	9295.07	11518.8	251	80656	9435.51	9997.51	716	61828
Population Growth ’03-‘14	-3.54	5.68	-21.34	9.93	-4.85	5.86	-23.58	11.45
Shrinking	0.43	0.5	0	1	0.5	0.5	0	1
Shrinking-below-median	0.35	0.48	0	1	0.4	0.49	0	1
Own tax revenues per capita	791.2	332.99	134.71	3218.75	708.61	322.98	213.13	4598.14
Staff costs in internal administration expenditures	0.74	0.09	0.12	0.93	0.73	0.08	0.25	0.89
Expenditures on internal administration								
per capita	167.57	66.62	0	813.7	177.5	101.12	0	2962.74
in total running expenditures	0.15	0.04	0.01	0.37	0.16	0.05	0.01	0.46
Number of direct neighbors	6.21	1.77	0	13	6.29	2.02	2	13
Mean distance to neighbors (km)	9.72	28.68	2.79	727.68	8.5	2.26	2.87	23.15
Number of Municipalities	191				150			

Source: Authors’ calculations.

Table 3.1 provides descriptive statistics for the 341 municipalities remaining in our estimation sample. Municipal population ranges from under 300 to approximately 80,000 inhabitants with a mean of approximately 9,400 inhabitants. On average, the population declined by 4.1 percent between 2003 and 2014 though the variation is substantial. The average municipality has 6.3 neighbors. On average, municipalities’ tax revenues per capita amount to 755 €. 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, while per capita income is much less dispersed and shows a high level of spatial correlation. The expenditures per capita on internal administration amount to 172 € on average while the share of administrative expenditure in total running expenditures is 15 percent on average (over the period 2003-2014). Around 74 percent of expenditures on internal administration are spend on personnel. Again, 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 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 3.1 depicts the pattern of IMC-emergence in the field of internal administration. As mentioned above, 92 municipalities (around 18 percent of respondents) already cooperated in the field of internal administration in 2000. By 2015, a total of 163 municipalities have started cooperation (around 50 percent of respondents). It is important to note that a consortium – once founded – is usually not resolved. Among the 515 municipalities that responded to our survey, only nine 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.

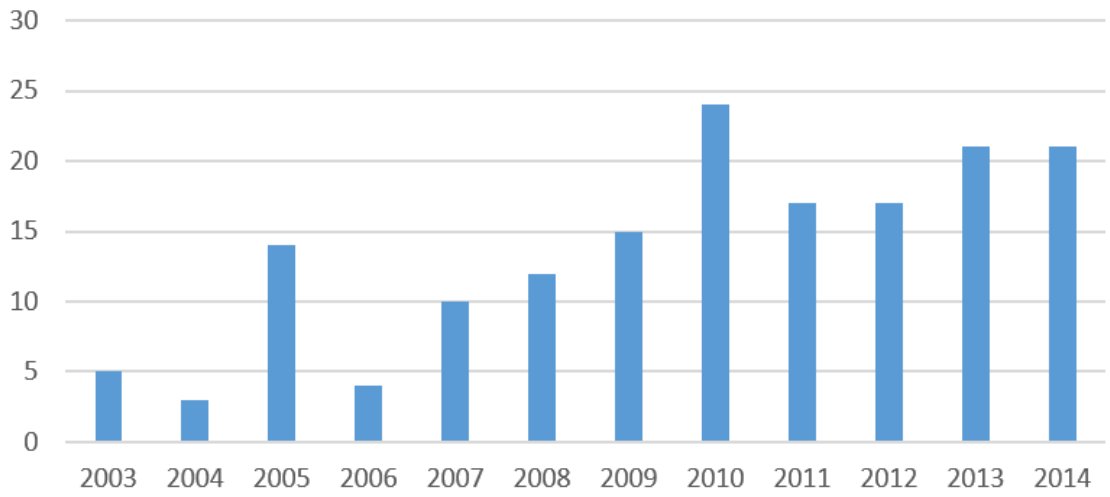

Figure 3.1: Number of municipalities starting IMC by year interval (2003-2014)
Source: Authors' illustration.

3.4 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 2002 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 2003 to 2014 and 12 discrete time intervals. All municipalities that do not already cooperate in 2002 enter the analysis in time interval one. From then on, they are "at risk" of starting cooperation. Following Allison (1982), the discrete-time hazard rate for cooperation is given by

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

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

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

The non-parametric baseline hazard α_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.

Our first hypothesis refers to the effect of population dynamics on the emergence of IMC. Figure 3.2 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. In the analysis below, we use two different ways to define shrinking municipalities. First, shrinking municipalities are those municipalities that witness a decline in population for two consecutive years. Second, we call municipalities "shrinking-below-median" if their rate of population change is lower than the median rate for two consecutive years. In our sample, 44 respectively 35 percent of the municipalities belong to this category. It is important to note that shrinking municipalities cluster regionally. The coefficient of correlation between the rate of population growth of a certain municipality m and the average rate of its neighbors is 0.42.

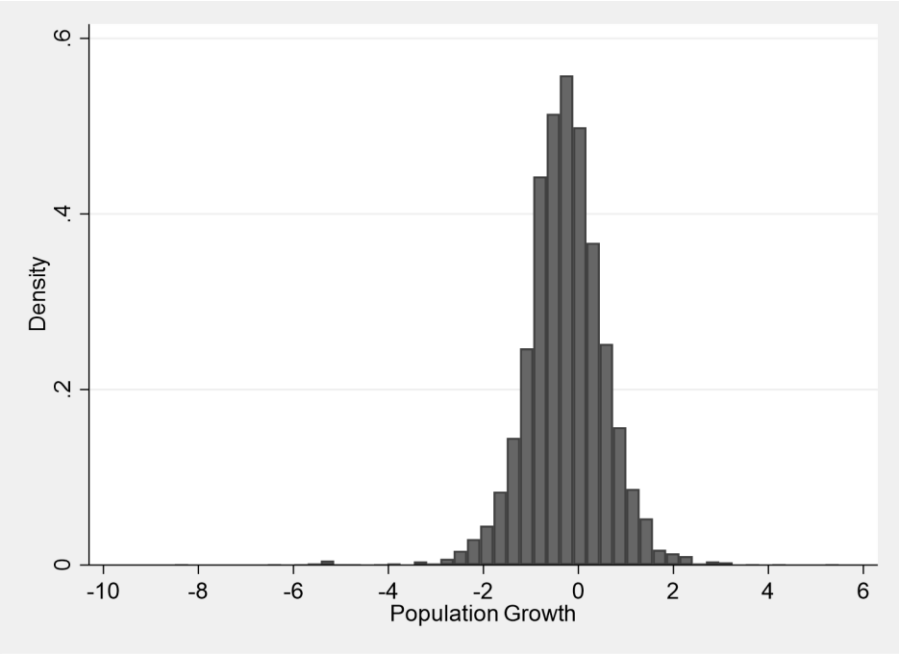

Figure 3.2: Population growth rates in sample municipalities
Source: Authors' illustration.

To test for the timing of IMC-agreements in the election cycle (hypothesis H2 *Timing*), we make use of the fact that municipal election dates differ across states.[5] We introduce dummy variables to capture municipality m's proximity to the next local election.

Table 3.2: Years of municipal council elections in the West-German states

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

Source: Authors' compilation.

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.[6] Fiscal and population size measures are expressed in logs (see Table 3.3).

5 See Table 3.2

6 Fiscal variables in prices of 2015.

Table 3.3: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
Shrinking	Dummy=1 if municipality m lost population in t-1 and t-2
Shrinking-below-median	Dummy=1 if the rate of population growth in municipality m was lower than in the median municipality in t-1 and t-2
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 (2)	Dummy=1 one (two) years before a municipal council election
Num Sim Shrinking	Number of neighbors that are shrinking in population size, 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 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
Spatial lags of X	Neighborhood median (without m) of measure X
Neighborhood+m of X	Median of measure X of m and its neighbors

Source: Authors' compilation.

Some state governments provide systematic support to municipalities that engage in IMC – typically through subsidies for new consortia granted upon application (see Table 3.4). 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).

Table 3.4: Support for IMC at state level

State	Form of Support	Year
Schleswig Holstein	No explicit funding	
Lower Saxony	Directive for the promotion of inter-municipal mergers and inter-municipal cooperation	2007 - 2010
North Rhine-Westphalia	No explicit funding	-
Hesse	Funding for IMC for	
	municipalities < 18k inhabitants	2004 – 2007
	municipalities < 30k inhabitants	2008 – 2010
	all municipalities	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	2012
	all municipalities	since 2015
Saarland	No explicit Funding	-

Source: Authors' compilation.

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 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. Bel and Warner, 2016) 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 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 the share held by "local initiatives" because a high share of them in the local council may reflect a strong local identity. Moreover, these local initiatives they do not have political network comparable to those of parties organized nation-wide.

3.5 Results

We use the hazard model described in expression (2) to identify factors driving IMC in the tasks of internal administration.

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 IMC 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 partly in line with hypothesis H1: The rate of population growth in municipality m has a positive though weakly significant impact on the probability of cooperation while the impact is highly significant for the median rate of population growth among m's neighbors. The election year dummy is non-significant – thus not supporting our *Timing* hypothesis H2.

Among the control variables, we find – in line with the literature – a negative impact of m's population size. Furthermore, we find a positive impact for the neighborhood median administrative expenditures per capita, while the administrative expenditures per capita in municipality m yield a positive yet weakly significant effect. IMC is less likely in counties with high unemployment rates. Financial incentives to start IMC by state governments have a positive impact on IMC-emergence while the opposite is true for the average distance to m's neighbors. Municipalities located at a county border are less likely to start cooperation. Municipalities that switched from cash-based accounting to accrual accounting are more likely to start cooperation. All other variables are insignificant.

Table 3.5: Results for the discrete time hazard model

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Population Size	0.758***	0.673***	0.688***	0.873	0.789*	0.730***	0.815*	0.784**
	(0.0808)	(0.0652)	(0.0710)	(0.107)	(0.0998)	(0.0758)	(0.0899)	(0.0802)
Population Size (spatial lag)	0.719*	0.593***	0.574***	1.570	1.374	0.611***	0.708**	0.758
	(0.128)	(0.0934)	(0.0912)	(0.669)	(0.544)	(0.0973)	(0.125)	(0.136)
Population Growth	0.856*						0.854*	0.866*
	(0.0734)						(0.0740)	(0.0754)
Population Growth (spatial lag)	0.465***						0.454***	0.426***
	(0.0968)						(0.0960)	(0.0900)
Tax Capacity	0.824	0.820	0.771	1.135		0.834	0.507*	0.854
	(0.239)	(0.235)	(0.226)	(0.344)		(0.254)	(0.190)	(0.248)
Tax Capacity (spatial lag)	0.697	0.873	0.970	6.361*		0.708	0.996	0.709
	(0.292)	(0.362)	(0.403)	(7.066)		(0.316)	(0.466)	(0.299)
Admin. Expenditures	1.441*	1.571**	1.554**	1.497**		1.914***	1.494**	1.105
	(0.291)	(0.316)	(0.310)	(0.295)		(0.373)	(0.304)	(0.246)
Admin. Expenditures (spatial lag)	1.706**	1.930***	1.931***	1.744		2.112***	1.691**	1.705**
	(0.376)	(0.406)	(0.412)	(1.353)		(0.465)	(0.368)	(0.387)
Shrinking		1.298				0.275***		
		(0.278)				(0.104)		
Shrinking (spatial lag)		1.605**						
		(0.376)						
Shrinking-below-med.			1.093					
			(0.211)					
Shrinking-below-med. (spatial lag)			1.795***					
			(0.375)					
Population Size (Neighborhood+m)				0.338**	0.355**			
				(0.175)	(0.174)			
Population Growth (Neighborhood+m)				0.411***				
				(0.0949)				
Tax Capacity (Neighborhood+m)				0.0913**	0.851			
				(0.110)	(0.192)			
Admin. Expenditures (Neighborhood+m)				0.993	2.576***			
				(0.794)	(0.526)			
Shrinking (Neighborhood+m)					1.907***			
					(0.399)			
Num Sim Shrinking						0.744***		
						(0.0442)		
Shrinking# Num Sim Shrinking						1.648***		
						(0.164)		
Election Year # Tax Capacity							5.431***	
							(3.082)	
Election Year # Admin. Expenditures								7.237***
								(4.687)

Source: Authors' calculations.

Table 3.5 continued

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Unemployment Rate	0.498***	0.515***	0.512***	0.501***	0.514***	0.495***	0.502***	0.501***
	(0.0332)	(0.0343)	(0.0339)	(0.0337)	(0.0337)	(0.0336)	(0.0333)	(0.0333)
Election Year	0.696	0.615*	0.624*	0.708	0.650	0.660	1.14e-05***	2.80e-05***
	(0.184)	(0.165)	(0.165)	(0.190)	(0.171)	(0.180)	(4.16e-05)	(9.33e-05)
Election Year -1	0.769	0.820	0.820	0.775	0.856	0.876	0.779	0.771
	(0.209)	(0.224)	(0.224)	(0.209)	(0.228)	(0.238)	(0.215)	(0.210)
Election Year -2	0.906	0.858	0.899	0.877	0.873	0.970	0.917	0.922
	(0.248)	(0.239)	(0.250)	(0.242)	(0.245)	(0.269)	(0.253)	(0.254)
Num Sim Share Under 18	1.087*	1.085*	1.093*	1.084*	1.091*	1.065	1.093**	1.095**
	(0.0503)	(0.0493)	(0.0509)	(0.0490)	(0.0526)	(0.0480)	(0.0488)	(0.0506)
Same Strongest Party	1.017	1.020	1.016	1.008	1.015	1.056	1.014	1.010
	(0.0493)	(0.0491)	(0.0487)	(0.0489)	(0.0487)	(0.0490)	(0.0481)	(0.0481)
Share Local Initiative	0.995	0.995*	0.994*	0.993**	0.994*	0.994*	0.996	0.996
	(0.00323)	(0.00311)	(0.00306)	(0.00309)	(0.00292)	(0.00307)	(0.00318)	(0.00326)
IMC Support	5.355***	6.448***	7.396***	5.913***	6.414***	5.973***	5.313***	5.192***
	(1.920)	(2.345)	(2.744)	(2.151)	(2.300)	(2.303)	(1.895)	(1.813)
Doppik	4.266***	4.403***	4.377***	4.115***	4.454***	4.885***	4.476***	4.343***
	(0.965)	(1.007)	(1.019)	(0.930)	(0.959)	(1.190)	(0.994)	(1.005)
Avg. Distance	0.962***	0.996	0.996	0.990	0.980	0.981	0.962***	0.959***
	(0.0127)	(0.0216)	(0.0196)	(0.00891)	(0.0423)	(0.0429)	(0.0129)	(0.0129)
Border County	0.654***	0.628***	0.643***	0.644***	0.676***	0.706**	0.671***	0.668***
	(0.0865)	(0.0818)	(0.0873)	(0.0868)	(0.0876)	(0.0983)	(0.0879)	(0.0851)
State Dummies	YES	YES	YES	YES	YES	YES	YES	YES
Observations	3,507	3,508	3,508	3,507	3,513	3,508	3,507	3,507

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

Source: Authors' calculations.

As our first hypothesis H1 refers to shrinking municipalities rather than to the rate of population growth, we replace rate of population growth in municipality m and the median rate of population growth among its direct neighbors in model 2 and 3. Model 2 uses a dummy that takes on the value 1 if municipality m has been shrinking in size in t-1 and t-2. To account for the characteristics of neighboring municipalities, we introduce the number of neighboring municipalities that fall in the same category. Model 3 reproduces model 2 using the indicator shrinking-below-median. It marks all municipalities that have been shrinking faster than the median municipality in t-1 and t-2. In both models, the indicator that marks municipality m as

shrinking is insignificant while the number of neighboring municipalities shrinking is highly significant and positive. Compared to the baseline model, the median population size of m's neighors and municipality m's administrative expenditures per capita becomes significant (with the expected direction of influence), while the distance between m and its neighbors is insignificant. All other variables perform like they do in the baseline model.

In all three models, we find the coefficient for municipality m's rate of population growth to be at best weakly significant while the corresponding spatial lag yields a highly significant estimator. Given that population dynamics cluster regionally, we test whether the emergence of IMC is related to the population dynamics of the cluster of municipalities municipality m is situated in (consisting of m and its direct neighbors). To this end, we drop the measures for population dynamics used in the baseline model 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. We also replace the indicators for population size, tax capacity and administrative expenditure per capita in the same fashion. The results of model 4 show that municipalities in shrinking clusters are more likely to engage in IMC. The performance of all other variables is qualitatively similar to the baseline model. Model 5 reproduces model 2 in the similar fashion. The dummy variable shrinking cluster marks a cluster as shrinking if the median municipality in the cluster of m and its neighbors has been shrinking in t-1 and t-2. The probability that municipality m cooperates is significantly higher if it located in a cluster of shrinking municipalities. The same result emerges for clusters that shrink faster than the median. Given the space restriction, the results are not reported here.

In section 3, we argued that the incentive of shrinking municipalities to cooperate may be driven by the urge to avoid a further increase in administrative expenditures. This suggests that shrinking municipalities that already face high administrative expenditures per capita are

particularly likely to cooperate with other municipalities. We test for this moderating effect by extending model 2 and introducing the interaction between the dummy variably shrinking and the (log of) the administrative expenditures per capita (see model 6). The corresponding margin plot in Figure 3.3 clearly supports this notion. Shrinking municipalities with high administrative expenditures per capita are more likely to cooperate while this is not the case for shrinking municipalities with low administrative expenditures.

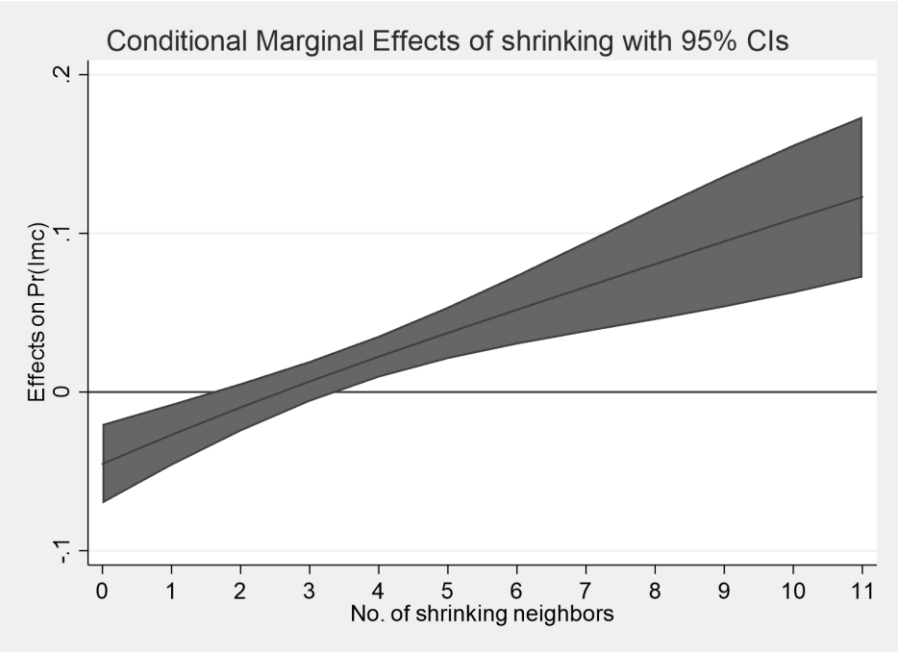

Figure 3.3: Marginal effects of population growth on starting IMC over the number of neighbors with the same category
Source: Authors' illustration.

In section 3, we also discussed the question whether municipality m is more likely to find suitable partners if its neighbors are also shrinking (due aligned preferences) or growing (due to complementarities). In model 7, we test for the moderating effect of the demographic trend in the neighboring municipalities. To this end, we extend model 2 and introduce the interaction the dummy variably shrinking and the number of neighboring municipalities that are also

shrinking. The margin plot in Figure 3.4 clearly shows that the probability that a shrinking municipality m cooperates rises in the number of shrinking neighbors.

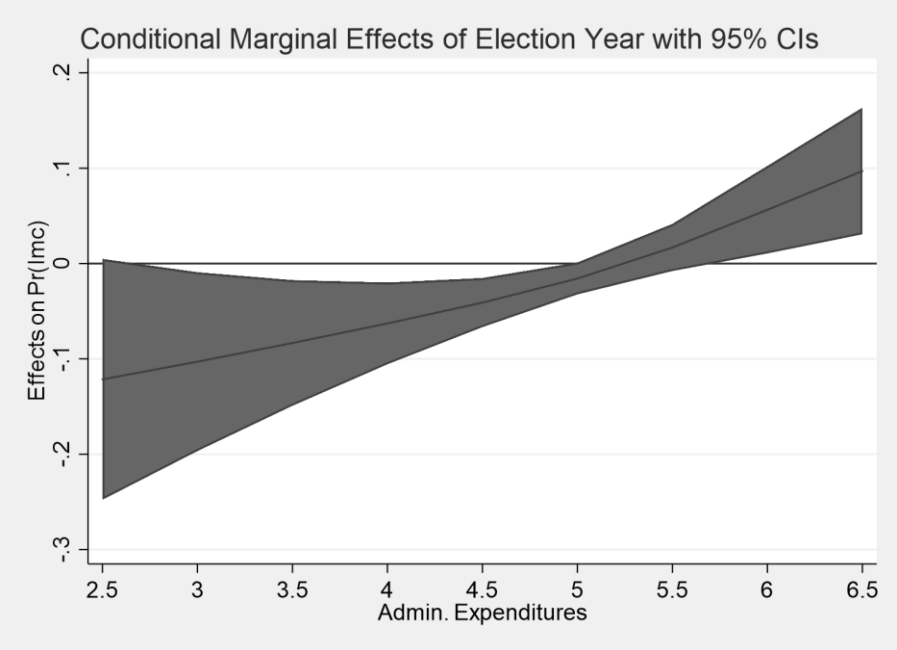

Figure 3.4: Marginal effects of election year/pre-election year on starting IMC over administrative expenditures
Source: Authors' illustration.

In the models discussed so far, the variables capturing the proximity of an election are rarely significant. Thus, the proximity of an election does not seem to have a direct effect on the timing of IMC-agreements. In model 7 and 8, we test whether the effect of the proximity of an election is moderated by the fiscal situation in municipality. To this end, we interact the election-year dummy with the administrative expenditures (model 7) or the own tax revenues (model 8). The corresponding margin plot (Figure 3.5) in show a significantly negative effect for the election year which is moderated by increasing tax revenues or increasing administrative expenditures. Municipalities with low fiscal capacity are less likely to start a cooperation in an election year while the opposite is true for fiscally strong municipalities. Figure 7 shows the same pattern for administrative expenditures per capita.

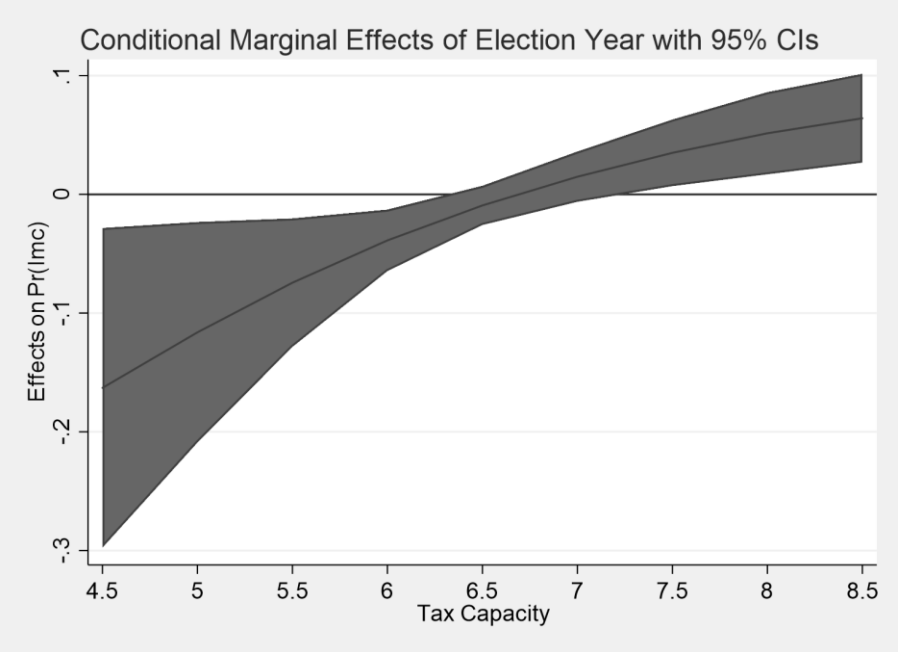

Figure 3.5: Marginal effects of election year/pre-election year on starting IMC over tax capacity
Source: Authors' illustration.

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: In model 4, an increase in the median rate of population growth by 1 percentage point in the cluster around municipality m is associated with a 58 percent decrease in the probability of starting IMC. In model 5, the probability that municipality m cooperates increases by 40 percent if the share of shrinking municipalities in the cluster including m increases by one standard deviation. Regarding our control variables, municipalities with access to IMC support at state level are six to seven times more likely to start IMC compared to municipalities that are located in regions without IMC support, and an increase in the county's unemployment rate by one percentage point relates to a 50 percent decrease in probability to start IMC. A ten percent increase in population size is associated with a 7 percent decrease in the probability to start cooperating.

3.6 Discussion

In line with previous studies, we find IMC to be more likely to emerge in clusters of small municipalities. 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. According to our results, fiscal capacity makes a difference in election years. Here, fiscally strong municipalities are more likely to cooperate while the opposite is true for fiscally weak ones.

A main focus of our analysis rests on the role of population dynamics. We argue that shrinking municipalities are more likely to cooperate in the field of internal administration. Our regression results show IMC to be more likely in clusters with shrinking municipalities. This effect is primarily driven by the general population trend within the cluster while the population dynamics in the specific municipality m has less explanatory power. In fact, shrinking municipalities without shrinking neighbors are less likely to cooperate. As the number of shrinking neighbors increase, however, the probability increases sharply. This result indirectly contradicts the notion according to which municipalities with declining population are particularly suitable to cooperate with growing municipalities because their interests are complementary.

By accounting for the time dimension of IMC-emergence, our hazard model enables us to explore the timing of IMC arrangements. To this end, we investigate the role of IMC-promoting state policies. These are found to have a strong impact on the emergence of IMC. We also analyze the role of a politically motivated timing of IMC-arrangements. We hypothesized that IMC may be unpopular among citizens and thus local governments are less likely to start IMC in times near elections, yet our results do not support this notion. At the

same time, we find IMC-arrangements to be more likely in election years in municipalities with high fiscal capacity while the same is true for municipalities with high cost pressure. While it seems straight forward to expect that cost pressure drives IMC, the performance of fiscal capacity is puzzling. Unlike in previous studies, we do not find it to drive the emergence of IMC in general. This effect may be covered up by the more appropriate measure for cost pressure in administrative tasks. However, it does not explain why the fiscal capacity suddenly has an impact in election years. If fiscally strong municipalities are more attractive partners to cooperate with and thus find cooperation partners more easily, this argument should also apply to non-election years.

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). Another shortcoming of using survey data is that our data does not provide reliable information regarding the partners, that cooperating municipalities choose when they cooperate. Thus, we are unable to explicitly test whether IMC-arrangements are designed to make use of complementarities between shrinking and growing neighbors. On the other hand, there is an important benefit of using survey data. This type of data includes less formalized forms of cooperation. Studies based on official data cannot account for these forms of cooperation.

3.7 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 stickiness of cost in administrative tasks due to strict labor regulations in the public sector, we expect IMC

to be more likely in municipalities with shrinking population size. Our results strongly support this notion. A closer look reveals that this effect is predominantly driven by the population dynamics in municipalities' near surroundings rather than by the dynamics of the single municipality at hand. The odds ratios identify the effect to be of considerable size.

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. This approach 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 indicate that Public Choice considerations influence the timing of IMC arrangements. Furthermore, they clearly show 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 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 Sebő, 2019). These studies suggest that the cost-savings from IMC exist in capital intensive tasks like sewage and waste disposal while there is also mixed evidence regarding the effects of IMC in other fields of government policies where transaction costs can be substantial (e.g., Sørensen, 2007; Blåka, 2017; 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.

4 Does inter-local competition drive cooperation in local economic development policies?

Evidence on inter-local business parks in Germany

Ivo Bischoff (University of Kassel), Simon Melch, and Eva Wolfschütz

Abstract

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

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

JEL: H77, H71, R58, R14

4.1 Introduction

Local firms provide jobs for local residents and generate local tax revenues. Therefore, building and maintaining an attractive environment for business activities is an important objective of local governments (e.g., Peddle, 1990; Büttner and Schwerin, 2016). One essential element of such an environment is attractive land for business settlements (e.g., Taylor, 1992). In many countries, land for business settlement is provided in so-called business parks. These encompass a large entity of land specifically dedicated to commercial and/or industrial activities of several firms (Peddle, 1990).[7] When developing business parks, local governments face a trade-off. On the one hand, they can benefit substantially from developing business parks jointly with neighboring jurisdictions. This cooperation allows them to exploit economies of scale, pool the risk associated with under-utilization and internalize spillovers (e.g., Oates and Schwab, 1988). On the other hand, these neighboring jurisdictions are competitors. Offering a business park that is better than the one in the neighborhood or finalizing it earlier may attract substantial amounts of capital – also from these neighboring jurisdictions (e.g., Taylor, 1992). Developing business parks jointly means waiving the potential benefits of this intra-regional competition. Our paper takes this trade-off as its starting point.

The main course of argumentation in this paper proceeds in three steps. First, building on the economic theory of cartels (e.g., Levenstein and Suslow, 2006) and international tax coordination (e.g., Keen and Konrad, 2013), we argue that joint business parks creates a platform that allows municipalities to coordinate behavior and reduce the intensity of intra-regional competition. Second, we argue that the incentives to form joint business parks depend – among other things – on the intensity of intra-regional competition. The more intense the

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

intra-regional competition is, the larger the incentives for local governments to develop business land jointly with others. Third, we test this conjecture using data on inter-local business parks in Germany developed between 2000 and 2015. We focus on municipal tax-setting behavior as a crucial dimension of intra-regional competition. We are aware of the fact that intra-regional competition is multidimensional and contains more than competition in local tax rates (e.g., Taylor, 1992; Overton, 2017). On the other hand, tax competition is a well-understood and important dimension of this competition. Its main advantage is the availability of clear-cut indicators that allow us to measure the intensity of intra-regional (tax) competition. To the best of our knowledge, the question as to whether intra-regional competition fosters inter-municipal cooperation has not been raised in the literature, nor has it been tested. Thus, our paper breaks new grounds.

German municipalities are a highly suitable testing ground. First, they have the competence to decide how much land to provide for business settlements. Unlike in some other countries like the US, German municipalities not only regulate land-usage but usually develop it before it is sold to firms (e.g., Hirt, 2012). Hence, public financing is common. Second and more importantly, German municipalities collect revenues from local business and land taxes and they are entitled to set the tax rates for both taxes (e.g., Bischoff and Krabel, 2017).[8] Economic theory (Wellisch, 2006) predicts that regions with intense competition for mobile firms apply low tax rates to mobile tax bases like business profits while simultaneously applying high tax rates to less mobile bases like land and real estate. Thus, the institutional settings in Germany allow for a very direct way to measure the intensity of intra-regional (tax) competition and test the above hypothesis.

[8] Technically speaking, they set a tax multiplier (see section 4) that determines the effective tax rate.

To test this hypothesis, we apply a hazard model to a panel of more than 6 000 West-German municipalities between 2000 and 2015. The results strongly support our hypothesis: We find inter-local business parks to be more likely to emerge among municipalities that – other things equal – have low business tax rates and high land tax rates. This result remains stable over a wide range of econometric specifications. We control for many other factors that have the potential to drive the emergence of joint business parks. In line with the previous literature on inter-municipal cooperation, we find joint business parks to be more frequent among small municipalities and among municipalities that are similar in composition of their population. We also find evidence supporting the notion that inter-local business parks serve as an instrument to solve the problem of land scarcity.

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

4.2 Review of Literature

4.2.1 Inter-local competition

Economic theory takes it that local governments compete for mobile businesses and firms (e.g., Oates and Schwab, 1988; Boyne, 1996). Classical location theory stresses the relevance of access to markets, transportation and/or raw materials (e.g., Dawkins, 2003) while new economic geography emphasizes the importance of existing agglomerations in attracting new capital (e.g., Borck and Pflüger, 2006). From the perspective of a single municipality trying to attract firms, most of these factors are difficult to change. On the other hand, there are a number of factors such as education and especially tax policies that are controlled by local governments and thus may serve as instruments in the competition for firms (e.g., Blair and Premus, 1987; Oates and Schwab, 1988; Wolkoff, 1992).

Inter-local competition shapes local policy decisions in many fields and the complex multidimensional game is still not well understood (e.g., Overton, 2017). At the same time, the rich literature on tax competition can serve as a starting point to identify important mechanisms at work. The seminal paper by Zodrow and Mieszkowski (1986) and a large number of theoretical papers building on them show that the mobility of capital forces governments to set low tax rates for mobile factors – especially capital.[9] The largest bulk of the empirical studies on tax-setting behavior show that local business tax rates are spatially correlated – thus supporting the notion of tax mimicking among local governments (e.g., Revelli, 2001; Allers and Elhorst, 2005).[10] In order to finance local amenities, they have to rely on other, less mobile

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

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

tax bases. Next to taxes on labor income, land and local real estate taxes are commonly used for this purpose (e.g., Wilson, 1999; Wellisch, 2006).

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

4.2.2 Inter-municipal cooperation

The second strand of literature deals with inter-municipal cooperation (IMC). IMC is widespread in many industrialized countries and covers a wide spectrum of municipal activities (Hulst et al., 2009; LeRoux et al., 2010). Over the last 20 years, scholars mostly from public administration have compiled a large body of empirical studies on the emergence of IMC (see Bel and Warner (2016) for an excellent review). 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., 2018).

Pioneered by Richard Feiock and co-authors, the Institutional Collective Action (ICA)-framework illustrates that negotiating, implementing and controlling IMC-contracts entails substantial transaction costs (e.g., Feiock and Scholz, 2009). Under the ICA-framework, these

transaction costs are considered the main obstacle for inter-local cooperation. Accordingly, transaction costs are lower and thus IMC is more likely the more similar municipalities are (e.g., Feiock et al., 2009). This argument is known as the homophily-argument (e.g., Bel et al., 2013b). Furthermore, pre-existing political networks are found to matter because they create a platform for exchange among administrative staff and political decision makers (e.g., LeRoux et al., 2010). Embeddedness in these platforms lowers transaction costs and thus fosters IMC (Feiock, 2013). The empirical relevance of both homophily and embeddedness is supported in numerous empirical studies (e.g., Warner and Hefetz, 2002; Feiock, 2013; Bel et al., 2013b; Schoute et al., 2018) – including a number of papers that investigate cooperation aiming specifically at fostering economic development (e.g., Feiock et al., 2009; Hawkins, 2010; Feiock et al., 2012; Hawkins, 2017). Using data from a survey among development officials in US cities, Feiock et al. (2009) also show that economic development joint ventures are more likely to emerge in cities where economic development is considered critical.

Few studies have investigated the emergence of IMC in Germany. Bergholz (2018) focusses on IMC in tourism marketing while Bischoff and Wolfschütz (2019) analyze IMC in administrative services. Using the same survey among German municipalities, they both find IMC to be more likely among small municipalities. Bischoff and Wolfschütz (2019) also find population decline to be an important driver of IMC-arrangements while IMC-agreements are less frequent in election years. Wuschansky and König (2006) conducted a survey among German municipalities involved in inter-local business parks: The respondents state that inter-local business parks are most frequently motivated by the particular suitability of land situated at the municipal border. Other factors include strategic development goals, financial straits or the shortage of land.

4.2.3 Coordinated behavior among competitors

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

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

Only very few papers relate IMC to tax setting behavior. Breuillé et al. (2018) analyze the impact of IMC on local taxation. They show that the membership in the French "Establishments for inter-municipal cooperation" increases municipal tax rates. Büttner and Schwerin (2016) explore the fact that a strikingly large number of German municipalities apply exactly the same tax rate. They argue that this tax bunching is an indication of partial tax coordination, though they do not provide any empirical evidence to back this hypothesis. Blesse

and Martin (2015) analyze the tax setting behavior of municipalities in the German state North Rhine-Westphalia and find more intense tax interactions among municipalities located in the same county or administrative district (Regierungsbezirk) or covered by the same local newspaper. While these studies indicate that tax coordination takes place where there are networks or organizations of inter-local interaction, they do not test for the role of tax competition in the establishment of these networks or organizations. This is where our paper comes in.

4.3 Main Hypothesis

Consider the government in a certain municipality m. Assume that it wants to maximize expected business tax revenues net of business-related expenditures. The government may share this objective with the local electorate if tax competition is too intense (e.g., Zodrow and Mieszkowski, (1986). And even if this condition does not apply, it is in the interest of the local governments to reduce the intensity of tax competition, because this increases their propensity to generate tax revenues and increase expenditures without burdening the local median voter (e.g., Aidt et al., 2011). To achieve its aim, the government can either change the tax rate or take measures to broaden the tax base. The latter can be achieved by improving the quality of the existing land or by developing new land for business activities. New business land can either be developed individually or jointly with neighboring municipalities. Our main argument is that forming a joint business park has the potential to achieve both aims – broaden the tax base and allow for an increase in tax rates.

This argument builds on the literature on tax coordination and collusion sketched above. It shows that pre-existing organizational structures and institutional platforms facilitate effective coordination. By establishing an inter-local business park, municipalities create such an institutional platform that facilitates inter-local coordination in the future. This effect cannot be reached by improving the infrastructure in existing business parks or by establishing its own

business park.[11] Furthermore, municipalities that agree on a joint business park automatically also agree on a common quality of infrastructure and timing of land development. Thereby, they commit themselves not to circumvent a possible agreement on tax coordination by shifting the competition to the field of infrastructure quality or the time of finalizing it.

Municipalities face different costs and benefits when developing business land – jointly or individually. As business parks are long-term investments, comparing the jointly and individually developed business parks requires a comparison of present value. Taking the option "no new business park" as a benchmark case, the total present value (PV_b) of the other two options (b = *ind(idvidual), joint)* is given by the following expressions:

$$PV_{ind} = \sum_{0}^{T} \frac{\tau_{tind} \cdot \Delta B_{tind} - C_{tind}}{(1 + r_t)^t}$$

$$PV_{joint} = \sum_{0}^{T} \frac{\tau_{tjoint} \cdot \Delta B_{tjoint} - C_{tjoint} - TC_t}{(1 + r_t)^t}$$

with τ_{tb}= business tax rate in period t (t = 0, …T)

ΔB_{tb} = change in tax base compared to the benchmark case in t

C_{tb} = Costs of establishing a business park in t

TC_t = (additional) transaction costs associated with negotiating, implementing and running the business park jointly in t.

r_t = interest rate in t

T = time horizon of the investment

Forming a joint business park is beneficial if $PV_{joint} > PV_{ind}$ and $PV_{joint} > 0$.

[11] While an improved quality of infrastructure opens up some leeway to increase business taxes without expelling firms, this leeway is larger in a coordinated move with neighboring municipalities.

For reasons of simplicity, let us start by assuming that the additional tax base ΔB_t as well as the discount rate r_t do not depend on whether the additional business land attributed to municipality m is produced jointly or individually. In this case, the difference in present values can be expressed as follows:

$$PV_{joint} - PV_{ind} = \sum_{0}^{T} \frac{C_{tjoint} - C_{tind}}{(1 + r_t)^t} - \sum_{0}^{T} \frac{TC_t}{(1 + r_t)^t} - \sum_{0}^{T} \frac{(\tau_{joint} - \tau_{tind}) \cdot \Delta B_t}{(1 + r_t)^t}$$

The first sum captures the benefits from economies of scale and scope while the second sum captures the additional transaction costs associated with cooperation. Other things equal, joint business parks are more profitable, the larger the economies of scale and scope and the lower the transaction costs. According to the ICA-framework (see section 2.3), it is the second term that poses the major obstacle to the formation of joint business parks. The main new argument proposed in this paper is expressed in the third sum. It captures the additional tax revenues that municipality m can generate because cooperation creates a platform for tax coordination that can be used to apply higher tax rates. Other things equal, joint business parks are more profitable, the more power municipalities have to raise taxes when they cooperate.

A positive relationship between the intensity of inter-local competition faced by a municipality and the expression $PV_{joint} - PV_{ind}$ emerges if the capacity to raise taxes is higher in clusters with high inter-local competition. Alternatively, it emerges if cooperation in these clusters implies lower transaction costs. While we are not aware of any empirical evidence supporting the first condition, the following course of argumentation supports the second condition: Accordingly, intense competition creates time pressure in negotiations for joint business parks. This time pressure may reduce the room for strategic veto players and thereby speeds up negotiations and reduces transaction costs. Thus, other things equal, $PV_{joint} - PV_{ind}$ may decline in the initial business tax rate. However, this argument is ad hoc. In other words, neither the theory of tax coordination and collusion, nor the ICA-framework provides strong

arguments in favor of a link between the level of inter-local competition and the incentives to form joint business parks.

A more convincing argument emerges if we take into account evidence on the political economy of IMC provided by Bergholz and Bischoff (2018). They analyze data from a survey among local politicians in the German state of Hesse. Their results show that politicians associate cooperation with a loss in political power that reduces their utility from holding office. It seems reasonable to assume that the loss in power from inter-local cooperation is less severe in municipalities operating under intense tax competition because politicians have less discretionary power in the first place. The more intense the intra-regional competition is, the less discretionary power is lost and thus the more inclined politicians are to cooperate – other things equal. This notion is supported by a side-result of Bergholz and Bischoff (2018) – showing that politicians in municipalities suffering from high debt per capita and a high ratio of running expenditures to own revenues are more likely to support IMC.

It is important to note that the potential benefits are likely to be regionally limited in scope. In other words, inter-local business parks may help to reduce *intra*-regional competition but are unlikely to have any effect on *inter*-regional competition. This also implies that the incentives to form an inter-local business park are driven by the intensity of intra-regional competition: This leads to our main hypothesis:

Main Hypothesis:

The more intense the intra-regional competition a certain municipality faces, the more likely it is to form a joint business park.

4.4 Institutional background

We use data on West-German municipalities between 2000 and 2015 to test the above hypothesis. East-Germany is excluded because it went through fundamental regional reforms that prevent the use of long panel data sets. German municipalities provide important public services like local roads, business parks, cultural infrastructure and pre-school childcare. They account for approximately 20 percent of overall government expenditures (Zimmermann, 2009: 93-99). While having to fulfill minimum standards set by upper-tier governments, German municipalities have considerable leeway when choosing quality and quantity of many important public 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 eliminating differences in fiscal capacity (e.g., Büttner, 2016).

The local business tax is the most important endogenous source of municipal revenues accounting for more than 15 percent of revenues in West-Germany in 2015. Municipalities decide about the effective rate on profits of local business establishments. Specifically, they set a so-called tax multiplier that is applied to a unified tax base. A multiplier of 400 is equivalent to a tax rate of 14 percent. Similarly, they determine the tax multipliers and thus rates and receive the revenues from local land taxes (e.g., Bischoff and Krabel, 2017). The so-called land tax A is imposed on agricultural and forested land while land tax B burdens developed real estate and buildable ground. In 2015 both sum up to 7.1 percent of average municipal revenues (West-Germany). Around 86 percent of the land tax revenues stem from land tax B. Table 4.1 provides descriptive statistics for the tax multipliers in West German municipalities for business and land tax B. There is substantial variation across space and time. On average, both multipliers increase in the period of observation.

Table 4.1: Local tax multipliers, and business and industrial land-use in West-German municipalities

Category	year	obs.	mean	std. dev.	min.	max.
Business tax multiplier	2000	8,525	327.58	36.358	0	900
	2015	8,579	356.59	44.09	0	900
Land tax B multiplier	2000	8,526	298.99	48.17	0	900
	2015	8,579	359.59	72.39	0	960
Business and industrial land	2000	8,394	.4103	1.77	0	77
(km², absolute)	2015	8,394	.4999	1.78	0	68.3
Share of business and industrial land	2000	8,394	1.019	1.94	0	33.7
(percent)	2015	8,394	1.295	1.87	0	21.7
Change in the above share among municipalities with changes > 0 (percent)	2000-2015	5,591	.6657485	.8729744	.1	17.8

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

German local governments have the power to regulate the use of land within its borders. The German land-use regulation system rests on the principle of functional zoning and – in its basic mechanism – resembles other systems such as land zoning in the US (e.g., Hirt, 2012). The municipalities develop plans of land-usage in which they legally dedicate land to specific purposes (Hirt, 2012). Changes in the plans for land-usage must pass the municipal council and need approval by an upper-tier administration. The main categories of land-usage are residential, agricultural, commercial/industrial purposes and natural reserves. Firms are only allowed to operate on land which is dedicated to business activities. This creates a direct link between the provision of commercial land and tax revenues on the local level (Büttner, 2016). Table 1 shows that most municipalities (5591 out of of 8394) have increased the share of land dedicated to business purposes between 2000 and 2015 (on average by 0.67 percentage points).

The provision of commercial land is an (if not the most) important instrument for promoting local economic development for German municipalities (Lehmann-Grube and Pfähler, 1998). Unlike in some other countries where the development of commercial land tends to be carried out by private sector companies, German municipalities actively develop business

land. They acquire suitable land from its owners (if not already owned by the municipality), develop it, conduct marketing and sale activities and take over ongoing management and/or maintenance tasks.[12] This makes the development of business land an expensive endeavor with inherent risks for the municipality. If business parks fail to attract firms, municipalities must still bear the costs.

In an increasing number of cases, business parks are developed jointly by two or more municipalities. The municipalities participating in these inter-local business parks generally settle their agreements in a formal contract. This contract settles the land allocation as well as fiscal aspects: Municipalities agree on the division of both development costs and local tax revenues from the joint business park. Often, costs and revenues are divided between the participants accordingly, e.g. a municipality that bears 20 percent of the costs also receives 20 percent of the tax revenues.

4.5 Data

There is no official data on inter-local business parks in Germany. We collect data on joint business parks from various sources. Data was extracted 1) from an extensive study on German joint business parks by Wuschansky and König (2006), 2) from official data on municipality owned enterprises, 3) from official data on administrative unions, 4) from federal commercial

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

estate databases and 5) - to identify outliers - supplementary internet searches using keywords.[13] Given the comprehensive approach of our data collection, we are confident to have constructed a complete data set of joint business parks in Germany. [14] For every joint business park, we know which municipalities participate in it and we know the year in which the contractual agreement between the participants was signed. Finally, we gather information about which of the cooperating municipalities provide land for the business park (so-called situs municipalities).

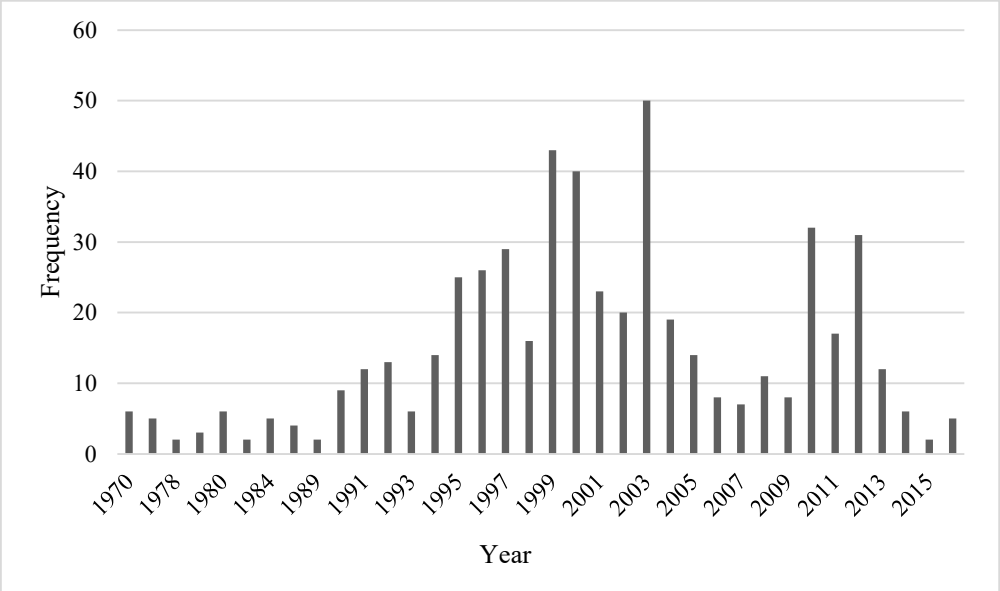

Figure 4.1: Number of West German municipalities starting an inter-local business park from 1970 to 2015
Source: Authors' illustration.

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

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

In total, we have identified 180 joint business parks as of December 2017 involving 570 participating municipalities (approximately 6.5 percent of West German municipalities). There has been a general increase in joint business parks which intensified during the 1990s. Figure 4.1 depicts how many municipalities have started a joint business park between 1970 and 2015. Figure 4.2 maps the involved municipalities across Germany. It becomes clear that joint business parks are not spread equally across Germany. Most notably, there is much more cooperation in Western and South-Western regions.

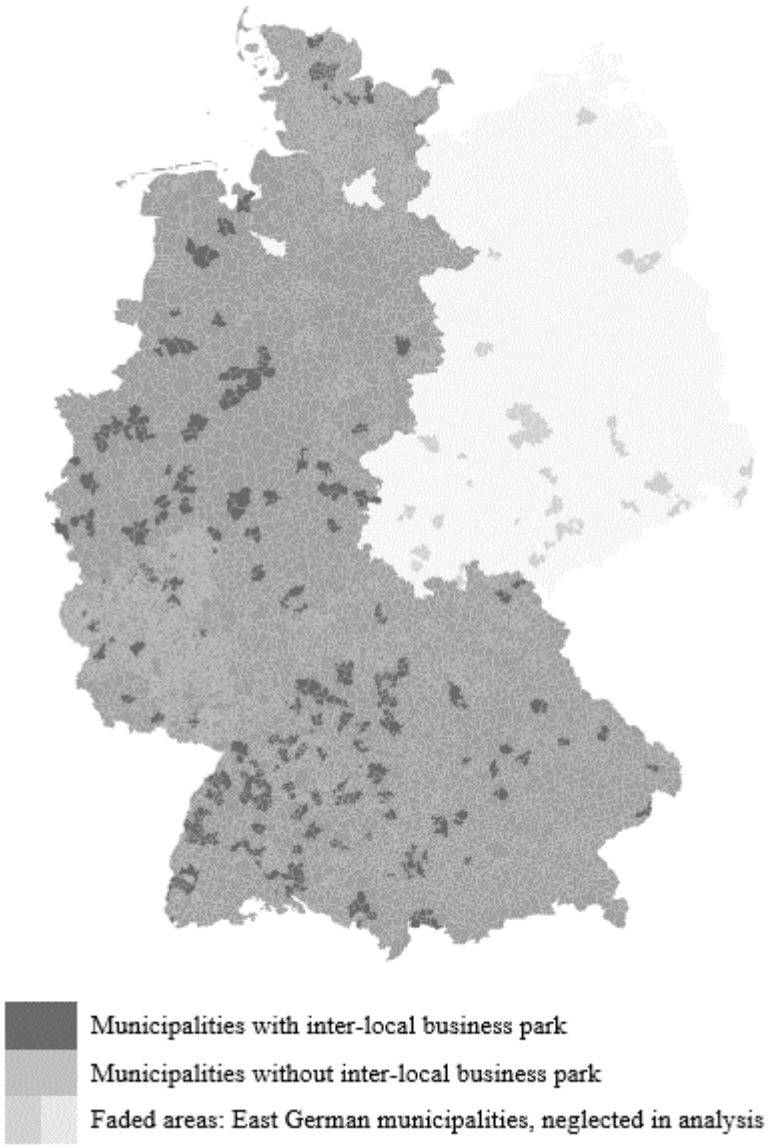

Figure 4.2: German municipalities with inter-local business parks in 2015
Source: Authors' illustration.

Most inter-local business parks encompass two cooperating municipalities (95 cases; 53 percent). In 43 cases, three municipalities are involved. Business parks with four or more partners are rare (see Figure 4.3). Slightly more than half of the inter-local business parks are cross-boundary in nature (at least two municipalities contribute land) while intra-boundary inter-local business parks (only one land donor) comprise about 44 percent of the cases.

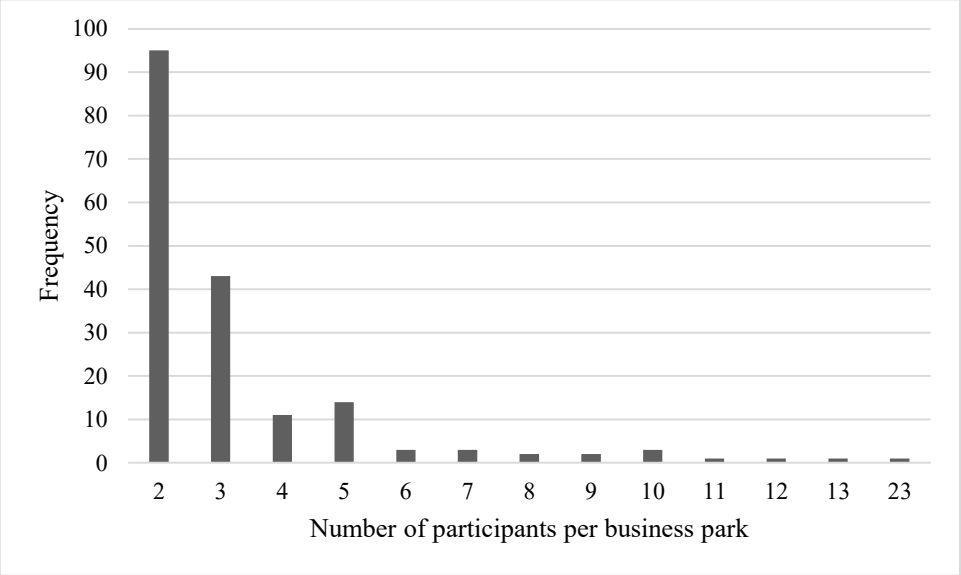

Figure 4.3: Number of participating municipalities
Source: Authors' illustration.

Our main hypothesis states that the intensity of intra-regional competition drives the emergence of joint business parks. Two decisions have to be made when developing a measure for intra-regional (tax) competition. First, we have to decide which measure best captures the intensity of intra-regional competition. In this paper, we use measures that build on the local tax rates.[15] Clearly, inter-local competition is multi-dimensional with tax competition being only one dimension (e.g., Overton, 2017). At the same time, tax rates capture an essential part of this competition and it is very unlikely that intense competition does not also manifest in the tax rates. Moreover, their main advantage is that they provide a clear quantitative measure that

[15] For a complete variable description see Table 4.2

is readily available. Following the basic logic of the tax competition literature (see section 2.1), we use the multiplier of the local business tax as well as the multiplier of the local land tax (B). Economic theory predicts that municipalities facing intense competition for mobile capital will impose low taxes on capital. In order to fund necessary expenditures, these municipalities have to tax immobile land and real estate at a higher rate – other things equal (e.g., Wilson, 1999). Building on this logic, we use these two tax multipliers as proxies for the intensity of tax competition: The intensity of tax competition is high if the business tax multiplier is low and the land tax multiplier is high. Consequently, our main hypothesis translates as follows: Joint business parks are more likely to emerge in local clusters with low business and high land tax multipliers. Second, we have to decide about the boundaries of the relevant intra-regional market on which municipality m is competing with other municipalities for firm settlements. Following the studies on spatial interaction in local tax-setting behavior (e.g., Bischoff and Krabel, 2017), we will use the cluster of municipality m and its direct neighbors, i.e. municipalities that share a common border with m. In other words, we measure the intensity of tax competition that a certain municipality faces by the multipliers this municipality sets and by the tax multipliers its direct neighbors set.

Table 4.2: List of variables

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

Source: Authors' compilation.

We introduce numerous other explanatory variables to account for other factors that may drive the emergence of joint business parks. The selection of variables primarily builds on the literature on IMC (see section 2.2). In addition, we introduce a number of variables related to the specific context of developing business land. First, we account for the fact that municipalities may be limited in the availability of suitable land and thus the ability to develop new business parks. In these municipalities, the incentives to join an inter-local business park

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

We also control for the availability of a good transport connection in municipality m and its neighbors. Transport connectivity is regarded as a major location factor (e.g., Meinel et al., 2007; Möller and Zierer, 2018) and hence an essential factor determining the quality of business parks. We capture the availability of a transport connection in municipality m using a dummy variable that takes on the value 1 if there is a motorway junction within the jurisdictional borders of m (0 else). To account for the transport connections in municipality m's neighbors, we introduce the number of neighboring municipalities with a motorway junction on their territory.

Next, we control for variables that have been found to drive IMC in earlier studies. These studies suggest that municipality's m inclination to start IMC is driven by its fiscal situation and size (Ferris and Graddy, 1988; Garrone and Marzano, 2015; Di Porto et al., 2016). The impact of municipal size is captured by the logarithm of the total number of citizens. We measure fiscal capacity by per capita tax revenues from vertical tax sharing generated by the observed municipality. The tax revenues from business and land taxes are excluded to avoid

endogeneity issues. To account for the situation in municipality m's neighbors, we also include the spatial lags, more precisely the median value for logarithmic population size and fiscal capacity among municipality m's neighbors. A dummy variable marks urban clusters. It takes on the value 1 in all cases where municipality m or one of its neighboring municipalities has more than 100.000 inhabitants (0 else) or has the status of a city with county rights. Urban clusters generally offer the benefits of agglomeration (see section 2.1). In addition, they often host institutions of higher education that are of particular importance for start-ups and innovation networks (e.g., Audretsch et al., 2005). At the same time, land tends to be more scarce in urban clusters.

To accommodate the ICA-approach, we introduce a number of variables. Two variables are introduced to control for the homophily-argument according to which similarities in citizens' tastes between municipality m and its potential partners foster IMC. First, we use the number of neighboring municipalities that are similar to municipality m in their age composition; a neighbor is considered similar if the share of inhabitants younger than 18 years deviates by less than 10 percent from that in municipality m. On average, slightly more than half of the neighboring municipalities qualify as similar in this respect. Second, we control for the number of neighboring municipalities that have the same strongest party in the local council as municipality m (LeRoux and Carr, 2007; e.g., Feiock, 2007; Bel and Warner, 2016; Bergholz, 2018). This variable also serves as a proxy for the expected political transaction costs associated with IMC. The higher the number of neighbors with ideologically similar municipal councils, the lower the expected transaction costs (e.g., Bergholz, 2018; Bischoff and Wolfschütz, 2019). On average, slightly more than 40 percent of the neighboring municipalities qualify as similar in this respect.

Next, we introduce two variables that capture the embeddedness of municipality m in pre-existing local networks that reduce IMC-related transaction costs. The first network is the

county. Especially the mayors within a county are firmly organized in the so-called "Bürgermeister-Kreisversammlung" – a committee consisting of all mayors within one county. This committee meets regularly to discuss political and administrative questions of all kinds. Except for the cities with county rights, all municipalities are member of one of these committees. The second formal network we account for are the so-called "Verbandsgemeinden", "Samtgemeinden" or "Ämter" (hereafter covered by the generic term administrative municipal union). These are jurisdictions formed to support a group of small municipalities in a number of government tasks, especially back-office activities. These jurisdictions have been formed in a top-down process by the state governments to increase efficiency. These special jurisdictions only exist in Rhineland-Palatine, Lower Saxony and Schleswig-Holstein and their scope differs across states. While these jurisdictions do not have the right to decide about tax multipliers, they – just like the "Bürgermeister-Kreisversammlung" – provide a network for exchange among neighboring municipalities. In the regressions below, we will calculate the level of embeddedness between municipality m and its direct neighbors by calculating the number of neighboring municipalities belonging to the same county and special jurisdiction respectively. A high level of embeddedness reduces the transaction costs of collective action. However, this does not automatically mean that joint business parks are more likely among well-embedded municipalities. In fact, even the opposite may be true because the administrative municipal unions and "Bürgermeister-Kreisversammlung" may themselves be a platform to coordinate tax policies. In this case, they serve as substitutes for IMC.

We control for the role of ideologically motivated differences in the attitude towards IMC among both citizens and local politicians. To this end, we include the share of seats in municipality m's council held by "local initiatives" (mainly free voters associations) and by the Christian democrats (CDU). To control for possible timing effects of IMC-agreements in the election cycle, we introduce a dummy variable for election years (e.g., Bischoff and

Wolfschütz, 2019). Some state governments support municipalities that engage in IMC through subsidies for new consortia granted upon application. We control 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).

Our sample consists of all municipalities in West-Germany and covers the time period 2000 to 2015. Because of missing values in explanatory variables, we are left with 84,293 observations from an initial number of 6,061 municipalities in the sample, 277 of which start to cooperate during our observation period. Table 4.3 presents descriptive statistics for those municipalities included in the analysis. It differentiates between those 277 municipalities that form a joint business park at some point in time between 2000 and 2015 and the other 5,784 municipalities that do not.

Table 4.3: Descriptive statistics of selected variables for the year 2000; differentiated between municipalities with (w) and without (w/o) inter-local business park
Source: Authors' compilation.

Variable		Obs.	Mean	Std. Dev.	Min	Max
Business tax rate	w	277	331.058	28.955	280	445
	w/o	5784	324.257	29.290	180	470
Land tax rate	w	277	299.726	42.744	180	450
	w/o	5784	296.525	46.475	100	800
Share CDU	w	277	25.377	23.348	0	76.19
	w/o	5784	22.337	24.515	0	100
Share local initiative	w	277	44.720	34.31	0	100
	w/o	5784	45.125	36.189	0	100
Population size (abs.)	w	277	9176.7	12649.03	167	95158
	w/o	5784	6009.899	9935.657	68	150013
Median population size of neighbors (abs.)	w	277	7464.81	9010.466	581	81696
	w/o	5784	5363.525	7687.495	87	116680.5
Urban cluster	w	277	.09	.313	0	1
	w/o	5784	.111	.287	0	1
Tax capacity (abs.)	w	277	389.652	90.135	189.809	668.734
	w/o	5784	356.831	122.657	28.826	5786.227
Motorway access	w	277	.249	.433	0	1
	w/o	5784	.112	.316	0	1
Land scarce	w	277	.668	.472	0	1
	w/o	5784	.520	.5	0	1
No. of neighbors	w	277	1.253	1.192	0	6
	w/o	5784	.826	1.118	0	8
No. neighbors with abundant land	w	277	1.942	1.768	0	8
	w/o	5784	2.184	1.757	0	12
No. neighbors with same strongest party	w	277	2.534	2.022	0	11
	w/o	5784	2.498	1.998	0	12
No. neighbors sim. share under 18	w	276	3.826	1.903	0	9
	w/o	5,571	3.363	1.904	0	13
No. neighbors in same administrative union	w	277	1.379	1.413	0	5
	w/o	5784	1.637	1.643	0	9

Source: Authors' calculations.

The table shows that the tax multipliers on both business profits and land are slightly larger on average in those municipalities that cooperate eventually. At the same time, the maximum tax multipliers are higher in the municipalities that do not form a joint business park in our period of observation. Univariate tests show that the difference in tax multipliers is significant (t-test, $p = 0.05$). There is, however, a noticeable difference in population size: Cooperating municipalities are substantially larger and have larger neighbors on average. This also goes along with a larger number of neighbors, higher tax revenues per capita from tax sharing (due to rules in the fiscal equalization schemes) and a higher share of municipalities with motorway junctions, more land scarcity and fewer neighbors with abundant land and lower

scores on embeddedness in an administrative municipal union. Apart from that, the two groups of municipalities do not differ much.

4.6 Empirical Analysis

4.6.1 Empirical Strategy

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

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

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

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

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

Here, α_t is a vector of constants reflecting the baseline hazard of starting cooperation for each year and β' is a vector that captures the effects of the explanatory variables in matrix x_{mt} on

the instantaneous probability to start cooperation. Positive values for β' signify an increase in the likelihood of municipalities starting a joint business park while negative values signify a decrease.

4.6.2 Results

We use a hazard model as described in expression (2) to identify factors driving the fact that a certain municipality m forms a joint business park in period t (year of signing the inter-municipal contract). State dummies are used to control for all time-invariant institutional differences, e.g. in the degree of decentralization and in the fiscal equalization system. Except for the political measures and geographical variables, all independent variables are lagged by one year to avoid a simultaneity bias.

Table 4.4 reports the results of different specifications using different measures for our central variables. It is important to note that we report odds ratios rather than regression coefficients. Odds ratios tell us by what (multiplicative) factor the probability that municipality m starts cooperating in t increases when the corresponding explanatory variable increases. Odds ratios lower than 1 indicate that a factor retards the formation of a joint business parks while odds ratios above 1 indicate that a factor accelerates it. Standard errors are clustered at the municipal level.

The baseline specification includes all variables described above. The tax multiplier for the business tax in municipality m does not have a significant effect on the likelihood that this municipality cooperates in the development of business land while the tax multiplier for the land tax has a positive effect. Turning to the spatial lags, we find municipality m's likelihood of cooperating to decrease in the median business tax multiplier among m's neighbors and increase in the median land tax multiplier. These results are largely in line with our main hypothesis.

Municipality m is more likely to enter a joint business park if land is scarce and/or it has a motorway access on its territory. A negative effect is observed for the interaction of *land scarcity x abundant land among neighbors*. The larger the number of neighbors being part of the same administrative municipal union as municipality m, the less likely the latter is to form a joint business park. The same negative relationship is reported for the number of neighboring municipalities with the same strongest party in the city council while the opposite is true for the number of neighbors with a similar age composition of the population. The likelihood of cooperation decreases in the population size of a municipality and in the median population size of its neighbors. Election years see fewer agreements while state policies supporting IMC increase the likelihood that joint business parks emerge. The probability to form a joint business park increases in the share of seats in the municipal council held by free voter associations or Christian democrats. All other variables are insignificant.

Table 4.4: Results from the hazard model on the emergence of joint business parks (odds ratios)

VARIABLES	(1)	(2)	(3)	(4)
Business tax rate	0.998			
	(0.00378)			
Business tax rate (spatial lag)	0.991**			
	(0.00439)			
Land tax rate	1.004***			
	(0.00142)			
Land tax rate (spatial lag)	1.005**			
	(0.00236)			
Business tax rate (neighborhood median)		0.988***		
		(0.00349)		
Land tax rate (neighborhood median)		1.010***		
		(0.00216)		
Ratio business tax rate/ land tax rate			0.155***	
			(0.0772)	
Ratio business tax rate/ land tax rate (spatial lag)			0.0704***	
			(0.0572)	
Ratio business tax rate/ land tax rate (neighborhood median)				0.0104***
				(0.00706)
Land scarce	1.862***	1.866***	1.757***	1.739***
	(0.332)	(0.330)	(0.334)	(0.326)
No. neighbors with abundant land	1.019	1.019	1.026	1.026
	(0.0444)	(0.0445)	(0.0462)	(0.0464)
Land scarce#No. neighbors with abundant land	0.847***	0.845***	0.851**	0.850**
	(0.0539)	(0.0535)	(0.0557)	(0.0556)
Motorway access	1.257**	1.268***	1.220**	1.235**
	(0.116)	(0.116)	(0.117)	(0.118)
No. of neighbors with motorway access	1.064*	1.064*	1.030	1.036
	(0.0381)	(0.0383)	(0.0384)	(0.0384)
Same strongest party	0.944**	0.945**	0.943**	0.941**
	(0.0264)	(0.0261)	(0.0268)	(0.0262)
Share CDU	0.991**	0.991**	0.992**	0.992**
	(0.00366)	(0.00363)	(0.00367)	(0.00360)
Share local initiatives	0.993***	0.992***	0.994**	0.994***
	(0.00235)	(0.00232)	(0.00238)	(0.00233)
Election year	0.521***	0.517***	0.504***	0.501***
	(0.120)	(0.119)	(0.116)	(0.115)
Population size	0.878**	0.897*	0.929	0.951
	(0.0534)	(0.0551)	(0.0595)	(0.0611)
Population size (spatial lag)	0.630***	0.620***	0.702***	0.697***
	(0.0580)	(0.0582)	(0.0660)	(0.0657)
Urban cluster	0.989	0.950	0.945	0.879
	(0.144)	(0.136)	(0.143)	(0.129)
No. neighbors sim. share under 18	1.053**	1.055**	1.066**	1.070***
	(0.0264)	(0.0265)	(0.0277)	(0.0274)
IMC support	(0.750)	(0.756)	(0.634)	(0.647)
	(0.0982)	(0.0981)	(0.145)	(0.146)
No. neighbors in same admin. municipal union	0.910**	0.917*	0.937	0.950
	(0.0429)	(0.0425)	(0.0434)	(0.0429)
No. neighbors in same county	1.012	1.007	1.003	0.997
	(0.0280)	(0.0284)	(0.0287)	(0.0292)
Tax capacity	0.799*	0.789*	0.989	0.967
	(0.0982)	(0.0981)	(0.145)	(0.146)
Tax capacity (spatial lag)	0.883	0.891	1.047	1.057
	(0.0818)	(0.0812)	(0.109)	(0.105)
Observations	84,293	84,293	84,291	84,293

All models include state and year dummies. Robust se eform in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculations.

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

In model 3 and 4, we use yet another set of measures to test our main hypothesis. In model 3, we introduce the ratio of business tax multiplier and land tax multiplier for municipality m and its neighbors. In model 4, we calculate the corresponding ratio for the median value in the cluster of municipality m and its neighbors. The higher these ratios, the lower is the intensity of intra-regional tax competition. As predicted in our main hypothesis, they have a significantly negative impact on the probability of municipality m cooperating in the development of business land. Compared to model 1, the population size of municipality m and the number of neighbors belonging to the same administrative municipal union becomes insignificant. All other variables perform like they do in model 1.

In section 4, we learned that not all municipalities developed additional land during the period of observation. The fact that some municipalities did not devote additional land to business purposes may have two reasons: First, there may have been no demand for additional business land. Second, there may have been demand yet the development of business land was

not possible because a stand-alone business park was unfeasible or too expensive or the municipalities were unable to find suitable partners. Thus, it is not clear ex ante whether the municipalities that did not develop additional land between 2000 and 2015 should be part of the population that we apply our regression model to. To test the robustness of our results, we rerun the models in table 4 with a reduced starting population consisting only of those municipalities that actually develop additional business land in the period 2000-2015 (see Table B.1, appendix B). Expect for a minor difference in the performance of the spatial lag of the business tax multiplier in model 1, the performance of the main variables of interest is equivalent to the one in table 4. Again, they strongly support our main hypothesis. The performance of all other exogenous variables is qualitatively unchanged.

The size of the odds ratios for significant variables informs us about the magnitude of their impact on municipality m's probability to form a joint business park. It is important to note that the overall probability of establishing a joint business park in our sample is low. Among the 6,061 municipalities in our baseline sample, 277 eventually establish a joint business park. This amounts to 4.6 percent. Odds ratios inform us about the degree to which this average probability is scaled up or down. The odds ratio of 2.06 for urban clusters informs us that municipalities in urban clusters have a probability of forming a joint business park that is by 106 percent higher than those of municipalities outside the clusters – other things equal. The value of 1.90 for the dummy variable indicating land scarcity means that municipalities with less available land for business development than the median municipality are by 90 percent more likely to cooperate than municipalities with a share of available land above the median. A very strong effect emerges for the election year and state policies supporting IMC: In election years, the probability to sign an agreement on a joint business park drops by almost 50 percent while the state policies increase the probability by 110 percent. Having access to the motorway reduces this probability by about 25 percent. Let us now turn to the main variables

of interest: The impact of a change of one standard deviation in the median tax multiplier on business profits in the cluster of m and its neighbors amounts to more than 30 percent. For the land tax multiplier, the change by one standard deviation in the tax multiplier is equivalent to an increase in the probability of cooperation by 38 percent. In sum, the effects are sizeable.

We run a large number of additional models to test the robustness of the results. Among other things, we include other fiscal indicators and additional control variables (e.g. population dynamics or topographic characteristics). This does not change the performance of the main variables of interest (results are available upon request).

4.7 Discussion

We use a hazard model to analyze the factors that drive the establishment of joint business parks in West Germany between 2000 and 2015. In line with the previous literature, we find cooperation to be more frequent among small municipalities. Our results also indicate that joint business parks are used as a means by which municipalities cope with land scarcity. Interestingly, agreements for local business parks are less likely in election years.

The main focus of this paper rests on the role of intra-regional competition in fostering the establishment of joint business parks: We hypothesized that joint business parks are more likely to emerge the more intense intra-regional competition is. In cases of intense competition, joint business parks serve as a platform to coordinate tax policies and thereby reduce the intensity of competition. Joint business parks are a highly suitable means for this purpose because they set high incentives or even force municipalities to agree on the business tax multiplier as well as the quality of infrastructure provided and the timing of providing the additional land for business purposes. Our results strongly support this hypothesis: inter-local business parks are more likely when municipalities (and their neighbors) apply low tax multipliers on business profits and high tax multipliers on land.

At first sight, our results seem at odds with parts of the ICA-framework. While we find support for the homophily-argument in all our models, the number of municipalities with the same strongest party in the municipal council is negatively correlated with the formation of joint business parks. In two specifications, the same holds for the number of neighbors in the same administrative municipal union – one of our measures for embeddedness. However, the contradiction is less severe once we acknowledge that these variables point at the existence of other platforms that can be used to coordinate activities and thereby reduce the bite of intra-regional competition. These platforms may serve as a substitute for joint business parks. If interpreted this way, our results no longer contradict the ICA-approach.

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

Second, we measure the intensity of intra-regional competition for mobile capital solely based on data on tax multipliers. Other dimensions of competition between municipalities (e.g., Overton, 2017) are ignored. Consequently, we do not fully capture the phenomenon. On the other hand, the taxation-based measures we use are widely accepted to be one of the most important parameters of inter-local competition. Thus, we confidently claim that low business tax multipliers – together with high tax multipliers on land and real estate – provide a strong indication that there is intense competition for mobile capital. What is more, we are convinced that tax multipliers provide the only reliable measure for intra-regional competition that is available on a larger scale.

4.8 Conclusion

We provide an empirical study on the role of inter-local competition in fostering inter-municipal cooperation. To the best of our knowledge, it is the first study on this issue. Neither has there been a large-scale empirical analysis on the emergence of inter-local business parks, nor has the specific role of inter-local competition been emphasized before. Based on the literature on collusive behavior and international tax coordination, we argue that inter-local business parks can be seen as a cartel of municipalities aimed at coordinating policies – among them business

tax multipliers. Thus, we hypothesized that inter-local business parks are more likely to emerge among municipalities suffering from intense competition.

We test this hypothesis applying a hazard model to a large panel of more than 6500 West-German municipalities spanning over a time period of more than 15 years (2000 – 2015). The intensity of inter-local competition is measured using the local tax multipliers set by a municipality and its direct neighbors. Intense competition implies low business and high land tax multipliers – other things equal. Our results strongly support our main hypothesis. Joint business parks are more frequent in clusters of municipalities that apply low business tax multipliers and high tax multipliers on land. This result is stable and the effect size is economically meaningful. Thus, inter-local competition is identified to be one important driver of joint business park formation.

The question that immediately follows from our paper is the following: Do joint business parks reduce intra-regional tax competition? Except for the paper by Breuillé et al. (2018), the economics literature has not addressed this question so far. If we compare the recent multipliers set by West-German municipalities in 2015, we find that the average business tax multiplier and the average land tax multiplier is higher in those with a joint business park. The ratios of business to land tax multipliers used as explanatory variables above are on average slightly below 1.0 for these municipalities, while they are above 1.02 for those municipalities that do not form a joint business park. At first sight, this seems to support the notion that joint business parks reduce intra-regional competition. However, this comparison is by no means compelling. Neither are the differences statistically significant, nor does this naïve and univariate comparison control for co-variates etc. Clearly, a thorough analysis of this question goes far beyond the scope of this paper and must be left to further research.

5 The effect of inter-municipal cooperation on economic development in West-German municipalities

Eva Wolfschütz

Abstract

Does inter-municipal cooperation (IMC) enhance municipal economic performance? This study employs marginal structural models to address selection into treatment and time-dependent confounding to estimate the effectiveness of IMC in the field of local business development. I use data on municipalities in four West-German states, Lower Saxony, Hesse, Rhineland Palatinate, and Bavaria during the years 2008-2015. I find that, over time, IMC has a positive effect on local economic performance and local business development resources are spent more productively in clusters with cooperating municipalities.

Key words: Inter-municipal cooperation, economic development, marginal structural models, Germany

JEL: H77, O10, O22, D78

5.1 Introduction

Given the widening urban-rural gap in many European countries, municipalities are eager to attract businesses and people, and to provide public services efficiently. Inter-municipal cooperation (IMC) in local business development presents an instrument to share local capabilities and risks that come with development investments (e.g., Chen et al., 2016). Motivation for engaging in cooperation in general stems from the expectation of economies of scale or scope, a benefit that would also be attainable by merging jurisdictions. The somewhat loser and more flexible alternative of IMC is expected to be less taxing on the electorate and, therefore, an attractive alternative instrument to improve public service delivery (cf. Blesse and Rösel, 2017). Moreover, joint provision of public goods and services via IMC can be tailored to fit specific strengths and weaknesses of the participating municipalities.

While a framework for institutional collective action (ICA) has been developed (cf. Feiock, 2007) and factors determining the formation of cooperative agreements have been studied extensively (e.g., Morgan et al., 1988; Bel et al., 2013b; Bergholz, 2018)[16], the analysis of the impact of such agreements remains a challenge. On the one hand, IMC has been proven to grant size benefits through the joint delivery of some mandatory public services (e.g., Bel and Costas, 2006; Dijkgraaf and Gradus, 2013; Niaounakis and Blank, 2017). On the other hand, IMC has been related to extensive transaction costs that inhibit cost advantages generated by IMC (e.g, Sørensen, 2007; Blåka, 2017).

The existing literature suffers from two shortcomings: 1) Only a narrow range of public services has been analysed. 2) The methodological approaches do not adequately address the

[16] For a comprehensive overview see Bel and Warner (2016).

problem of selection into treatment, and time-varying confounding. Few studies employ quasi-experimental designs to make causal inferences about IMC (e.g., Ferraresi et al., 2018).

This study applies a new method for causal inference and focusses on cooperation in a voluntary public service: local business development.

Many German states support IMC and over the course of the last decade, German municipalities have increasingly engaged in cooperation. This is why I analyse municipalities in four West-German states, Lower Saxony, Hesse, Rhineland Palatinate, and Bavaria. Using two-way fixed-effect (FE) models in addition to marginal structural models (MSMs), I find that cooperating municipalities are more successful in their local business development efforts and that, over time, cooperations are more effective.

The paper is structured as follows: In section 2, I will review the relevant literature concerning inter-municipal cooperation. In section 3, I will present the hypotheses regarding IMC-effects, before introducing the institutional background of German municipalities and the data in section 4. Section 5 presents the empirical analysis, and section 6 the results, which are discussed in section 7. Concluding remarks follow in section 8.

5.2 Related Literature

The joint provision of public goods and services relates to a central problem discussed in the literature on fiscal federalism: The optimal size of jurisdictions. While large jurisdictions can benefit from economies of scale and internalize external effects, the distance between governments and their constituents is also increased (cf. Oates, 1972). Via IMC, local governments agree to provide certain services jointly while other services are left to the single municipalities' discretion. Thus, size benefits can be attained without centralizing local authority. Compared to blanket amalgamations, this approach suggests a more precise focus on

areas with room for improvement or urgency for relief. The question of the optimal size is reformulated: Who should cooperate to provide which service?

Empirical findings on the effectiveness of IMC are mixed. Numerous studies find a negative correlation between the cost of provision and IMC. Bel and Costas (2006) look at municipal costs for waste collection in Spanish municipalities and find that costs are decreased in cooperating municipalities with a population smaller than 20,000. Bel et al. (2013a) explicitly study small (on average 5,000 inhabitants) Spanish municipalities and test whether cooperation in solid waste services can reduce municipal costs. They find that cooperating municipalities have lower costs in solid waste services. Niaounakis and Blank (2017) investigate whether IMC enhances efficiency in Dutch tax departments. They find that municipalities can increase cost efficiency through economies of scale. Expanding on IMC in the Netherlands, Allers and Greef (2017) confirm that cooperation in the field of tax collection is associated with lower costs; however, they do not find cost savings in cooperations in the fields of welfare provision, sheltered work, and waste collection, leaving municipal spending overall unchanged by IMC.

On the other hand, there are studies that find a positive correlation between costs and IMC. Blaeschke and Haug (2017) focus on German municipalities cooperating in the wastewater sector. They find lower technical efficiency when it comes to cooperating municipalities compared to non-cooperating ones, attributing this finding to agency and coordination costs. Sørensen (2007) looks at user fees and costs in the provision of waste collection in Norwegian municipalities. His findings show higher fees and costs in municipalities that share ownership of waste collection companies. He argues that the dispersion in ownership leads to agency costs and subsequently to losses in efficiency. In another study on Norwegian municipalities, Holum and Jakobsen (2016) examine citizens' satisfaction under IMC. They consider cooperation in fire services and waste services. While they find a positive effect of IMC on citizens' satisfaction when it comes to waste services, they

find a negative effect in the field of fire services. They argue the effect of IMC depended on the characteristics of the services provided cooperatively. Waste collection services was a field in which transaction costs are low and therefore, cost advantages through IMC are expected. Holum and Jakobsen (2016) further point out that citizens would frequently come into contact with waste collection services and could, to a certain extent, gage increases in quality. Whereas fire services suffered a loss of accountability under IMC because of the increased distance to the citizens.

A meta-study by Bel and Sebő (2019) on 18 IMC-effects studies confirms the frequent finding that small municipalities can benefit from cost advantages through IMC. They also find that studies with more recent databases and/or panel data point to greater reductions in costs, concluding that over time municipalities learn to cooperate more effectively. They further test for the impact of service related transaction costs and do not find a significant effect of the ease of measurement or asset specificity on the efficacy of IMC.

When it comes to the methodological approach, a majority of studies estimate cost functions in order to investigate the effect of IMC on municipal costs (e.g. Bel and Costas, 2006; Zafra-Gómez et al., 2013; Dijkgraaf and Gradus, 2013) but only a few employ quasi-experimental designs (e.g. Ferraresi et al., 2018).

There are two important empirical aspects concerning the analysis of IMC. First, the decision to cooperate is endogenous. Only a few studies account for the fact that municipalities select into cooperation. Frère et al. (2014) as well as Baba and Asami (2019) utilize instrumental-variable approaches to model municipal spending under IMC in France and Japan, respectively. While Frère et al. (2014) look at spatial effects of cooperation and find no significant effect of IMC on municipal spending, Baba and Asami (2019) study cooperation in health and fire services and find reduced spending in cooperating municipalities for both fields. Ferraresi et al. (2018) use a difference-in-difference estimator in combination with propensity

score matching to analyse the effect of IMC on expenditures in Italian municipalities and find a negative effect of cooperation on expenditures.

While an instrumental-variable approach, as well as propensity score matching, can control for selection into treatment, they cannot account for the second important empirical aspect of IMC-analysis: time-varying confounding. The decision to cooperate and resulting outcomes are dependent on time-varying factors that themselves are influenced by previous decisions on cooperation (see Figure 5.1). Time-varying confounding challenges the estimation of effects and effect sizes and, so far, has not been addressed in the IMC literature.

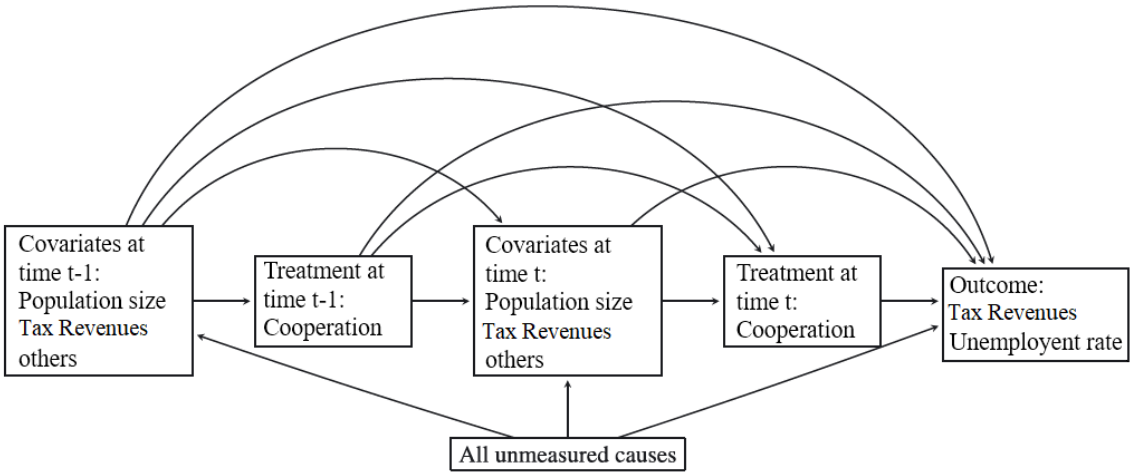

Figure 5.1: Time-varying treatment and covariates. Adapted from Bacak and Kennedy (2015)
Source: Author's illustration, based on Bacak and Kennedy (2015:117)

This study focusses on two shortcomings of the existing literature. The first concerns the method. Methodological approaches prevalent in IMC-research do not account for a selection into treatment bias, or for time-varying confounding. Other disciplines that rely on observational data make use of marginal structural models (MSMs) to deal with time-varying confounding. The seminal paper by Robins et al. (2000) introduces MSMs in the field of epidemiology. In sociology, Sharkey and Elwert (2011) as well as Wodtke et al. (2011) utilize MSMs to look at how neighborhood characteristics affect cognitive ability and high school

performance in children, respectively. Furthermore, Sampson et al. (2006) investigate the effect of marriage on crime, while Bacak and Kennedy (2015) look at the effect of incarceration on the probability to get married. In the political sciences, Blackwell (2013) studies the effect of negative campaigning on democratic vote share in the US using MSMs.

The second research gap pertains to the jointly provided service. Analyses concentrate on mandatory tasks such as waste services, fire services, tax collection, and health services (e.g. Holum and Jakobsen, 2016; Niaounakis and Blank, 2017; Baba and Asami, 2019). However, IMC is not limited to these services. The case of German municipalities shows cooperation in voluntary tasks like providing cultural and recreational facilities, tourism marketing, as well as local business development (cf. Schmidt, 2005). While cooperation in mandatory tasks, like waste services, is often induced by cost pressure, cooperation in voluntary tasks stands apart: If service delivery in these tasks is too expensive, the municipality can choose not to deliver at all. Engaging in cooperation in voluntary tasks signals ambition to make the municipality more attractive for inhabitants, tourists, and especially businesses. Local business development is foremost a regional matter, since it produces extensive external effects. This is why research on local business development focusses on the regional level. Chen et al. (2016) study the formation as well as the impact of regional economic development partnerships in urban areas. They find that in areas where government is more fragmented partnerships have a positive effect on personal income, employment, and the number of firms. Their study comes closest to this paper, as they model the emergence of cooperation before estimating outcome models for regional economic outcomes.

This paper addresses the shortcomings in the existing IMC literature by focussing on cooperation in the field of local business development and applying MSMs to control for selection into treatment as well as time-varying confounding.

5.3 Hypotheses

I am investigating direct as well as indirect effects of IMC on local economic performance. First, local business development projects produce external effects, which dissuades municipalities to engage in those projects in the first place. Through joint projects, they can internalize benefits from services that would otherwise spill over to neighboring municipalities. Thus, cooperating municipalities may have a higher economic performance than non-cooperating municipalities because they are more likely to engage in local business development (cf. Park and Feiock, 2006; Chen et al., 2016).

H_1: *Engaging in IMC has a positive effect on local economic performance for cooperating municipalities.*

Second, IMC can increase the productivity of local business development efforts. A municipality, that spends resources on local business development cooperatively, may profit from broadened capacities in infrastructure and expertise (cf. Chen et al., 2016). Thus, cooperation can increase the productivity of each Euro spent on local business development.

H_2: *Engaging in IMC increases the productivity of local business development expenditures.*

Third, the effect of IMC may change over the course of the cooperation. Coordination between the cooperation partners may be more difficult in the beginning and they may learn how to cooperate more effectively over the duration of IMC (cf. Bel and Sebő, 2019).

H_3: *Engaging in long-term IMC has a positive effect on local economic performance for cooperating municipalities.*

Lastly, local business development produces substantial spillovers. Thus, the effect of IMC in local business development is not limited to one municipality either. Attracting and promoting businesses influences neighboring municipalities even if they are not part of a cooperation. IMC, therefore, has an effect on neighborhood economic performance (cf. Frère et al., 2014; Chen et al., 2016).

H_4: *Neighbors of municipalities that engage in IMC have higher local economic activity than neighbors of municipalities that do not engage in IMC.*

5.4 Institutional Background and Data

I use data on German municipalities in order to test hypotheses H_1-H_4. The German setting is suitable because IMC is common practice. German municipalities act self-governing and decisions about local business development projects, business and land tax rates, are at their discretion. Furthermore, data is available not only on a number of municipal characteristics but on their cooperation activity as well.

5.4.1 Municipalities and Cooperation in Germany

Municipalities constitute the smallest jurisdictional unit in Germany and have the right of self-government. In 2017, municipal expenditures accounted for roughly 25 percent of all government spending (Statistisches Bundesamt, 2018). Higher tier governments delegate tasks to the municipal level, such as running elections and registry offices. Beyond that, municipalities provide local amenities, social security, elementary schools, as well as cultural and recreational services and have extensive discretion when it comes to fulfilling these tasks.

A mayor is head of the municipal council, which local citizens elect every five or six years, depending on the state. The council allocates the municipal budget and sets the tax rates for the business and property tax, which are the most important endogenous municipal

revenues. Municipalities also receive a share from federal income tax and value added tax revenues as well as grants through a fiscal equalization system.

Following the principle of subsidiarity German municipalities, are performing three types of tasks: Delegated tasks from higher levels of government, mandatory self-government tasks, and voluntary self-government tasks (Scherf, 2011: 502-503). The latter kind of tasks are at the discretion of the municipality, whereas the former two types are not. Municipalities can decide if and how they want to approach voluntary self-government tasks which comprise 1) providing cultural goods, like museums, theatres, and musical schools, 2) providing recreational facilities, like public pools, parks, and sport facilities, 3) engaging in spatial or land-use planning, 4) promoting economic development and tourism.

Municipalities can cooperate in different forms subject to public law and there are three prevalent forms with varying degrees of intensity. They can form working groups with other local actors (private and public), they can sign agreements with such actors, and they can form special purpose associations, called Zweckverbände (cf. Schmidt, 2005; Oebbecke, 2007). The latter has the capacity to be subject of legal rights and duties, and serves as a rather binding form of cooperation[17]. In this study, my focus lies on this strong form of IMC, which presents an opportunity for thorough analysis because of complete public information on special purpose associations and their members. Especially the joint provision of local business development takes place via special purpose associations. Given the risk of division costs and defection costs, credible commitment via a binding form of cooperation is important in local business development projects (cf. Carr and Hawkins, 2013; Hawkins, 2017).

17 Special purpose associations are also the oldest form of institutionalized cooperation in Germany (apart from the league of towns, already present in the Middle Ages), dating back to the first half of the 19th century (cf. Oebbecke, 2007).

Special purpose associations can serve a single purpose, e.g. waste collection; however, associations can also be committed to provide multiple services, and a municipality can be part in more than one association (cf. Schmidt, 2005). The municipal council can make the decision to become a member in a special purpose association or to terminate membership.

A majority of special purpose cooperations is concerned with the provision of local amenities, specifically waste management, which is costly for small municipalities to deliver on their own. Other associations manage graveyards, hospitals or fire and rescue services. This study focusses on local business development, which comprises the development of local business parks, promotion of local businesses and tourism spots.

5.4.2 Data

Data on special purpose associations was gathered from the statistical offices of Lower Saxony, Hesse, Rhineland Palatinate and Bavaria. It comprises all special purpose associations existing during the years 2005 to 2016 and their respective associated municipalities. The data contains additional information on the field or the purpose of the association, whether it was formed, e.g., to jointly run a public pool or to manage wastewater collection. In order to explain the decision to cooperate and the subsequent effect of cooperation I lag variables up to three years. The earliest available data on special purpose associations dates back to 2005, the first year of the observation period is 2008.

Of the overall 5726 municipalities of Lower Saxony, Hesse, Rhineland Palatinate and Bavaria, a majority of 3945 municipalities did join special purpose associations before 2008. Many of those cooperations are concerned with local amenities and waste/water disposal, and some of

them have existed for decades[18]. With respect to local business development, 220 municipalities started cooperations after 2007, forming 35 special purpose associations (see Figure 5.2).

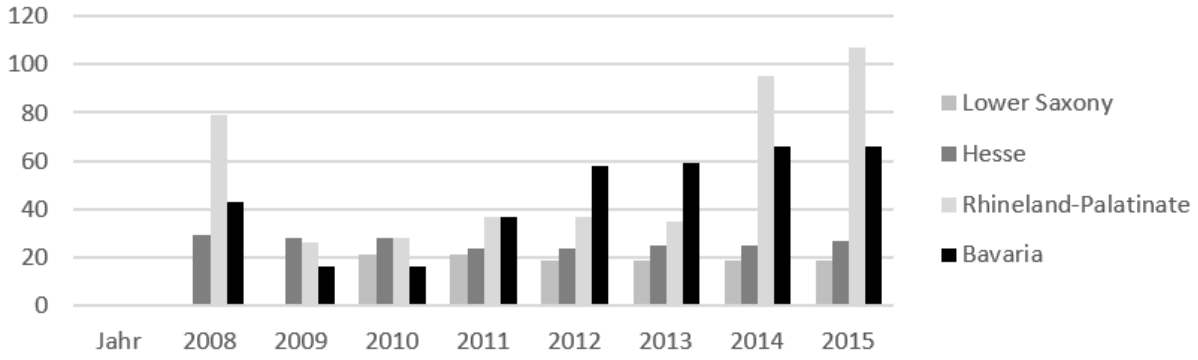

Figure 5.2: Municipalities cooperating in local business development
Source: Author's illustration.

These associations are concerned with promoting local businesses, tourism projects and business parks. In favor of brevity, I will refer to cooperation in the field of local business development plainly as cooperation, from here on.

I draw on the Regional Data Base Germany for data on demographic and economic characteristics, such as population size, area, and municipal revenues. Information on whether a state is in general supporting IMC projects financially and in which capacity was gathered from the respective states' ministries.[19] The final sample includes all municipalities in the four states that never cooperated during the years 2008-2015, the control group, and municipalities that started cooperation during 2008-2015, the treatment group. I exclude municipalities that cooperated before the observation period (see Figure 5.3). In the baseline year 2007, municipalities in the treatment group are smaller in population size and are shrinking at a higher

[18] In Bavaria, a law instituted in the 1970s established regional planning associations that are in principle considered as special purpose associations. Every municipality in Bavaria belongs to such a planning association.

[19] For more detailed information on IMC-support policies see Table C.1 in appendix C

rate than the municipalities in the control group(see Table 5.1). They also have lower tax revenues per capita, which comprise revenues from property tax, value added tax, income tax, and business tax. The unemployment rate is higher in the treatment group and the expenditures on local business development are on average more than twice as high as in the control group.

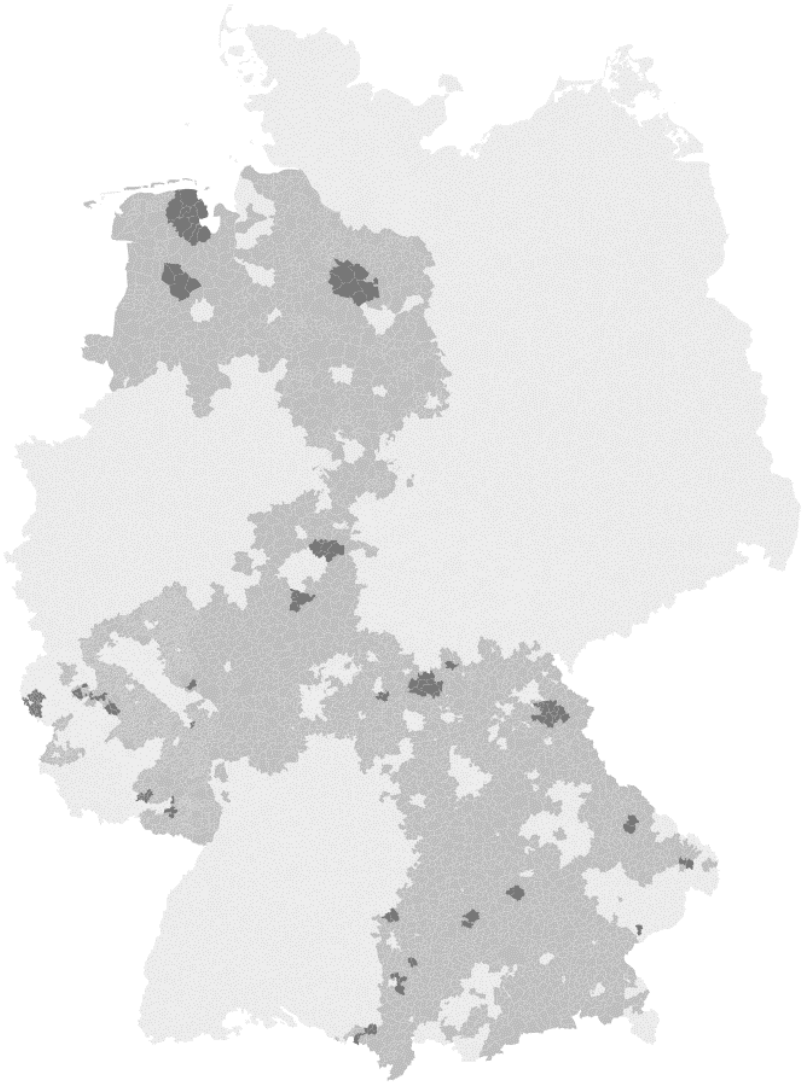

Figure 5.3: Municipalities in treatment (dark) and control (light) group, faded areas not in the sample
Source: Authors' illustration.

Table 5.1: Sample baseline means for cooperating and non-cooperating municipalities

	Non-cooperating				Cooperating			
VARIABLES	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Unemployment rate	4.11	1.79	0.79	18.18	5.72	5.48	1.03	50
Own tax revenue	678.66	483.21	-442.53	16342.23	588.66	348.89	54.56	2380.94
Population size	5583	25399.03	29	1311573	4842.46	9616.31	9	82192
Population growth	-0.25	1.65	-11.3	16.76	-1.04	4.49	-42.86	10.39
LBD exp..	0.65	3.57	0	65.43	1.77	4.6	0	24.36
IMC-support	0.28	0.45	0	1	0.2	0.4	0	1
Freeway access	0.11	0.31	0	1	0.14	0.35	0	1
City with county rights	0.01	0.09	0	1	0.02	0.14	0	1
Metro area	0.46	0.5	0	1	0.13	0.33	0	1
Area	28.09	30.8	0.39	357.5	35.31	47.62	1.39	247.15
Num. neighbors	6.03	2.05	0	29	6.08	2.02	2	12
Number of municipalities	4397				160			

Source: Author's calculations.

5.5 Empirical Strategy

The challenge in analysing the effect of IMC on local economic performance is twofold: 1) IMC is by definition a voluntary measure any municipality can choose to engage in. It is, as a treatment, not exogenous. 2) The factors confounding treatment and outcome are time-varying. I employ a two-way fixed-effects model, as well as a marginal structural model to address unobserved heterogeneity and endogeneity.

5.5.1 The FE-model

Although information on municipal characteristics is plentiful, I cannot claim to control for every source of heterogeneity. Therefore, I utilize FE-models to control for time-invariant unobserved heterogeneity. The FE-model for local economic performance (LEP) of municipality m in time t is

$$LEP_{mt} = \beta_0 + \beta_1 IMC_{mt-1} + \beta_2 X_{mt-1} + \alpha_m + \delta_t + \varepsilon_{mt} \quad (1)$$

LEP is measured by two outcome variables: m´s unemployment rate, and m´s own tax revenues per capita. If cooperation is successful, this success should manifest in higher property value, a higher tax base, thus, higher tax revenues, and a higher demand for labor. To test hypothesis H_1, I introduce the treatment dummy, IMC, indicating whether municipality m cooperated in t-1. X_{mt-1} is a vector of control variables, lagged by one year to circumvent simultaneity. X_{mt-1} comprises population size and population growth, to account for potential economies of scale, as is standard in the IMC literature (e.g., Bel and Mur, 2009; Holum and Jakobsen, 2016; Ferraresi et al., 2018). To capture m's state of business development, X_{mt-1} also includes m's local business development expenditures (LBD exp.), the sum of m's neighbors' local business development expenditures (LBD neighbors), and the share of small and large firms on county level. I also control for existing freeway access points within m's borders, an indicator for accessibility (cf. Bischoff et al., forthc.), and the number of existing cooperations of m as control for pre-existing local networks (cf. Hawkins et al., 2016). Furthermore, I control for state-level support for IMC (for variables' description see Table 5.2). α_m is the individual time-invariant unobserved effect, δ_t is a vector of period dummies controlling for exogenous shocks shared by all municipalities in period t, and ε_{mt} is the error term.

Table 5.2: Variables and their description

Variable	Measure
Time invariant variables	
City with county rights	Dummy=1 if the municipality is a city with county rights
Metro area	Dummy=1 if the municipality is located in a metropolitan area
Area	Municipal area in square kilometers
Num. neighbors	Total number of neighbors
Border county	Dummy=1 if the municipality is located at a county border
Border state	Dummy=1 if the municipality is located at a state border
State dummies	Dummy=1 if municipality m is located in state LS,HE,RP,or BA
Time varying variables	
Population size	Natural log of the total number of citizens
Population growth	One year growth rate of the municipal population
Unemployment rate	Reported unemployed/population between 15 and 65 y/o
Own tax revenue	Business, property, income, and value added tax revenues per capita
LBD exp.	Municipal expenditures on local business development per capita
LBD neighbors	Sum of expenditures on local business development per capita spent by m's direct neighbors
IMC support	Dummy=1 in year and state where the state government supports IMC projects
Other cooperations	Number of other unions municipality m is part of in year t
Election year	Dummy=1 in year of municipal council election
Freeway access	Dummy=1 if municipality m is located near a freeway access
Share small firms	Share of firms with less than 10 employees (on county level)
Share large firms	Share of firms with more than 250 employees (on county level)
IMC	Dummy=1 if municipality m engages in IMC in year t
LBD. exp. IMC	Expenditures on local business development per capita spent by m and m's neighboring cooperation partners

Source: Author's compilation.

The second hypothesis, H_2, refers to the mediating effect of IMC on the productivity of LBD efforts. To test for this effect, I include the sum of LBD expenditures, spent by m and m's neighboring cooperation partners (LBD. exp. IMC) in a specification of the baseline model (1). If m is not engaging in IMC it means that LBD exp. IMC is zero, as no LBD expenditures made by m are affected by an extension of capacities or infrastructure as result of IMC.

In order to investigate the effect of IMC duration on LEP, stated in hypothesis H_3, I estimate model (1) using a series of duration dummies, indicating the years a cooperation lasted.

The fourth hypothesis, H_4, suggests possible spillovers generated by IMC. To analyze the effect of IMC on neighboring municipalities, I run the baseline model (1) and the specifications

for H_2 and H_3, with the neighborhood median values of the dependent variable as outcome measure.

The model described in (1) may produce biased results. As studies on time-varying treatment and covariates highlight (e.g., Robins et al., 2000; Blackwell, 2013; Imai and Ratkovic, 2015), controlling for time-varying covariates when modelling outcome can induce post-treatment bias, also termed the "bad control problem" (cf. Angrist and Pischke, 2009). In the case of IMC, the treatment (cooperation) and the outcome (economic performance) may both be dependent on time-varying factors, such as population size. For example, smaller municipalities have higher incentives to cooperate because they can benefit from economies of scale (Bel and Costas, 2006; Bel et al., 2013a; Bel and Sebő, 2019). If a municipality successfully cooperates it may attract more inhabitants, thus, the population may increase after cooperation. At the same time, economic activity depends on both cooperation activity as well as population size in past periods (see Figure 1). The FE-model cannot capture such a dynamic process and excluding time-varying confounders will induce omitted variable bias (see e.g. Angrist and Pischke, 2009). Therefore, I introduce a method, new to the field of IMC, for dynamic causal inference: MSMs.

5.5.2 The MSM

In their seminal paper on MSMs, Robins et al. (2000) suggest a two-step process: First, they model treatment assignment for each point in time as a function of covariate and treatment history. The predicted propensity scores are used to construct inverse probability of treatment weights (IPTW). Weighting the sample via IPTW creates a pseudo-population in which treatment is no longer confounded (Robins et al., 2000). Thus, observational data is reweighted to resemble a randomized treatment assignment. In the second step, a weighted linear outcome model is estimated. Inferences via MSMs are, therefore, inferences about potential outcomes rather than about a subset of observed outcomes. This argument follows the lines of the

Heckman selection models. Blackwell (2013) points out, however, that MSMs are not restricted to use instrumental variables in the first stage as selection is on observable rather than unobservable factors.

The limitation of this approach lies in the assumption of sequential ignorability (Robins, 2000). It means that treatment is assumed to be random given that we controlled for *all* common causes of treatment and outcome. In other words, we assume no unobserved heterogeneity.

5.5.2.1 Constructing IPTW: Determinants of Cooperation

I will build on previous findings on determining factors for IMC to model treatment assignment. Since the IPTWs depend on the specification of the treatment model, it is crucial to build this model on a firm basis. Bel and Warner (2016) give a thorough overview of the existing literature on IMC-emergence and point out that emergence factors pertain to the categories of fiscal constraints, economies of scale, organizational form, service level transaction costs, community wealth, spatial effects, racial homogeneity, and politics. As Blaeschke (2014) shows, it is important to reflect on these categories in light of the set-up of cooperation. He argues that a municipality alone cannot enforce IMC without having suitable cooperation partners. As municipalities are most likely to cooperate with direct neighbors, the direct neighborhood forms the pool of potential cooperation partners (see also Bischoff et al., forthc.; Bischoff and Wolfschütz, 2019). Therefore, in modelling IMC-emergence, one has to refer to measures of fiscal constraints, economies of scale, etc., on both, the side of the observed municipality m, and m's potential cooperation partners, m's neighbors. This is why I include spatial lags in the following model to estimate the decision to cooperate, i.e. the treatment assignment via pooled logistic regression.

$$IMC_{mt} = \beta_0 + \beta_1 \overline{IMC}_{mt-1} + \beta_2 \overline{X}_{mt-1} + \beta_3 X_0 + \delta_t + \varepsilon_{mt} \quad (2)$$

IMC_{mt} is a dummy variable taking the value of one if municipality m is cooperating in year t, and zero otherwise. $\overline{IMC}_{mt-1}$ represents m's treatment history for the last three years. $\overline{X}_{mt-1}$ is a vector of the three year variable histories of all control variables included in the FE-model from (1) and their spatial lags (m's neighborhood median without m). Additionally, three year histories of the outcome measures, own tax revenues and unemployment rate, are included here. X_0 includes baseline values of the time-varying variables included in $\overline{X}_{mt-1}$ in addition to time-invariant variables. The latter include dummy variables indicating whether m is a city with county rights, whether m is located in a metropolitan area[20], the number of m's direct neighbors and m's area. δ_t is a vector of period dummies and ε_{mt} is the error term.

[20] Cities with more than 100,000 inhabitants are regarded as metropolitan city centres and their direct neighbors with a daytime population density bigger than 500 and/ or more than 50 percent of commuters commuting to a city centre are regarded as suburban areas. A municipality is categorized as non-metropolitan if less than 25 percent of its outbound commuters commute to a city bigger than 100,000 or such a city's suburban areas. Guidelines following the Federal Institute for Research on Building, Urban Affairs and Spatial Development, https://www.bbsr.bund.de/

Table 5.3: Pooled logistic regression predicting cooperation, odds ratios

	OR	SE		OR	SE
Time invariant and time-varying variables at baseline			*Time varying variables continued*		
City with county rights	4.885**	(3.360)	LBD exp.		
Metro area	0.180***	(0.0505)	At t-1	0.999	(0.00237)
Area	1.013***	(0.00302)	At t-2	1.001	(0.00131)
Num. neighbors	0.934	(0.0454)	At t-3	1.002***	(0.000772)
Other cooperations	1.032	(0.0232)	Population size (SL)		
IMC support	1.626e+07***	(1.986e+07)	At t-1	3.113**	(1.750)
Freeway access	2.425***	(0.674)	At t-2	0.799	(0.454)
Population size	14.19	(48.69)	At t-3	0.225*	(0.203)
Population size (sl)	2.375	(1.427)	Population growth (SL)		
Population growth	0.969	(0.0393)	At t-1	1.050	(0.0765)
Population growth (sl)	0.950	(0.0873)	At t-2	0.855**	(0.0659)
Unemployment rate	1.062	(0.0784)	At t-3	1.371***	(0.105)
Unemployment rate (sl)	1.322***	(0.103)	Unemployment rate (SL)		
Own tax revenue	1.607	(0.641)	At t-1	0.680**	(0.117)
Own tax revenue (sl)	4.045*	(2.992)	At t-2	1.051	(0.174)
LBD exp.	1.057***	(0.0123)	At t-3	0.695**	(0.104)
LBD neighbors	1.033***	(0.00546)	Own tax revenue (SL)		
Share small firms	0.839	(0.121)	At t-1	0.595	(0.667)
Share large firms	0.864**	(0.0503)	At t-2	0.152*	(0.171)
			At t-3	0.112**	(0.0971)
Time varying variables			LBD neighbors		
			At t-1	0.996*	(0.00191)
IMC			At t-2	1.002*	(0.00128)
At t-1	5.853e+10***	(3.474e+10)	At t-3	0.999	(0.00128)
At t-2	4.28e-07***	(4.41e-07)	IMC support		
At t-3	1.931	(2.419)	At t-1	7.010***	(2.669)
Population size			At t-2	0.125***	(0.0580)
At t-1	0	(0)	At t-3	4.204***	(2.078)
At t-2	3.199e+143	(6.884e+145)	Share small firms		
At t-3	0***	(0)	At t-1	0.507***	(0.115)
Population growth			At t-2	1.831**	(0.458)
At t-1	19.32	(41.31)	At t-3	1.557	(0.436)
At t-2	0.711***	(0.0829)	Share large firms		
At t-3	1.086*	(0.0497)	At t-1	0.661***	(0.0647)
Unemployment rate			At t-2	1.106	(0.0905)
At t-1	0.819	(0.103)	At t-3	1.667***	(0.182)
At t-2	1.298**	(0.162)		0.507***	(0.115)
At t-3	0.933	(0.0817)	Election year	3.608***	(1.144)
Own tax revenue					
At t-1	0.807	(0.303)	Constant	660.0**	(2,129)
At t-2	0.693	(0.303)			
At t-3	0.877	(0.402)	Observations	40,180	

Also included: state and county border dummies, state dummies, and year dummies. Robust seEform, clustered on municipal level, in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Author's calculations.

Results from the pooled logit estimation show that IMC is rather persistent, as IMC in the previous year is a good predictor for IMC in year t (see Table 5.3). Cities with county rights are more likely to cooperate, while municipalities with strong commuter flows towards large cities are less likely to engage in IMC. Area and freeway access have a positive effect on the probability to cooperate, as does state support for IMC. The unemployment rate, own tax revenues, as well as the amount of expenditures on LBD by m and m's neighbors have a positive effect on the probability to cooperate. Furthermore, I find municipalities are more likely to cooperate in local election years and the share of large firms (>250 employees) on county level shows a negative effect.

In the next step, I predict the probability to start IMC for municipality m in period t, conditional on previous treatment, outcome and covariate histories, as well as, baseline covariates $\Pr(IMC_{mt} \mid \overline{IMC}_{mt-1}, \overline{X}_{mt-1}, X_0)$[21]. Multiplying the inverse of this propensity score over the observation periods gives us the inverse probability of treatment weights for each observation, SW_m . These weights are stabilized weights, in that the numerator is not equal to one, but equal to the marginal probability of treatment, conditional on treatment history and baseline covariates, which I estimate in a separate numerator model.

$$SW_m = \prod_{t=1}^{T} \frac{\Pr(IMC_{mt} \mid \overline{IMC}_{mt-1}, X_0)}{\Pr(IMC_{mt} \mid \overline{IMC}_{mt-1}, \overline{X}_{mt-1}, X_0)} \qquad (3)$$

[21] The latest studies on IMC-emergence in Germany employ hazard models to explain the switch from non-cooperation to cooperation (Bergholz, 2018; Bischoff et al., forthc.; Bischoff and Wolfschütz, 2019). Since municipalities in my sample also terminate cooperation, IMC in local business development is less permanent than in other fields studied. Therefore, I use a pooled logistic model to explain a municipality's binary choice between cooperation and non-cooperation for each point in time.

5.5.2.2 Estimating the MSM: The Effect of Cooperation

Having determined the treatment assignment, I am estimating a weighted linear MSM of the form

$$LEP_m = \beta_0 + \beta_1 IMC_m + \beta_2 X_0 + \varepsilon_m \quad (4)$$

LEP is dependent on the treatment dummy, IMC, taking the value of one if m cooperated during the observation period, and on baseline variables, X_0. ε_m is the error term. Baseline variables are the same as in the numerator-model of the IPTW so that in the weighted model confounding factors are controlled for by 1) the weighting itself and 2) the baseline variables. Local economic performance is measured at the end of the observation period, in 2015, by m´s unemployment rate and m´s own tax revenues per capita.

As in the FE-model, I use two specifications of the model presented in equation (4). In the first specification, I include the sum of LBD expenditures, spent by m and m's neighboring cooperation partners (LBD. exp. IMC) to test hypothesis H_2. The second specification includes duration dummies, indicating the length of cooperation, to test hypotheses H_3. To test hypothesis H_4 I estimate model (4) and its specifications using neighborhood median values of the unemployment rate and own tax revenues.

5.6 Results

Table 5.4 reports the results of the FE-model and the MSM. The models test for the direct effect of IMC (hypothesis H_1) and the mediating effect of IMC on the productivity of LBD expenditures (hypothesis H_2) on local economic performance.[22] The MSM shows a significant positive effect of LBD expenditures by m and its neighboring cooperation partners on m's tax

[22] Results for all control variables are available upon request.

revenues. The FE-model shows a significant negative effect of IMC, as well as a negative effect of LBD expenditures on the municipal unemployment rate, supporting hypotheses H_1.and H_2.

Table 5.4: The effect of IMC on unemployment rate and own tax revenues, MSM and FE

Model	Variables	Unemployment	Unemployment	Tax Revenue	Tax Revenue
	IMC	-0.0202		0.0222	
		(0.122)		(0.0187)	
	LBD. exp. IMC		-0.000224		0.000272***
MSM			(0.000210)		(9.65e-05)
	Observations	4,448	4,388	4,452	4,384
	R-squared	0.657	0.660	0.694	0.693
	IMC	-0.152**		0.00282	
		(0.0605)		(0.0116)	
	LBD. exp. IMC		-0.000838**		0.000186
FE			(0.000413)		(0.000115)
	Observations	40,487	40,409	40,591	40,505
	R-squared	0.207	0.207	0.210	0.210

Control variables in the FE: Population size, population growth, LBD Exp., LBD neighbors, other cooperations, IMC support, share small firms, share large firms, year dummies.
Control variables in the MSM are the FE-controls, outcome variables, and their respective spatial lags at baseline, as well as, city with county rights, metro area, area, num. neighbors, border county, border state, state dummies.
Robust standard errors in parentheses, clustered on municipal level *** p<0.01, ** p<0.05, * p<0.1. N=4552

Source: Author's calculations.

Figure 5.4 and Figure 5.5 illustrate the results of the FE-model and the MSM with respect to the effect of IMC duration (hypothesis H_3) and spillovers (hypothesis H_4).[23] The FE-model shows an increasing negative effect of IMC duration on m's unemployment rate, while the MSM shows a positive effect on m's tax revenues in cooperations that last six to eight years. Both models show a negative long term effect of IMC on the neighborhood median unemployment rate, as well as a positive long term effect on neighborhood median tax revenues. The MSM further reports a negative effect on neighborhood median unemployment in the first

[23] See Table C.2 in appendix C for estimation results.

year of cooperation, and a positive effect in cooperations that last four to five years. H_3 and H_4 are largely supported by the results.

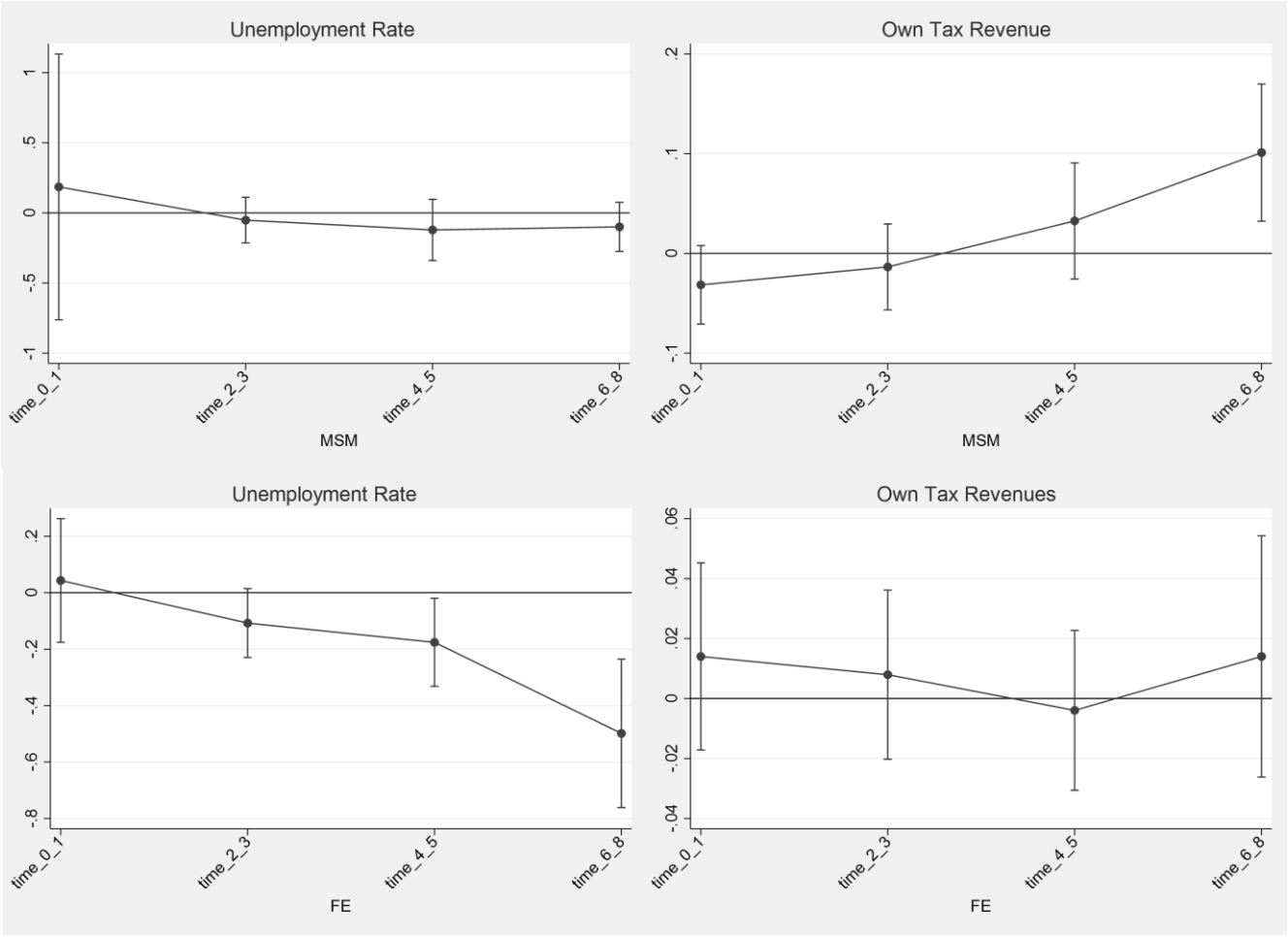

Figure 5.4: The effect of IMC duration on the unemployment rate and own tax revenues, MSM and FE-models
Source: Author's illustration.

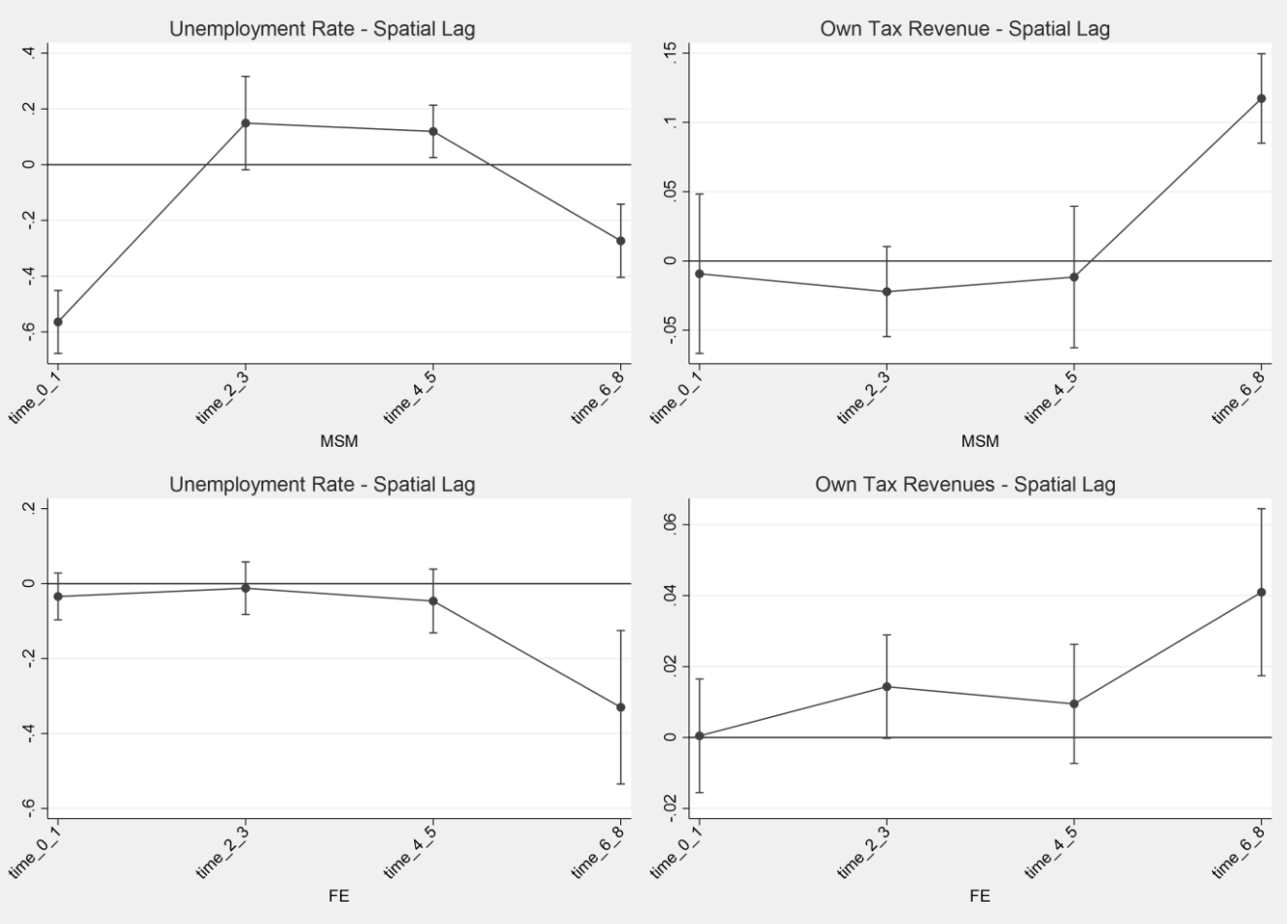

Figure 5.5: The effect of IMC duration on the neighborhood unemployment rate and neighborhood own tax revenues, MSM and FE-models
Source: Author's illustration.

I further test hypothesis H_4 by estimating the direct effect of IMC and the effect of LBD resources spent by m and m's cooperating neighbors on m's neighborhood median unemployment rate and tax revenues. Table 5.5 shows a negative effect of IMC and LBD expenditures spent by m and m's cooperating neighbors on the neighborhood median unemployment rate, found in the MSM. The FE-model shows a positive effect for IMC as well as for LBD expenditures on neighborhood median tax revenues, while the MSM confirms the positive effect on tax revenues for LBD expenditures.

Table 5.5: The effect of IMC on neighborhood unemployment and neighborhood own tax revenues, MSM and FE-models

Model	Variables	Unemployment (neighborhood)	Unemployment (neighborhood)	Tax Revenue (neighborhood)	Tax Revenue (neighborhood)
MSM	IMC	-0.149*		0.0200	
		(0.0815)		(0.0222)	
	LBD. exp. IMC		-0.000776***		0.000301***
			(0.000118)		(2.66e-05)
	Observations	4,445	4,388	4,452	4,384
	R-squared	0.758	0.761	0.831	0.833
FE	IMC	-0.0272		0.0152**	
		(0.0320)		(0.00605)	
	LBD. exp. IMC		-0.000156		0.000197***
			(0.000230)		(5.68e-05)
	Observations	40,454	40,379	40,604	40,518
	R-squared	0.416	0.416	0.505	0.504

Control variables in the FE: Other cooperations, IMC support, share small firms, share large firms, year dummies, as well as neighborhood median values of population size, population growth, and LBD Exp.
Control variables in the MSM are the FE-controls, outcome variables, and their respective spatial lags at baseline, as well as, city with county rights, metro area, area, num. neighbors, border county, border state, state dummies.
Robust standard errors in parentheses, clustered on municipal level *** p<0.01, ** p<0.05, * p<0.1. N=4552

Source: Author's calculations.

As a robustness check, I truncate the IPTWs at the 1st and 99th percentile. Truncating weights is referred to as efficiency trade-off between bias reduction and variance (cf. Austin and Stuart, 2015; Thoemmes and Ong, 2016).

Table 5.6: Summary statistics on inverse probability of treatment weights

	Min.	1st Quartile	Median	Mean	3rd Quartile	Max
Not-Truncated	0. 013	0.992	0.999	0.999	1.001	25.009
Truncated at 1st and 99th Percentile	0.127	0.992	0.999	0.978	1.001	1.121

Source: Author's calculations.

Table 5.6 shows non-truncated and truncated weights. Although the mean is close to one in the original weights, there are rather low/high minimum/maximum values that can justify truncation in favor of efficiency. Results from the MSMs using truncated weights confirm a positive effect of LBD expenditures spent by m and m's cooperating neighbors on both, m's tax revenues and m's neighborhood's median tax revenues. With respect to the effect of IMC

duration, a short term negative effect of IMC on the neighborhood median unemployment rate and a positive effect of long-lasting cooperation on m's neighborhood's tax revenues is robust to truncation (see Table C.3 and Table C.4 in appendix C).

Overall MSM and FE produce significant results in the models predicting neighborhood median measures rather than outcomes of the single municipality m, which is likely to be due to the nature of IMC. Cooperation, by design, affects a group of partners and not a single municipality exclusively.

5.7 Discussion

The results produced by the FE-models and the MSMs show significant differences due to the different approaches in bias reduction. FE-models control for time-invariant unobserved factors that may drive selection into treatment, like persisting political networks between neighboring municipalities. MSMs control for time-varying factors that themselves are depending on previous cooperation activities. State support for IMC, e.g. may be more prominent in regions where municipalities previously were hesitant to initiate cooperation. Therefore, IMC may be dependent on IMC support, which is in turn dependent on previous IMC activities. While the FE-model shows a direct (and over time, increasing) effect of IMC on municipality m's unemployment rate, the MSM only reports positive effects of LBD expenditures that were spent by m and neighboring cooperation partners on m's tax revenues.

While the results from the FE-model and the MSM differ in the specifications that predict municipality m's own performance, they are very similar (in effect direction and size) in the specifications where the neighborhood's performance is the dependent variable. In both models the LBD expenditures have a positive effect on neighborhood median tax revenue. One might argue that this is attributable to fuzzy model design. Cooperation happens between neighboring municipalities so that the treatment is not limited to m but involves some of m's

neighbors. If this would drive the effect, however, the effect should be detectable within municipality m itself as well. As the effect of m's cooperative LBD projects cannot be restricted to only m's cooperating neighbors (e.g., by only employing people living in m or in cooperating neighboring municipalities), it is likely to spur municipal economic performance of any neighbor, regardless of whether that neighbor is part of the cooperation or not. This makes sense, especially if a mobile factor like labor is the basis for a measure of local economic performance, like the unemployment rate.

The fact that both models produce remarkably similar effect sizes could have two reasons: Either, both approaches correct for discretely different biases of the same size, or they correct for a bias that has its origin in a mix of time-invariant unobserved and time-varying confounders. For example, the combination of neighborhoods with persistent informal networks and IMC support over time. If networks were persistent over time, the FE-model controls for this unobserved effect. As there is no data on informal networks the MSM cannot account for this source of heterogeneity. The MSM can, however, control for time-varying confounders, like IMC support, which the FE-model cannot. Neither model can control for both sources of heterogeneity, however, each can control for one of the two.

The role of local networks is important in implementing local business development, as Hawkins et al. (2016) argued for US metropolitan areas. If networks were rather persistent over time, the FE-model can control for such heterogeneity. It stands to reason, however, that there is variation over time in the political relationships between municipalities. If so, neither the FE-model nor the MSM control for the influence of political networks on the likelihood and efficacy of IMC.

With respect to the duration of IMC both methods show similar trends. The FE-model shows a significantly negative long-term effect on unemployment (both municipal and neighborhood median unemployment), while the MSM shows a negative first-year and long

term effect (only in the neighborhood specification). The neighborhood's own tax revenues are positively affected by long-term cooperation in both models. These findings indicate that cooperation in LBD takes time to affect municipal performance. Cooperative LBD projects take a few years until completion. For example, buying and developing land for a joint business park, will take time before businesses can settle. Anecdotal evidence suggests that, if coordination among IMC partners is difficult in the early years of cooperation, LBD projects may not reach completion in the first place.

5.8 Conclusion

This contribution analyses the effect of IMC in the field of local business development. To my knowledge, it is the first study to focus on IMC in the field of local business development utilizing a method that allows for causal inference. I draw on the extensive literature on IMC-emergence to explain the decision to cooperate and control for selection into treatment and post-treatment bias. In addition to a FE-model, I use MSMs to estimate the average treatment effect of IMC on own tax revenues per capita and the municipal unemployment rate. I find that cooperation has a mediating effect on the productivity of local business development efforts, in that with increasing expenditures on local business development, neighborhoods with cooperating municipalities have a lower unemployment rate and higher tax revenue. Furthermore, municipal neighborhoods with long-term cooperations, lasting at least six years, show increased own tax revenues.

This study is not without shortcomings. First, MSMs address the bad control problem encountered in the FE-model; however, the sequential ignorability assumption for MSMs is hard to test. It is reasonable to assume that I cannot measure every common cause of treatment and outcome, as I am relying on observational data. One example is missing data on informal networks, that may influence the decision to engage in IMC. Therefore, the MSM may not produce completely unbiased results. Nonetheless, the quality of information on German

municipalities is good and the treatment-predicting model builds on a very rich empirical literature.

Second, while unemployment rate and tax revenues show an impact of cooperation, the effects of IMC may manifest in different outcome measures. It remains a challenge to devise a more detailed, informative measure; one that is meaningful given the different contexts of cooperation with respect to the field of cooperation and the kind of potential cooperating parties.

Third, in focusing on special purpose associations I neglect less formalized forms of IMC, like working groups or agreements. However, as there is no official data on the latter forms, complete if narrow information makes it possible to utilize panel data and to control for unobserved heterogeneity via the FE-approach.

More research is called for in order to identify the drivers of successful cooperation in different environments and to develop methodological approaches that can deal with the dynamic setting of cooperation over time.

6 Does inter-municipal cooperation help improve local economic performance?

Evidence from Poland

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Abstract

This paper aims at testing whether inter-municipal cooperation (IMC) in policies to promote local business development has a positive impact on local economic performance. We apply two-way fixed effects as well as marginal structural models to a panel data set covering 1,849 Polish municipalities between 2007 and 2014. We use the unemployment rate and the rate of population growth as a proxy for local economic performance. Our results show a systematic effect of IMC on local economic performance. However, the results are contradictory. While IMC causes higher rates of population growth, they also cause higher rates of unemployment.

JEL: D72, H77, H80, O10

Key-words: Inter-municipal cooperation, local business development, population decline, marginal structural models, Poland

6.1 Introduction

Citizens and local government benefit from a well-performing local economy as it guarantees employment opportunities and safeguards the local tax base. For local politicians, a good performance of the local economy increases the chance to get re-elected (e.g., Lewis-Beck and Stegmaier, 2000). Local governments have some tools to promote local business development (hereafter LBD). These include marketing activities, investments in business-related infrastructure like business parks, telecommunication infrastructure or local roads. The theory of fiscal federalism predicts that these tools are likely to be under-used. First, they generate considerable spillovers and thus municipalities have faced incentives to free-ride on the activities of neighboring municipalities (cf. Olson, 1969; Bergholz, 2018). Second, these tools are often too costly to implement for a single municipality while substantial economies of scale can be generated if they are applied at a supra-municipal scale. However, the Coase-Theorem suggests that there is a remedy: inter-municipal cooperation (IMC). Through cooperation, local governments can internalize spillovers as well as share costs and risks associated with LBD policies (e.g., Feiock et al., 2009; Bergholz, 2018). So far, we know very little about the potential of IMC in strengthening local economic performance. This is where our paper comes in.

We analyze the impact of IMC in the field of LBD on local economic performance using data on Poland in the time-period between 2007 and 2014. We proxy local economic performance with the unemployment rate and population growth. We apply standard two-way fixed effects models with municipal-specific trends as well as marginal structural models. The latter method utilizes time-varying propensity score weights to control for the selection into treatment. More importantly, they also deal with the bad control problem emerging when time-variant covariates are driven by the treatment (e.g., Robins et al., 2000; Angrist and Pischke, 2009).

Our results can be summarized as follows: While the existence of IMC as such is not found to have a stable impact on local economic development, we find evidence that they mediate the effect of local government expenditures. The impact of LBD-expenditures coordinated among union members is significantly different from the impact of overall expenditures on LBD. However, the impact is not always positive. Coordination through IMC reduces the rate of population decline yet leads to higher unemployment. These results are backed by both empirical strategies – two-way fixed effects and marginal structural models.

The paper proceeds as follows. Section 2 reviews the relevant literature. The main hypotheses are presented in section 3. Section 4 presents the institutional background in Poland while section 5 describes the data. The empirical strategy is described in section 6 before section 7 presents the results. Section 8 discusses the results and concludes.

6.2 Literature review

A search for literature on the relationship between local government policies and the performance of the local economy strikes many different strands of literature. The fiscal federalism literature suggests that especially small local governments face limited incentives to engage in LBD policies as these generate positive regional spillovers (e.g., Oates, 1972; Park and Feiock, 2006; Bergholz, 2018). An analogy from the tax competition literature (e.g., Buettner, 2006) suggests that fiscal equalization schemes may further reduce the incentives to engage in local development policies.

The literature on tax competition does not support this conclusion. It argues that local governments use local tax rates and infrastructure projects as strategic tools in the competition for mobile capital (Taylor, 1992; Wilson, 1999; Salmon, 2006). This inter-jurisdictional competition forces local governments to set low business tax rates and provide high-quality infrastructure and even bears the danger that these tools are used too extensively – meaning that municipalities set inefficiently low tax rates and provide too much business-related

infrastructure (e.g., Taylor, 1992; Wellisch, 2006; Jayet and Paty, 2006). While the question whether or not inter-local competition increases efficiency is disputed, there is a broad consensus that it leaves the single municipality with little political leeway.[24]

The literature on New Economic Geography offers an even more pessimistic view. Accordingly, the regional distribution of economic activities is driven by agglomeration forces and dispersion forces. Initially small inter-regional differences in regional economic activities may grow to substantial differences because agglomeration forces make the region with the higher activities more attractive for both firms and workers. The process of agglomeration only stops when dispersion forces outweigh the agglomeration forces (e.g., Borck and Pflüger, 2006). Consequently, the scope for local-level policies to influence the process of agglomeration is limited. This implies that inter-local competition largely takes place between jurisdictions within the same region.

The scope of upper-tier governments and supranational organizations trying to mitigate the consequences of agglomeration through top-down regional policies is the subject of yet another strand of literature. In their recent survey, Neumark and Simpson (2015) have coined the term place-based policies. Place-based policies can be justified on efficiency grounds because agglomerations generate negative externalities. Often – like in the European Union (e.g., Becker et al., 2012) – it is motivated on distributional grounds. Numerous studies assess the success of these place-based policies (for a survey, see Neumark and Simpson, 2015). The evidence is mixed. Positive effects are often reported for policies that develop the hitherto low-quality infrastructure in peripheral regions (Dreger and Reimers, 2014; e.g., Zhang and Sun,

[24] Another, remotely related strand of literature analyzes the relationship between decentralization and economic performance. The meta-study by Baskaran et al. (2016) supports the notion that decentralization may have a positive impact on overall economic performance within a country. However, they do not refer to the role of local government policies.

2019) while evidence on enterprise zones is mixed (e.g., Neumark and Simpson, 2015). The literature assessing the effects of EU regional policies find positive effects of some instruments (e.g., Mohl and Hagen, 2010) though they do not seem persistent (e.g., Becker et al., 2018).

The bottom-line of the above literature states that the scope for local governments to promote local economic performance is limited – with the main concern being not to fall behind on the intra-regional competitors. However, this literature ignores the implications of the Coase-Theorem and the role of IMC. Through IMC, municipalities can establish a platform that allows for the coordination of policies used in the competition for mobile capital (e.g., Bischoff et al., forthc.). This platform enables local governments to internalize spillovers and allows especially smaller jurisdictions to pool risks and exploit economies of scale (e.g., Feiock et al., 2009). Thereby, LBD policies that are not beneficial when carried out individually become beneficial under IMC. This line of argumentation suggests that IMC in the field of LBD policies has the potential to improve local economic performance.

The last two decades have seen a steady increase in the intensity of inter-municipal cooperation (e.g., Hulst and van Montfort, 2007; Rosenfeld et al., 2016). The scientific literature contains numerous studies on the factors driving the emergence of IMC (e.g., Bel et al., 2013b). One strand of literature focusses 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., 2018). Pioneered by Richard Feiock and co-authors, the Institutional Collective Action Approach illustrates that negotiating, implementing and controlling IMC-contracts entail substantial transaction costs (e.g., Feiock and Scholz, 2009). Empirical studies following this logic show that municipalities with similar characteristics or pre-existing political networks are more likely to cooperate (e.g., Feiock et al., 2009; LeRoux et al., 2010). Blaeschke (2014) and Bel and Warner (2016) provide excellent surveys of the relevant literature.

So far, however, only few studies addressed the question whether or not IMC really lives up to the expectations of its proponents. These studies can be divided into two groups. The first group of studies focusses on the impact of IMC in the capital-intensive technical infrastructure like sewage or waste disposal (e.g., Bel and Warner, 2008; Bel et al., 2013a). Applying sophisticated methods of efficiency analysis, these studies generally find cooperating municipalities to be more (cost-) efficient than municipalities that do not cooperate (e.g., Bel et al., 2013a).[25] The second group of studies focusses on IMC in other fields of government activities where an appropriate measure of success is more difficult to find. The relevant studies often use gross expenditures per capita and many of them do not differentiate between the fields in which municipalities cooperate (Bel and Sebő, 2019).[26] The results so far are inconclusive. This may be partly due to the fact that the indicator "gross expenditures per capita" does not allow for a straight-forward interpretation (Fiorillo and Ermini, 2008; Luca and Modrego, 2019). To see this, consider the example of municipalities cooperating in the field of administrative services (e.g. in the field of IT). If this cooperation reduces costs, the resources saved in these services may be spent on improving the quality of other services – e.g. through additional personnel in the local kindergarten. In this case, IMC had a positive effect yet the gross expenditures per capita do not change – just like in the case where IMC has not yielded any benefits.

With respect to the methods used, both strands of literature largely rely on cross-sectional analyses that cannot control for unobserved heterogeneity. Moreover, most studies do not

[25] For an exception, see Luca and Modrego (2019).

[26] One noteworthy exception is the study by Niaounakis and Blank (2017). They find that IMC in the Dutch tax administration reduces specific costs per capita especially for small municipalities.

control for selection into treatment.[27] Thus, their results do not allow for a causal interpretation. We are aware of only one study that allows for a causal interpretation. Ferraresi et al. (2018) apply a difference-in-difference model that uses matching techniques to control for the selection into treatment. They find a robust and persistent reduction of total expenditures per capita for municipalities organized in municipal unions of the Italian region of Emilia Romagna. They do not find any evidence that this effect comes at the price of reduced service quality[28]. Summing up, the causal effect of IMC has received little attention so far. This paper contributes to filling this research gap.

6.3 Hypotheses

We focus on IMC in the field of LBD. Our research question reads as follows: Does IMC in LBD policies improve local economic performance? This section seeks to identify the main mechanisms that need to be accounted for. To this end, we have to take a closer look at the characteristics of LBD policies. Many of these are characterized by economies of scale and a high share of sunk costs. This applies to all investments in the local infrastructure like roads, business parks or fast internet connections, but also to marketing measures aiming to attract

[27] In the case of the first group of studies, the IMC-unions analyzed usually exist for many decades and thus the available data does not cover the time before the unions were formed. Therefore, the data needed to control for the selection into treatment is often missing.

[28] Osterrieder et al. (2006) argue that cooperation in the field of economic development can lessen gender, social and regional inequalities by common development planning. The overview of cooperation among European municipalities provided by Teles and Swianiewicz (2017) shows that it is frequently focused on the field of economic development in e.g. Czech Republic, Iceland, Portugal and Slovakia. Yet the number of studies examining whether the economic development goals of IMC declared by its members were accomplished is limited. In two case studies, Lysek and Šaradín (2018) find the success of IMC in the field of economic development to be connected with appropriate governance with reference to human capital.

firms (e.g., Jayet and Paty, 2006; Dreger and Reimers, 2014). Taking these policy measures jointly allows municipalities to generate economies of scale and/or share risks. Thereby, policy measures that are not beneficial when carried out individually become beneficial for municipalities organized in inter-municipal consortia. In addition, some of the above-mentioned policy measures are likely to generate positive regional spillovers and IMC-consortia provide the political arena to internalize these spillovers (e.g., Feiock, 2007). The argumentations above suggest that – other things equal - municipalities organized in IMC-consortia spend more resources on LBD than municipalities that are not member of such consortia.

On the other hand, Taylor (1992) and Jayet and Paty (2006) show that an intense competition for mobile capital leads to an over-provision of business-related infrastructure. In this case, IMC may be platform upon which municipalities can agree to reduce over-provision (Bischoff et al., forthc.). Thus, IMC may go along with less LBD activities. The net effect of IMC on the intensity of LBD activities is unclear ex ante.

Regardless of the intensity of LBD activities, coordinated infrastructure investments and marketing activities are likely to be more productive than uncoordinated activities that potentially offset each other. Therefore, we expect IMC to have a directly positive impact on local economic performance. Thus, our first hypothesis reads:

H1: direct effect of IMC

IMC in the field of LBD policies has a positive impact on local economic performance.

Even though the impact of IMC on LBD activities is unclear ex ante, it seems reasonable to assume that the benefit of coordination rises in the intensity of activities that are coordinated. We expect IMC to increase the efficacy of every Euro spent by the consortium. This leads to our second hypothesis:

H2: increased efficacy of LBD policies through IMC

The impact of IMC on local economic performance is larger, the more resources the members of the consortium spend on LBD.

It is important to note that the increase in efficacy applies to all projects geared towards LBD – regardless of whether they are pursued under the roof of the consortium or directly by the municipalities themselves. In the empirical analysis below, we will test for the mediating effect of IMC on LBD expenditures spent through different channels.4.

6.4 Institutional background

6.4.1 The role of Polish municipalities

In the process of economic transformation, Polish local self-government was restored in 1990 after 40 years of nonexistence. The three-tier territorial division of Poland and, at the same time, the three-tier local self-government was introduced in 1999. Currently, Poland consists of 16 regions (voivodeships), 314 counties and 2478 municipalities[29]. The Constitution of the Republic of Poland guarantees municipalities the status of the dominant jurisdiction – responsible for all local self-government public tasks not explicitly assigned to counties or regions. Among other tasks, municipalities are in charge of primary education and upbringing,

[29] The number of municipalities is stable from October 2002, with only one change from 2478 to 2479 in 2010-2014. In 2010 one new municipality was established, but in 2015 two other municipalities were merged.

social security, transportation, water supply and management, gas and electricity, housing, health services, public order and culture.[30] Municipal revenues stem from local taxes and charges (approx. one third of total revenues), shares in personal (PIT) and corporate (CIT) income taxes (approx. one fifth of total revenues) and conditional and unconditional grants (Act of 13 November 2003)).

The economic and fiscal situation of municipalities in Poland varies remarkably depending mainly on the type of municipality – with urban municipalities generally being economically and fiscally stronger than rural ones. Comparing the percentage of total expenditures covered with own revenues, the top decile of municipalities' outcome reaches 63%, whereas the lowest reaches only 21% – with the average being 37%. Rural municipalities, especially in the eastern parts of Poland, are characterized by unemployment rates of up to over 30%, whereas other regions reach rates of less than 1% (e.g., Banaszewska and Bischoff, 2017).

After the EU-accession in 2004, Poland is among the primary recipients of EU funds[31] (e.g., Banaszewska and Bischoff, 2017). Polish municipalities received roughly one third of these funds – amounting to an annual influx to the municipal budget of 39 € per capita on average (constant prices). This accounts for more than 5 percent of total municipal expenditures and 20 percent of investment expenditures on average. EU funds are spent on highly visible projects and the utilization of EU funds can be expected to have a considerable impact on citizens' living conditions (e.g., Banaszewska and Bischoff, 2017). EU funds supported the building and modernizing infrastructure as well as "soft projects" (trainings, events, consulting

30 The scope of public services delivered by municipalities is generally independent of their type – urban, rural and urban rural – except for cities with county rights that perform tasks reserved for counties as well.

31 These comprise of funds from the European Regional Development Fund, European Social Fund and Cohesion Fund as well as funds from Common Agricultural Policy and Common Fisheries Policy.

services etc.) within a wide scope of fields such as transportation, technical utilities, schooling, social assistance, culture, tourism and sports. The scope of these projects goes far beyond the LBD policies that we are primarily interested in in this paper.

6.4.2 Polish IMC-unions

The Constitution of the Republic of Poland (Act of 5 June 1998)) states that municipalities have the right to associate in various forms on the local and regional national or international level. They are allowed to jointly provide public goods and services by transferring these tasks to inter-municipal unions (IMC-unions) or to settle the joint provision in an inter-municipal agreement. Both forms are subject to the principles of administrative law (Act of 8 March 1990)). In addition, municipalities can choose two other forms of cooperation regulated by the private law – associations and inter-communal companies. Official statistical data or financial statements are available for IMC-unions but not for inter-municipal agreements, associations and inter-communal companies. For this reason, the upcoming analysis will focus on these IMC-unions.

IMC-unions are voluntarily established via official statutes approved by the cooperating municipalities as separate entities with legal status. Once they are formed, they execute public tasks specified in their statutes on their own behalf and on their own responsibility.[32] IMC-unions are subject to the same financial management rules as municipalities and are empowered

[32] IMC-unions are managed by assembly and management board. An assembly is a control and resolution-passing authority constituted by the mayors of the member municipalities. The statute may grant more than one vote to certain municipalities. Additional representatives are appointed by the municipal councils concerned. The second body, the management board, is an executive authority appointed and dismissed by the assembly from among its members. As long as it is allowed by the statute, it is permissible to elect members of the management board from outside the assembly members in the number not exceeding one third of the total number of management board members (Act of 8 March 1990).

to run independent economic activity. In contrast to other European countries, the formation of Polish IMC-unions is not encouraged by any financial incentives from upper-tier governments. They generate revenues mainly from membership contributions (current and investment), but also from charges for providing public services, revenues stemming from own assets and EU funds. The division of costs, profits and liabilities is regulated by the statute (Act of 8 March 1990).

The official register of IMC-unions in Poland is run by the Ministry of the Interior and Administration. According to the register from 2017, 313 IMC-unions have been created since 1990 (the latest in 2016) and 208 were active up to that date. Figure 6.1 shows that the variation of IMC-unions formation is linked to major institutional reforms in Poland. The first compelling period covers the years 1991-1994 when many unions were established. Kołsut (2015) argues that uncertainty and instability caused by the economic transformation stimulated municipalities to join forces. In the second (2000-2004), the three-tier territorial division of Poland was installed and the upcoming Polish accession to the European Union forced Polish jurisdictions to implement many EU regulations[33]. Some of the unions emerging in this period were formed to attract EU funds (e.g., Osterrieder et al., 2006) but by far not all of them were successful (e.g., Swianiewicz et al., 2016). Unfortunately, neither the official register of IMC-unions nor their statutes provides us with information about which unions were formed to acquire EU funds. In the period after 2005, the number of newly established IMC-unions was significantly lower. Moreover, municipalities started to dissolve some of the unions – either

[33] The new regulations concerned solid waste disposal, among others, which apparently was one of the main tasks that new IMC-unions were formed for (Kołsut, 2015).

because their goals were accomplished or because the cooperation did not satisfy their members (e.g., Swianiewicz et al., 2016).

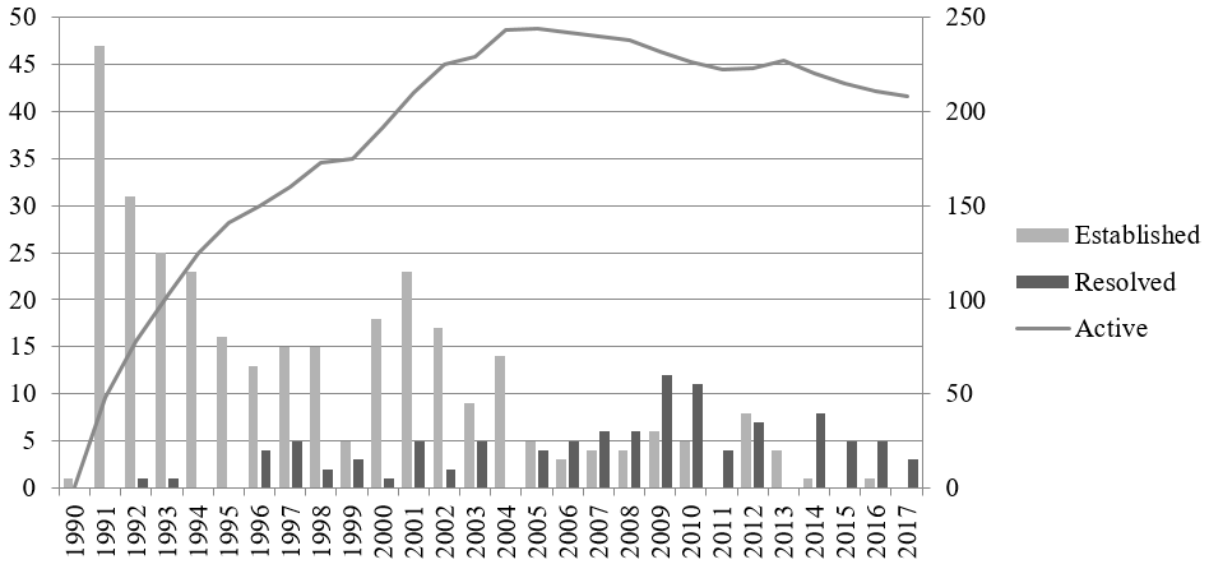

Figure 6.1: The number of established, resolved (left axis) and active (right axis) inter-municipal unions in Poland in 1990-2017
Source:Authors' illustration.

By 2017, 69 % of all municipalities in Poland became member of at least one IMC-union. More of 60 percent of these municipalities are rural municipalities; urban municipalities account for only 13%. Most of the IMC-unions (52%) have been of medium size (established by 4-9 municipalities); 28% of them can be considered as large (from 10 up to 49 municipalities) and 20% as small (2-3 municipalities). According to the Polish law, the number of IMC-unions that municipalities cooperate through is not restricted. In the period of 1990-2017 this number varied from 1 to 6 with 39% of municipalities being a member of the only one union, 36% are in two unions and 17% are in three unions.

The scope of public services provided by IMC-unions in Poland embraces almost all municipal activities.[34] (see Figure 6.2). 232 unions engaged in LBD activities for the member municipalities. The second task of great importance is connected to environmental protection with 157 unions proclaiming it as their aim. Numerous IMC-unions jointly deliver public services connected with solid waste (117), wastewater management (97) or wastewater treatment (66) and tourism (75).

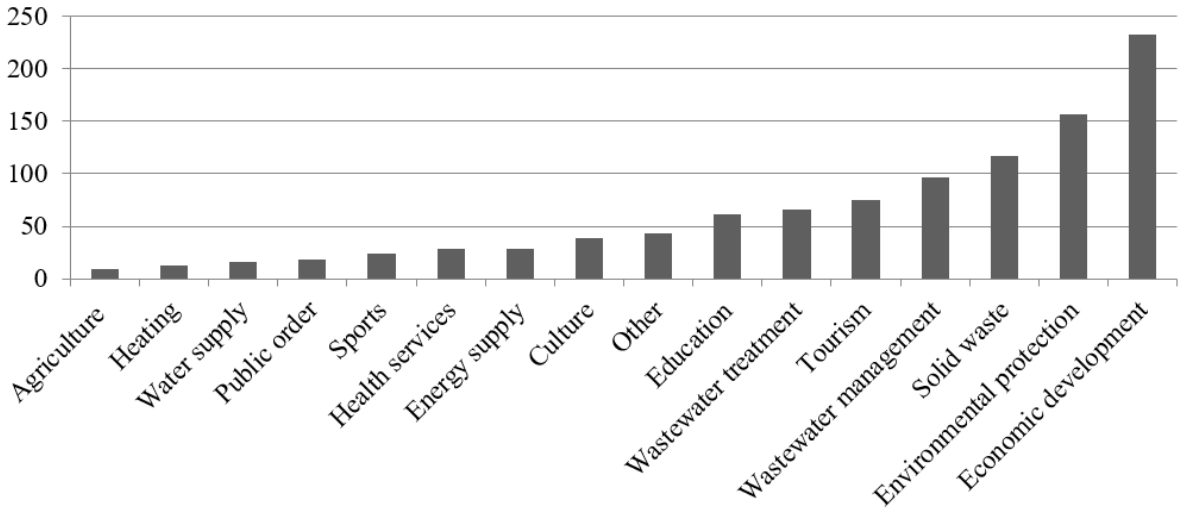

Figure 6.2: The number of inter-municipal unions and their tasks in 1990-2017
Source: Authors' illustration.

6.5 Data

The main purpose of our study is to test whether IMC in the field of LBD increases local economic performance. Unfortunately, GDP per capita is not available at the local level. Therefore, we use the unemployment rate and the rate of population growth to capture local economic performance. The unemployment rate used here is defined as the ratio of unemployed to population at working age. A low unemployment rate indicates that the local economy is

[34] A large majority of unions proclaimed to be responsible for far more than one category of tasks. For detailed list of tasks classified to each field, please see the table A.1 in the Appendix.

strong and structural skill mismatch stands for a minor problem. We use population growth because population decline has been a major problem of Poland after EU–accession – especially in rural areas. Preventing the outflux of population and/or attracting new citizens – even at a given level of unemployment – is thus considered an important political aim in Poland (Ministry of Administration and Digitalization, 2013).

The main hypotheses stated in section 3 claim that the effect of IMC on local performance depends not only on the existence of an IMC-consortium (hypothesis H1). Furthermore, IMC is expected to raise the efficacy of LBD policies carried out individually by the members of the IMC-consortium. To test these hypotheses, we have to restrict the analysis to the role of IMC-unions. Other forms of IMC, especially inter-municipal agreements, associations and inter-communal companies, cannot be analyzed because budget data is not available.[35]

In the upcoming analysis, we use yearly data[36] on Polish municipalities and IMC-unions that started to cooperate between 2007 and 2014 and state in their statutes to jointly deliver

[35] The same applies to the so-called Local Action Groups (LAGs). LAGs were formed in order to prepare the Local Development Strategies and apply for funds from the Rural Development Programme for 2007-2013 and 2014-2020 periods. They operate as foundations, unions of associations and associations. In the period of 2007-2013 LAGs covered 93% of the area eligible for support under Rural Development Programme (89% of the total area of Poland) (Agrotec Polska Sp. z o.o., 2010). Given this lack of variation we do not include them in the analysis. At the same time, we control for the amount of EU funds spent by local governments.

[36] Data on IMC-unions come from the official register of IMC-unions run by the Ministry of the Interior and Administration which is based on their official statutes. Demographic and socio-economic variables were extracted from Central Statistical Office Local Data Bank, apart from the data on own revenue capacity which was obtained from the Ministry of Finance. Geographic data were extracted from Central Statistical

services in the field of LBD[37]. This field includes all policies directed to the development of infrastructure of critical importance for local firms – among them modern technology of telecommunication and payment systems, roads and public transportation. We also include projects that aim at the modernization of the local public administration. At the same time, we exclude IMC-unions focusing on tourism, water and sewage infrastructure or energy supply. Policies aimed at counteracting unemployment are performed by upper-tier governments (counties). Thus, there are no IMC-unions directly aiming at the reduction of local unemployment.

Figure 6.3 depicts the emergence of IMC-unions in the field of LBD with the number of municipalities that engaged in the cooperation in each year from 2007 to 2014. They were formed by the overall number of 130 municipalities. The cumulative number of municipalities cooperating in the field of LBD in each year between 2007 and 2014 is presented on Figure 6.4. It is important to note that each municipality in our treatment group becomes member of only one IMC-union that aims at promoting LBD. Hence, we can express the relevant independent variable as a dummy in order to test Hypothesis 1. At the same time, most municipalities in control and treatment group are members in IMC-unions formed for other purposes.

Office Local Data Bank and Geodesic and Cartographic Documentation Centre. National election results were collected from National Electoral Commission.

37 For a detailed list of tasks classified to the field of local business development, see Table D.1 in the Appendix.

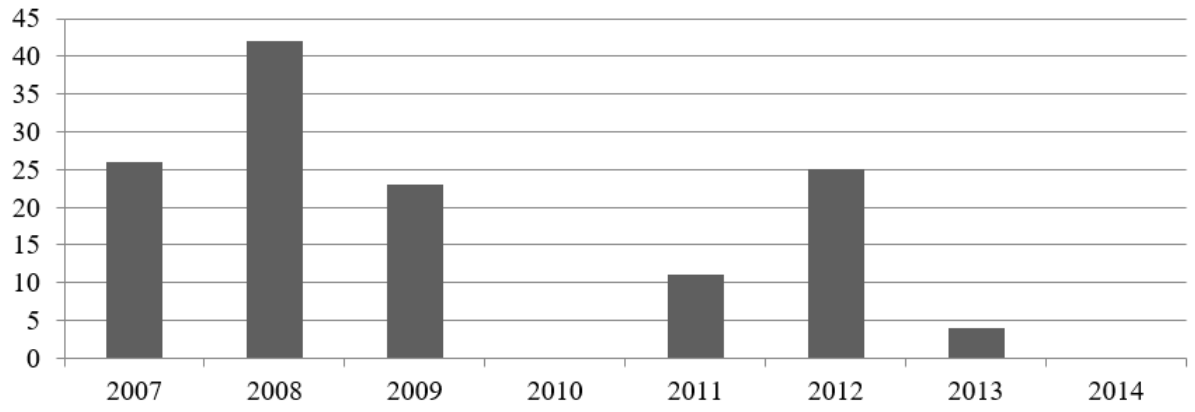

Figure 6.3: The number of municipalities that started cooperating in the field of LBD in 2007-2014
Source: Authors' illustration.

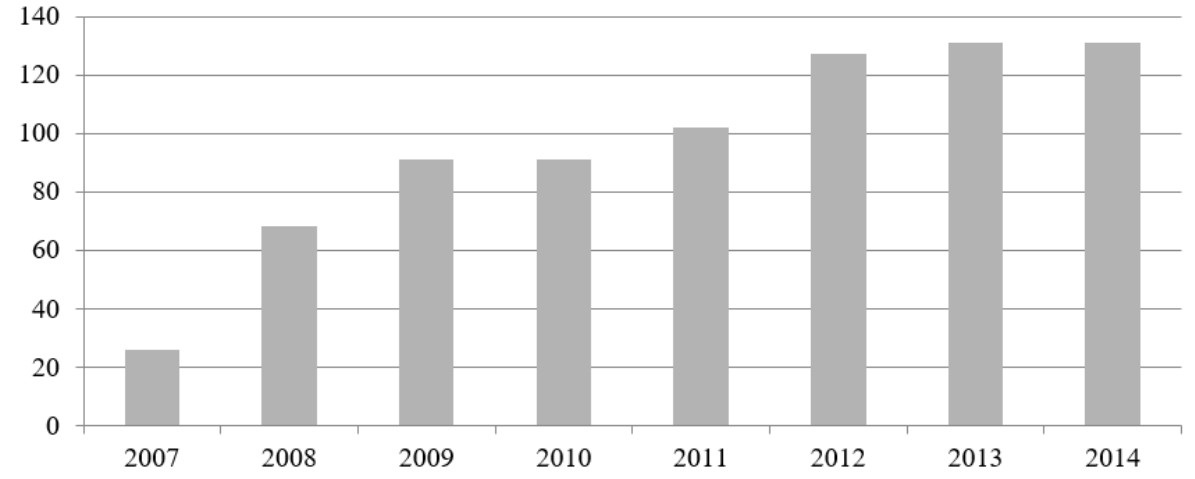

Figure 6.4: The cumulative number of municipalities cooperating in the field of LBD in 2007-2014
Source: Authors' illustration.

In the upcoming analysis, these 130 municipalities (out of a total of 2478) form the treatment group. The control group consist of 1719 municipalities that do not cooperate in this field prior to 2007 and do not start cooperation in LBD in our period of observation. We drop all municipalities that already cooperated in LBD before 2007. A few more municipalities were excluded because of missing data. Figure 6.5 presents the geographical distribution of

municipalities in the treated and control group. Both groups are widely distributed over the territory of Poland.

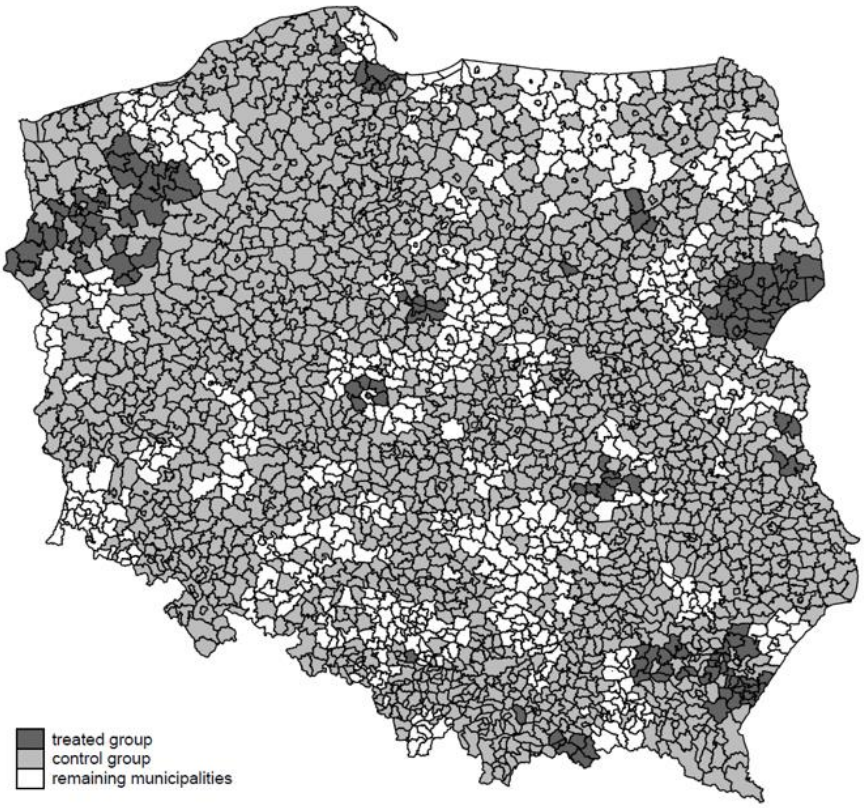

Figure 6.5: Municipalities in the treated and control group and remaining municipalities excluded from the analysis
Source: Authors' illustration.

Table 6.1 compares treatment and control group with respect to a number of other important socio-demographic, fiscal and institutional characteristics in 2007.[38] On average, the unemployment rate amounted to 8.6 % in the control group and to 9.8% in the treated group.

38 Demographic and socio-economic variables were extracted from the Central Statistical Office Local Data Bank, apart from the data on own revenue capacity which was obtained from the Ministry of Finance.

The population in the control group was growing by less than one percent, while the treatment group was on average shrinking by 0.28 percent. The control group spent an average of 205€ per capita on LBD, the treatment group 190€. The mean per capita EU-funds spent by the municipalities was higher in the control group than in the treated group and amounted to 106€ and 92€ respectively. The same holds for the EU funds the municipalities spent on investments (40€ and 24€, respectively). The area of the average municipality in the control group was smaller than in the treated group and amounted to 124.54 and 144.66 square kilometers respectively. Descriptive statistics indicate that municipalities in the control group, are, on average, involved in more unions of other types (0.46) than municipalities in the treated group (0.3). For municipalities in the treatment group, the share of neighboring municipalities with the same party obtaining the highest support in previous parliamentary elections was, on average (0.54) higher than in the control group (0.46). Among the differences in the average characteristics of treatment and control group described above, only the difference in the unemployment rate, LBD expenditures, EU-funds and EU-funds spent on investment, area and the same party support is statistically significant ($p < 0.05$). The remaining sample baseline means for the treated and control group are similar.

Geographic data were extracted from the Central Statistical Office Local Data Bank and Geodesic and Cartographic Documentation Center. National election results were collected from the National Electoral Commission.

Table 6.1: Sample baseline means for cooperating and non-cooperating municipalities

	Non-cooperating				Cooperating			
VARIABLES	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Urban	0.64	0.48	0	1	0.65	0.48	0	1
City with county rights	0.02	0.15	0	1	0.04	0.19	0	1
Area	124.54	75.5	3.32	573.96	144.66	87.45	16.17	484.77
Num. neighbors	5.73	1.81	1	18	5.48	1.91	1	11
Population Size	15133.64	54468.67	1549	1706624	14517.65	42445.6	1840	455717
Population Growth	0.11	1.13	-7.77	14.41	-0.28	1.95	-17.41	4.74
Revenue Capacity	581.22	825.39	150.85	30392.03	594.92	474.58	210.73	3764.87
Unemployment rate	8.57	3.52	1.95	25.03	9.78	3.75	2.39	19.19
Exp. LBD	205.17	240.1	28.75	7248.1	190.42	137.41	43.99	1091.14
Union expenditures	0	0	0	0	2.8	8.53	0	43.66
Share union exp.	0	0	0	0	0.02	0.07	0	0.39
EU-funds	106.48	140.63	22.15	2161.49	91.77	75.69	28.87	632.22
EU-investment	39.70	114.88	0	1861.38	24.43	59.31	0	471.06
Same party neighbors	0.46	0.31	0	1	0.54	0.36	0	1
Other cooperations	0.46	0.63	0	4	0.3	0.57	0	3
Number ofmunicipalities	1,719				130			

Source: Authors' calculations.

Table 6.2: Variable description

Variable	Measure
Time invariant variables	
Rural	Dummy=1 if the municipality is located in a rural area
City with county rights	Dummy=1 if the municipality is a city with county rights
Area	Municipal area in square kilometres
Num. neighbors	Total number of neighbors
Region dummies	Dummy=1 if municipality m is located in region r
Time varying variables	
Population Size	Natural log of the total number of citizens
Population Growth	Growth rate of the municipal population
Unemployment rate	Ratio of unemployed to population at working age
Revenue Capacity	Natural log of per capita own revenue capacity calculated on the basis of 'de jure' revenues from the following sources: property tax, agricultural tax, forest tax, motor vehicle tax, civil law activities tax, tax on small businesses, stamp duty, and extraction fee
Exp. LBD	Natural log of municipal expenditures on LBD, per capita
Same party neighbors	The share of neighboring municipalities with the same party that obtained the highest support in previous parliamentary elections
Other cooperations	Number of other unions municipality m is part of in year t
SEZ	Dummy=1 if the municipality is part of a special economic zone in year t
IMC	Dummy=1 if the municipality is part of a union in year t
Neighbors in union	Number of direct neighbors that are in a union with m in year t
Union exp.	Natural log of union expenditures per capita, spent by m and its neighboring union partners
Exp. LBD union	Natural log of municipal expenditures per capita on LBD, spent by m and its neighboring union partners

Source: Authors' compilation.

6.6 Empirical strategy

In order to test hypotheses H1 and H2 (see section 3), we apply two different empirical methods to the data describe above. First, we apply a two-way fixed effects panel model. Second, we apply marginal structural models (MSM).

6.6.1 Fixed-Effects Model

Our fixed-effects model predicts local economic performance in municipality m in time t, LEP_{mt} . The following empirical model defines the starting point of panel regressions:

$$LEP_{mt} = \beta_0 + \beta_1 IMC_{mt-1} + \beta_2 X_{mt-1} + \alpha_m + \varepsilon_{mt} \quad (1)$$

IMC_{mt-1} is the treatment dummy, taking the value 1 if municipality m has been a member of a LBD IMC-union in the year t-1. The matrix X_{mt-1} contains the control for a number of other time-varying factors that have the potential to drive local economic performance. First and most straight-forward, X_{mt-1} includes the expenditures on LBD by municipality m in t-1 (Exp. LBD). This variable covers the expenditures made by municipality m individually as well as municipality m's share in the expenditures of an IMC-union (for municipalities in the treatment group). Furthermore, it does not differentiate between expenditures funded by EU funds and expenditures funded from other revenues. In later specifications, we will differentiate between the different components of these expenditures.

In order to capture spillovers stemming from other municipalities, we have to control for their expenditures on LBD. When defining the set of municipalities whose activities have a major impact on the economic performance in municipality m, we restrict the set to those municipalities that share a common border with municipality m. In the regressions, we control for the sum of expenditures on LBD by m's neighbors (Exp. LBD (sum neighbors)). In the baseline specification, we do not differentiate between neighbors that cooperate with

municipality m in LBD and neighbors that do not. In later specifications, this distinction will be made.

Third, we control for the number of other unions municipality m is member of[39]. The latter variable controls for the argument put forth by Steiner (2003) that existing IMC-consortia may help coordinate municipal activities in fields that lie beyond the scope stated in the consortiums' statutes.

We further include m's membership in special economic zones. These zones are formed top down by the central government (Council of Ministers) after the request of the Minister of Economy. The request is submitted after receiving the opinion of the voivodship board and consent of a municipality council. Special economic zones are characterized by preferential conditions for business activity such as a corporate income tax exemption, a real estate tax exemption and a wider range of deductible costs connected with the investment. Their main role is to stimulate regional economic development, administer post-industrial estates and infrastructure, generate new job places and attract international investors (for further details see KPMG, 2009). Finally, we control for the size of municipality m, and include year dummies to control for external shocks common to all municipalities. In addition, we include municipal-specific linear time trends. To account for important time-invariant factors and the initial level of economic performance, we introduce municipal fixed effects (α_m); the error term is denoted ε_{mt}. Standard errors are clustered at municipal level.

The main strength of the fixed-effects model (FE) used above is that it controls for time-invariant unobserved heterogeneity and for municipal-specific trends. At the same time, it suffers from two shortcomings that are potentially severe in the context of this paper. First,

[39] See Table 6.2 for variable descriptions.

time-varying factors that are themselves dependent on prior treatment are bad controls and may bias the estimated effect of IMC. In particular, the formation of IMC may lead to higher expenditures on LBD which in turn improve economic performance. In explaining economic performance, controlling for both IMC and expenditures on LBD invites a bad control problem (cf. Angrist and Pischke, 2009). Second, two-way-fixed-effects models do not account for self-selection into treatment. Therefore, we also apply a second approach: Marginal structural models.

6.6.2 Inverse probability of treatment weighting and marginal structural models

Originating in the field of epidemiology, marginal structural models have been used to make causal inference possible for observational studies in which time-varying confounding renders traditional approaches unfeasible. Using inverse probability of treatment weights, marginal structural models (MSMs) model the marginal means of potential outcomes rather than observed outcomes. They have been introduced by Robins et al. (2000) and have been applied in political sciences, e.g. Blackwell (2013), and sociology, e.g. Sharkey and Elwert (2011).

In MSMs, observations are weighted by inverse probability of treatment weights (IPTW). IPTWs encompass the inverse probability to get treated conditional on treatment history, $\overline{IMC}_{mt-1}$, covariates measured at baseline, $X_{mt=0}$, and covariate history, $\overline{X}_{mt-1}$ (see Equation (2)).

$$W_m = \prod_{t=1}^{T} \frac{1}{\Pr(IMC_{mt} \mid \overline{IMC}_{mt-1}, X_{mt=0}, \overline{X}_{mt-1})} \qquad (2)$$

Unlike traditional weighting or matching procedures, where weights are calculated only based on pre-treatment information, MSM applies weights that also account for post-treatment information. In particular, they account for the time-varying confounders that themselves are

influenced by the treatment history. In our case, the most important confounding variable is the amount for resources spent on LBD, as it is expected to drive local economic performance but may change once an IMC-union is formed (see section 3). In the weighted population treatment is no longer confounded since covariates are balanced across time and treatment histories.

Because these weights can reach quite extreme values, the literature suggests stabilized weights where the numerator contains the probability to get treated conditional only on treatment history and baseline covariates (cf. Cole and Hernán, 2008; Thoemmes and Ong, 2016):

$$SW_m = \prod_{t=1}^{T} \frac{\Pr(IMC_{mt} \mid \overline{IMC}_{mt-1}, X_{mt=0})}{\Pr(IMC_{mt} \mid \overline{IMC}_{mt-1}, X_{mt=0}, \overline{X}_{mt-1})} \quad (3)$$

The MSM-approach is based on two important assumptions. First, it is assumed that all municipalities have some chance of getting treated, which is called the positivity assumption. Second, the MSM-approach rests on the assumption of sequential ignorability. Accordingly, conditional on past confounders, treatment assignment is independent of potential outcomes. This implies that there is no unmeasured confounding, a strong assumption which cannot be explicitly tested. In the case of IMC, we can make use of rather abundant information on Polish municipalities and draw on findings from the rich literature on IMC emergence to thoroughly capture the dynamic of IMC. Our model accounts for all major factors found to drive IMC in the vast literature on IMC emergence (see section 2). We rely on Feiock's theoretical framework for the emergence of IMC in which economies of scale and scope, as well as transaction costs play a role in determining how attractive it is to start cooperation (e.g., Feiock, 2007). We accommodate the factors presented in the recent literature review provided by Bel and Warner (2016). We follow Blaeschke (2014) and include not only variables describing the observed municipality m, but also variables describing m's pool of potential cooperation partners. To this end, we include so-called spatial lags (the median value of m's neighbors) of the population size, population growth, unemployment rate, per capita tax revenue, and

expenditures on LBD.[40] We also include the share of neighboring municipalities with the same party leading in the national election as the observed municipality to account for political transaction costs. We further control for the number of union memberships, other than LBD unions, to reflect willingness to cooperate and existing cooperation networks. In addition, we control for m's membership in a special economic zone. Lastly, we include municipality m's number of neighbors, dummy variables indicating whether municipality m is rural and/or a city with county rights and dummy variables marking regions and years.

[40] We do not use EU funds per capita as a separate explanatory variable because the EU funds spent on local business development are already contained in the corresponding expenditure variables. In addition, the institutional literature reviewed in section 4 clearly states that some IMC-unions were founded to acquire EU funds in the future.

Table 6.3: Logit Regression Predicting Cooperation (Odds ratios)

Time-invariant variables and time-varying variables at baseline		*Time-varying variables*		*Time-varying variables continued*	
Rural	1.340	IMC		Revenue capacity	
	(0.332)	At t-1	12,059***	At t-1	0.984
City with county rights	2.669		(9,214)		(0.422)
	(1.606)	At t-2	0.435	At t-2	1.107
Area	1.000		(0.325)		(0.617)
	(0.00118)	At t-3	10.65***	At t-3	1.054
Num. neighbors	0.997		(4.537)		(0.598)
	(0.0819)	Population size		Revenue capacity (sl)	
Other cooperations	1.123	At t-1	1.000*	At t-1	0.833
	(0.132)		(0.000157)		(0.546)
SEZ	0.219**	At t-2	1.000	At t-2	0.322
	(0.149)		(0.000188)		(0.234)
Population size	1.165	At t-3	1.000***	At t-3	1.333
	(0.236)		(0.000166)		(0.902)
Population size	1.000***	Population size (sl)		Exp.LBD	
spatial lag (sl)	(9.09e-06)	At t-1	6.883	At t-1	0.976
Population growth	1.262**		(54.48)		(0.208)
	(0.141)	At t-2	0.0151	At t-2	0.933
Population growth (sl)	1.585		(0.161)		(0.202)
	(0.478)	At t-3	8.231	At t-3	1.299
Unemployment rate	1.095		(49.03)		(0.242)
	(0.0861)	Population growth		Exp.LBD(sum neighbors)	
Unemployment rate (sl)	1.197*	At t-1	0.898*	At t-1	0.582
	(0.115)		(0.0576)		(0.211)
Revenue capacity	1.209	At t-2	1.042	At t-2	1.067
	(0.538)		(0.0763)		(0.401)
Revenue capacity (sl)	1.784	At t-3	0.872	At t-3	2.064**
	(1.341)		(0.0776)		(0.641)
Exp. LBD	0.868	Population growth (sl)		Same party neighbors	
	(0.149)	At t-1	0.380***	At t-1	0.559
Exp. LBD (sum neigh-	0.812		(0.0881)		(0.204)
bors)	(0.260)	At t-2	1.280	At t-2	1.085
Same party neighbors	2.311**		(0.202)		(0.500)
	(0.796)	At t-3	0.501***	At t-3	1.562
			(0.102)		(0.563)
		Unemployment rate		SEZ	
		At t-1	0.930	At t	0.992
			(0.0932)		(1.269)
		At t-2	0.987	At t-1	1.951
			(0.140)		(3.137)
		At t-3	1.008		
			(0.128)	Year Dummies	YES
		Unemployment rate (sl)		Region Dummies	YES
		At t-1	0.997		
			(0.122)	Constant	0***
		At t-2	1.186		(0)
			(0.170)		
		At t-3	0.709**	Observations	13,015
			(0.0962)		

Robust seEform in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculations.

Table 6.3 reports the logit model estimated to predict the emergence of IMC. The dependent variable is 1 if municipality m cooperates in year t (0 else). In line with previous findings (e.g., Bischoff and Wolfschütz, 2019), cooperation is largely persistent. Thus, cooperation in the previous year is a good predictor for cooperation in year t. Municipalities growing in population size are less likely to cooperate (see also Bischoff and Wolfschütz, 2019), as are municipalities that are part of a special economic zone. Political homogeneity among municipality m and its neighbors has a positive effect on the probability to engage in IMC.

Predicting the propensity score from this model gives us the denominator for the IPTW in equation (2) and (3). In a second step, cooperation is modelled conditional only on past cooperation and baseline covariates, giving us the numerator in equation (3). Based on these estimates, we construct stabilized weights and estimate a weighted linear model predicting the outcome at the end of our observation period:

$$LEP_m = \beta_0 + \beta_1 IMC_m + \beta_2 X_{mt=0} + \varepsilon_m \quad (4)$$

Mirroring the FE-model, we include the treatment dummy, IMC_m that takes the value of 1 if m has been part of an LBD-union during our observation period. $X_{mt=0}$ are covariate – both time varying and time-invariant at baseline, and ε_m is the error term.

6.7 Results

We apply the models presented in the previous section to test for hypotheses H1 and H2. Both predict a positive impact of IMC on local economic performance. More precisely, we hypothesize that IMC reduces local unemployment and raises the local rate of population growth. The first hypothesis refers to the effect of IMC itself. We test H1 by including a simple treatment dummy, in model (1), and by including the number of direct neighbors that are m's partners in the LBD-union, in model (2). H2 postulates that IMC has a mediating effect on LBD expenditures. Municipalities that are part of a union can make LBD-expenditures via the

union's budget or on their own. Thus, we employ two specifications in our analysis: first, we include the per capita union expenditures by m and its neighboring union partners. With this measure we test for the effect of resources spent cooperatively[41]. In the second specification, we include LBD-expenditures made by m and its neighboring union partners. Here, we test whether cooperation affects all resources spent on LBD, regardless of whether they are spent cooperatively (through the union) or not. In a final specification, we test for a possible impact on IMC on the efficacy of EU funds utilized by its union members. Investments funded by the EU constitute a crucial form of place-based policies in Poland in our period of observation. The final specification introduces the corresponding per capita expenditures of municipality m and its neighboring union partners.

Table 6.4 shows the results from the FE-model. Our treatment dummy shows no significant effect on our outcome measures. Looking at the number of direct neighbors that are in a union with m, we find a significant negative effect on m's unemployment rate, supporting our hypothesis H1, while there is no effect on population growth. For the union expenditures of m and its neighboring union-partners, as well as for the EU-investments spent by m and m's neighboring union-partners, we find no significant effect on our performance measures. Lastly, we find a weakly significant and positive effect of the total LBD- expenditures by municipality m and its union partners on m's unemployment rate. Given these mixed results, we cannot confirm our hypothesis H2.

[41] Since our data gives us information about the total expenditures of a union, but not how expenditures are distributed within the union, we use per capita union expenditures and assume that expenditures are distributed equally among union members.

Table 6.4: The effect of IMC on unemployment rate and population growth. FE-Models

Variables	(1) Unemployment	(2) Unemployment	(3) Unemployment	(4) Unemployment	(5) Unemployment	(6) Population Growth	(7) Population Growth	(8) Population Growth	(9) Population Growth	(10) Population Growth
IMC	-0.182					-0.106				
	(0.125)					(0.236)				
Neighbors union		-0.0768**					0.0286			
		(0.0360)					(0.0381)			
Union exp.			-0.0347					-0.0835		
			(0.0469)					(0.0691)		
Exp. LBD union				0.0339*					0.00797	
				(0.0191)					(0.0338)	
EU-investment union					-0.000530					0.00748
					(0.0185)					(0.0222)
Population size	0.940	0.969	0.979	1.100	1.030	-76.97***	-76.89***	-77.04***	-76.90***	-76.91***
	(1.326)	(1.322)	(1.323)	(1.316)	(1.319)	(3.233)	(3.323)	(3.214)	(3.286)	(3.342)
Exp. LBD	-0.0174	-0.0175	-0.0174	-0.0181	-0.0172	0.0255	0.0257	0.0251	0.0254	0.0255
	(0.0232)	(0.0232)	(0.0232)	(0.0233)	(0.0233)	(0.0191)	(0.0191)	(0.0191)	(0.0190)	(0.0191)
Exp. LBD (spatial lag)	-0.0193	-0.0191	-0.0190	-0.0186	-0.0174	0.0381	0.0397	0.0354	0.0389	0.0387
	(0.0412)	(0.0412)	(0.0411)	(0.0413)	(0.0413)	(0.0394)	(0.0402)	(0.0391)	(0.0408)	(0.0407)
Other cooperations	-0.203***	-0.202***	-0.175***	-0.174***	-0.166***	-0.0521	-0.0174	-0.0514	-0.0326	-0.0317
	(0.0526)	(0.0509)	(0.0491)	(0.0483)	(0.0487)	(0.0606)	(0.0432)	(0.0441)	(0.0428)	(0.0417)
SEZ	-0.203***	-0.202***	-0.175***	-0.174***	-0.166***	-0.0521	-0.0174	-0.0514	-0.0326	-0.0317
	(0.0526)	(0.0509)	(0.0491)	(0.0483)	(0.0487)	(0.0606)	(0.0432)	(0.0441)	(0.0428)	(0.0417)
Constant	0.618	0.355	0.250	-0.867	-0.228	696.0***	695.3***	696.7***	695.4***	695.5***
	(11.99)	(11.95)	(11.96)	(11.90)	(11.93)	(29.33)	(30.17)	(29.16)	(29.85)	(30.36)
Observations	14,904	14,904	14,904	14,904	14,904	14,936	14,936	14,936	14,936	14,936
R-squared	0.682	0.682	0.681	0.682	0.681	0.614	0.614	0.615	0.614	0.614

Source: Authors' calculations.

Table 6.5: The effect of IMC on unemployment rate and population growth. MSM-Models

Variables	(1) Unemployment	(2) Unemployment	(3) Unemployment	(4) Unemployment	(5) Unemployment	(6) Population Growth	(7) Population Growth	(8) Population Growth	(9) Population Growth	(10) Population Growth
					Non-truncated weights					
IMC	0.944***					-0.115				
	(0.308)					(0.101)				
Neighbors union		0.281*					-0.0374			
		(0.167)					(0.0716)			
Union exp.			0.365***					0.0309		
			(0.119)					(0.0781)		
Exp. LBD union				0.0846*					-0.00782	
				(0.0471)					(0.0148)	
EU-investment union					0.0933*					-0.00949
					(0.0567)					(0.0171)
Constant	6.541***	7.286***	7.374***	7.200***	7.043***	-4.831***	-4.919***	-4.940***	-4.916***	-4.898***
	(1.583)	(1.891)	(1.965)	(1.885)	(1.828)	(0.731)	(0.749)	(0.760)	(0.753)	(0.747)
Observations	1,632	1,632	1,632	1,632	1,632	1,643	1,643	1,643	1,643	1,643
R-squared	0.744	0.740	0.740	0.740	0.740	0.407	0.406	0.406	0.406	0.406
					Truncated weights					
IMC	0.511					-0.0186				
	(0.314)					(0.0904)				
Neighbors union		0.0957					0.000400			
		(0.126)					(0.0657)			
Union exp.			0.303***					0.0220		
			(0.103)					(0.0692)		
Exp. LBD union				0.0377					0.00239	
				(0.0416)					(0.0139)	
EU-investment union					0.0246					0.00552
					(0.0485)					(0.0157)
Constant	6.522***	6.611***	6.556***	6.559***	6.557***	-4.544***	-4.547***	-4.551***	-4.550***	-4.558***
	(1.442)	(1.456)	(1.454)	(1.455)	(1.457)	(0.743)	(0.743)	(0.744)	(0.743)	(0.743)
Observations	1,884	1,884	1,884	1,884	1,884	1,896	1,896	1,896	1,896	1,896
R-squared	0.728	0.727	0.728	0.727	0.727	0.423	0.423	0.423	0.423	0.423

Control variables at baseline: Population size, population growth, unemployment rate, shares in revenue capacity, Exp.LBD, SEZ, same party neighbors, other cooperations. Time-invariant controls: Rural, city with county rights, area, num. neighbors. Robust standard errors in parentheses, clustered on municipal level
*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculations.

Table 6.5 presents the results of the MSM. The literature on IPTW and MSM suggests to truncate weights in order to address extreme weights (e.g., Thoemmes and Ong, 2016).

Table 6.6: Inverse probability of treatment weights, not truncated and truncated

	Min.	1st Quartile	Median	Mean	3rd Quartile	Max
Not truncated	0.005	0.945	0.976	0.994	1.002	25.392
Truncated at 1st and 99th percentile	0.036	0.952	0.983	1.096	1.06	2.052

Source: Authors' calculations.

Table 6.6 presents descriptive statistics of our original weights and the weights after truncation at the 1st and 99th percentile. As the original weights are not extreme and the mean is close to one, results of the MSMs using truncated weights (Table 6) closely resemble results from MSMs using the original weights. We find a positive effect of union expenditures on the unemployment rate, which is the only effect in our MSM-model that is robust to truncation. All other variables of interest are non-significant.

The theoretical literature on local business expenditures we used to back our hypotheses clearly states that these expenditures generate substantial regional spillovers. Thus, the impact of IMC and the resulting LBD-expenditures are not restricted to municipality m but also impact its neighbors. Therefore, the regressions in table 5 and 6 may underestimate the effect of IMC on local economic performance. To account for the role of spillovers, we repeat our analyses for the neighborhood median of our performance measures – i.e. the median unemployment rate or rate of population growth in the cluster of municipality m and its neighbors. Table 6.7 and 6.8 present the FE- models and MSMs with the neighborhood median of the unemployment rate, population growth and revenue capacity as dependent variables.

The results for the FE-models show a significant positive effect of LBD-resources spent within a union on neighborhood unemployment. We further find IMC, as well as the number

of m's neighboring union-partners, to have a positive effect on the neighborhood's population growth, confirming hypothesis H1. The union expenditures by m and its neighboring union-partners, as well as the LBD expenditures of union members in the neighborhood, show a positive effect on neighborhood population growth, partly supporting hypothesis H2. We do not find an effect of EU-funds spent by m and m's union neighbors. The MSM confirms a positive effect on population growth by LBD expenditures from union members in the neighborhood. In addition, EU-investment funds spent by m and m's union neighbors also have a positive effect on neighborhood population growth. We further find a positive effect of union expenditures on the neighborhood unemployment rate, which is also robust to truncation of extreme weights.

Table 6.7: The effect of IMC on neighborhood unemployment rate and population growth. FE-Models

Variables	(1) Unemployment	(2) Unemployment	(3) Unemployment	(4) Unemployment	(5) Unemployment	(6) Population Growth	(7) Population Growth	(8) Population Growth	(9) Population Growth	(10) Population Growth
IMC	-0.132					0.121***				
	(0.0921)					(0.0470)				
Neighbors union		-0.0458					0.0375**			
		(0.0305)					(0.0150)			
Union exp.			-0.0439					0.0178*		
			(0.0337)					(0.0106)		
Exp. LBD union				0.0298**					0.0336***	
				(0.0141)					(0.00750)	
EU-investment Union					-0.00660					0.00618
					(0.0136)					(0.00652)
Population size (neighborhood)	3.484***	3.485***	3.524***	3.544***	3.538***	-18.08***	-18.08***	-18.12***	-18.10***	-18.13***
	(1.174)	(1.175)	(1.169)	(1.172)	(1.172)	(1.506)	(1.505)	(1.502)	(1.511)	(1.504)
Exp. LBD (neighborhood)	-0.0186	-0.0181	-0.0200	-0.0231	-0.0188	0.0653***	0.0650***	0.0664***	0.0620***	0.0656***
	(0.0341)	(0.0341)	(0.0341)	(0.0343)	(0.0342)	(0.0220)	(0.0220)	(0.0219)	(0.0220)	(0.0220)
Other cooperations	-0.155***	-0.150***	-0.139***	-0.136***	-0.128***	0.00561	-0.00141	-0.0145	-0.0264	-0.0196
	(0.0384)	(0.0367)	(0.0347)	(0.0344)	(0.0347)	(0.0279)	(0.0265)	(0.0252)	(0.0251)	(0.0249)
SEZ	0.104	0.105	0.107	0.110	0.105	0.0122	0.0112	0.0101	0.0150	0.0112
	(0.0769)	(0.0769)	(0.0771)	(0.0771)	(0.0770)	(0.0617)	(0.0617)	(0.0619)	(0.0618)	(0.0619)
Constant	-22.41**	-22.42**	-22.77**	-22.95**	-22.90**	161.9***	161.9***	162.3***	162.1***	162.4***
	(10.53)	(10.54)	(10.49)	(10.51)	(10.52)	(13.52)	(13.51)	(13.49)	(13.57)	(13.50)
Observations	14,833	14,833	14,833	14,833	14,833	14,936	14,936	14,936	14,936	14,936
R-squared	0.752	0.752	0.752	0.752	0.751	0.696	0.696	0.696	0.697	0.696

Year dummies and municipal-specific linear time trends included in all models. N=1,881. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculations.

Table 6.8: The effect of IMC on neighborhood unemployment rate and population growth. MSM-Models

Variables	(1) Unemployment	(2) Unemployment	(3) Unemployment	(4) Unemployment	(5) Unemployment	(6) Population Growth	(7) Population Growth	(8) Population Growth	(9) Population Growth	(10) Population Growth
					Non-truncated weights					
IMC	0.809***					0.0170				
	(0.266)					(0.0366)				
Neighbors union		0.250					-0.0148			
		(0.155)					(0.0250)			
Union exp.			0.290***					-0.0114		
			(0.0766)					(0.0265)		
Exp. LBD union				0.0588					0.00863	
				(0.0369)					(0.00554)	
EU-investment Union					0.0735					0.00779
					(0.0466)					(0.00612)
Constant	7.338***	7.977***	8.057***	7.936***	7.791***	-1.836***	-1.814***	-1.819***	-1.843***	-1.852***
	(1.377)	(1.666)	(1.757)	(1.688)	(1.616)	(0.319)	(0.324)	(0.325)	(0.327)	(0.325)
Observations	1,612	1,612	1,612	1,612	1,612	1,643	1,643	1,643	1,643	1,643
R-squared	0.761	0.757	0.757	0.757	0.757	0.640	0.640	0.640	0.641	0.641
					Truncated weights					
IMC	0.378					0.0240				
	(0.241)					(0.0349)				
Neighbors union		0.0404					-0.0202			
		(0.0988)					(0.0270)			
Union exp.			0.200***					-0.0108		
			(0.0635)					(0.0240)		
Exp. LBD union				0.0168					0.0122**	
				(0.0327)					(0.00535)	
EU-investment union					0.0103					0.0116*
					(0.0387)					(0.00597)
Constant	7.477***	7.540***	7.504***	7.517***	7.517***	-1.786***	-1.784***	-1.781***	-1.797***	-1.805***
	(1.262)	(1.272)	(1.272)	(1.270)	(1.270)	(0.307)	(0.307)	(0.307)	(0.308)	(0.308)
Observations	1,856	1,856	1,856	1,856	1,856	1,896	1,896	1,896	1,896	1,896
R-squared	0.759	0.759	0.759	0.759	0.759	0.635	0.635	0.635	0.636	0.635

Control variables at baseline: Population size, population growth, unemployment rate, shares in revenue capacity, Exp.LBD, SEZ, same party neighbors, other cooperations. Time-invariant controls: Rural, city with county rights, area, num. neighbors. Robust standard errors in parentheses, clustered on municipal level
*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculations.

6.8 Concluding remarks

Though the literature on IMC emergence is rich, only very few studies addressed the question whether or not IMC-arrangements are actually effective in reaching the proclaimed aims. Acknowledging the relevance of cooperation in the field of LBD we use data on Polish municipalities and IMC-unions that started to cooperate between 2007 and 2014 to test if IMC in the field of LBD serves its purpose. Next to a standard two-way fixed effects panel model, we apply a counterfactual approach in which we account for time varying treatment as well as time varying factors in estimating inverse probability of treatment weights. This approach allows us to model the marginal means of potential outcomes rather than observed outcomes and makes causal inference via the class of marginal structural models.

Our study is not without limitations. First and most importantly, our measures for local economic performance are incomplete. Unfortunately, data on GDP per capita is not available at municipal level. We could have used the per capita revenues from tax sharing that municipalities receive as the tax bases of personal and corporate income taxes are closely linked to the value added at local level. Unfortunately, however, personal income tax underwent a major reform in 2009 and thus caused a structural break that affected municipalities in different ways – dependent on their income structure and the share of the agricultural sector.

Our results only partly confirm a positive effect of IMC on local economic performance. While we find IMC positively affecting population growth, and negatively affecting unemployment in the FE-model, we do not find any direct effect in the MSM. Regarding our second hypothesis, we find mixed results. Population growth is positively affected by union expenditures, LBD-expenditures, and EU-investment funds spent on LBD. However, the FE-model and the MSM also produce a positive effect of union expenditures and LBD-expenditures on unemployment. Thus, we can only partly confirm hypothesis H2. The most stable results are found for the neighborhood median values of our outcome variables (see Table 6.7 and 6.8),

showing that cooperation impacts the economic performance of municipalities themselves, but also their neighbors' performance. This finding supports the notion that spillovers play an important role in the context of LBD.

The main result can be interpreted in different ways. Looking at the impact of IMC on unemployment rates, one may argue that IMC misses the target. One possible explanation is that IMC takes the form of a cartel that reduces competition among its members. This may be beneficial for the local incumbents yet come at the price of a reduction in local public efficiency (e.g., Di Liddo and Giuranno, 2016) which in turn leads to higher unemployment rates. However, one side result is at odds with this interpretation: We find that the membership of municipality m IMC-unions devoted to other purposes than LBD to be associated with a reduction in unemployment rate. This result contradicts the notion that IMC can be equated with welfare-reducing cartels.

An alternative interpretation for our mixed results starts from the fact that preventing or at least mitigating population decline was a primary political goal of Polish governments after the EU-accession. If this aim was the top priority, IMC must be regarded to be successful – albeit at the price of higher unemployment. This interpretation is supported by the result from table 3 according to which the rate of population growth has a negative impact on the probability of forming an IMC-union to promote LBD. At this stage, however, this interpretation is clearly ad hoc. More research is needed to understand the impact of IMC. The need for further research does not only pertains to the role of IMC in promoting LBD. Instead, there is a general lack of empirical research on the impact of IMC. This paper shows that marginal structural models provide a suitable method to this end.

7 Conclusion

The contributions presented in this thesis shed light on two important issues regarding IMC. Chapters 3 and 4 help us to better understand the emergence of IMC, while chapters 5 and 6 enrich the literature on IMC effects. All papers make contributions when it comes to the methods that are used in the field of IMC research; by way of introducing a new method (chapter 5 and 6), or by way of reinforcing innovative methods that are not well established, yet (chapter 3 and 4).

In chapter 3, we took a closer look at population dynamics as a driving factor for the decision to engage in IMC. As rural municipalities experience population decline, IMC presents the opportunity to share overcapacities that may not be as readily dismantled. In the field of internal administration, a labor intensive service, municipalities face cost stickiness because of strict labor regulation in the public sector. Therefore, the emergence of IMC in this field may be especially responsive towards changes in the municipal population. Our findings confirm this notion. While shrinking municipalities are not per se more likely to engage in cooperation, the likelihood that they will increases with the number of shrinking neighbors. We also find that cooperation is less likely in election years for municipalities with low tax capacity and low administrative expenditures, but more likely for municipalities with high tax capacity and high administrative expenditures. In this regard our findings do not conform with the literature, where fiscal stress was found to drive municipalities towards cooperation. Our paper highlights that we need to look closer at the interactions of different driving forces and how certain combinations of factors may change the decision to engage in IMC.

In Chapter 4, we focused on inter-local business parks to find out whether local competition plays a role in the emergence of IMC. We argued that municipalities in regions where competition for mobile capital is intense can increase taxes, as well as increase their tax base by way of forming a joint business park. Our findings support the hypothesis that

municipalities facing intense local competition are more likely to form a joint business park. This study broadens the perspective on IMC by looking at cooperation in the context of collusion.

The contributions with respect to the effect of IMC introduced a new method, marginal structural models, to the field. Addressing selection into treatment and time-varying confounding, this method gave us insights into the efficacy of IMC in the field of local business development. In chapter 5, I found IMC to be a successful instrument in improving municipal economic performance, while results in chapter 6 were mixed. Chapter 6 extends the reach of the previous chapters beyond the borders of Germany. Examining Polish local business development unions showed us that IMC in the Polish context may work differently than in the German one.

In this thesis, we looked at IMC through different lenses. We examined its emergence in internal administration with a focus on population dynamics, a factor that has been neglected and that future research has to take into account. Our results give some hints pointing towards an electoral cycle with respect to the decision to engage in IMC. Is there strategic/opportunistic behavior when it comes to the decision to cooperate? In light of increasing efforts to encourage IMC, this is an important question for future research. We further viewed IMC as a platform for collusion in the context of local competition. Here, the next step must be to look at whether the formation of joint business parks actually does reduce the intensity of local tax competition. The paper by Breuillé et al. (2018) so far is the only study to do so.

The implications of the studies on IMC emergence demonstrate the interdependency between IMC emergence and IMC effects: Knowing more about how IMC comes to be is more valuable once we know whether IMC has effects that justify cooperation in the first place. We would like to give recommendations on how to support municipalities in their efforts to cooperate. Knowledge about the driving forces of IMC is crucial in this regard. However, these

recommendations have to follow evidence on the efficacy of cooperation. We introduced a method to make causal statements about IMC but the application of MSMs is in its early stages. Here, we need to advance tests for model sensitivity and robustness of results. In the same vein, results from earlier studies need to be tested using more advanced methods. Our results for Polish municipalities also call for more thorough research. We find a positive effect on unemployment, which together with a positive effect on population growth hints at the fact that, employment may not increase at the same rate, as the population does. Future research needs to advance measures for economic performance on the municipal level.

With respect to the theoretical underpinnings of IMC, little has been done to contribute to the ICA framework in recent years. As the focus in IMC research lies heavily on empirical analysis, an encompassing economic theory still needs to be developed.

A Appendix to Chapter 3

The data on IMC agreements in internal administration was generated in a larger survey covering more than 6,700 municipalities from all German states and asking for IMC in different 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. Respondents were either the mayors, managing directors of the municipal administration or administrative clerks. Comparing municipal characteristics of the 1970 municipalities that received the questionnaire with the respondents' characteristics, we find no significant differences (see Table A.1 and Table A.2).

Table A.1: Descriptive statistics of the whole population of 1970 municipalities, averages over 2003-2014

Variables	Mean recipients	Mean respondents
Population	10029.97	9356.91
Population Growth 2003-2014	-3.30	-4.12
Number of neighbors with the same population dynamic	2.81	2.82
Number of neighbors with opposite population dynamic	0.66	0.62
Own tax revenues per capita	786.45	754.86
Staff costs in internal admin. expenditures	0.73	0.74
Expenditures on internal admin.		
per capita	175.95	171.95
in total running expenditures	0.15	0.15
Number of direct neighbors	6.3	6.25
Mean distance to neighbors (km)	8.97	9.18
Number of Municipalities	1970	341

Source: Authors' calculations.

Table A.2: Descriptive statistics of the sample of municipalities, averages over 2003-2014

Variables	Mean	Std. Dev.	Min	Max
Population	9356.91	10874.14	251	80656
Population Growth 2003-2014	-4.12	5.80	-23.58	11.45
Shrinking	0.46	0.5	0	1
Shrinking-below-median	0.37	0.48	0	1
Own tax revenues per capita	754.86	331.13	134.71	4598.14
Staff costs in internal admin. expenditures	0.74	0.09	0.12	0.93
Expenditures on internal admin. per capita	171.95	83.72	0	2962.74
in total running expenditures	0.15	0.05	0.01	0.46
Number of direct neighbors	6.25	1.88	0	13
Mean distance to neighbors (km)	9.18	21.51	2.79	727.68
Number of Municipalities	341			

Source: Authors' calculations.

The five administrative tasks that were provided jointly are personnel administration, running a registry office, electronic data processing (EDP), procurement, and financial administrative services. These tasks are back-office tasks, with the exception of the registry office where citizens are most likely to come into direct contact with municipal administrative tasks.

41 municipalities cooperated in all five of these tasks, 25 in four, 34 in three, 60 in two, and 114 in one of the tasks. Among the 114 municipalities cooperating in only one task the majority (48) are doing so in jointly running a registry office (see table A.3).

Table A.3: Survey respondents and the tasks they reported to provide jointly

Tasks / Municipalities	Personnel administration	Registry office	EDP	Procurement	Financial administration
cooperating	119	162	130	126	104
exclusively cooperating	15	48	23	21	7

Source: Authors' calculations.

The mix in tasks among those municipalities that are cooperating in two, three, or four tasks is rather heterogeneous. Table A.4 shows the combinations in cooperative tasks present in our survey answers. We find that no combination is a clear frontrunner for IMC and the distribution of tasks is quite even across all five categories. This is why we analyze cooperation in internal administration as a whole, as no single task stands out categorically.

Table A.4: Combinations of cooperative internal administration task

Municipalities cooperating in	Tasks	Frequency	Percent
two tasks	Registry + Procurement	13	21.67
	Personnel + EDP	10	16.67
	Registry + Financial	9	15
	EDP + Procurement	7	11.67
	Registry + EDP	5	8.33
	EDP + Financial	5	8.33
	Personnel + Registry	5	8.33
	Personnel + Procurement	3	5
	Personnel + Financial	3	5
	Total	60	100
three tasks	Registry + EDP + Procurement	5	14.71
	Personnel + Registry + Financial	5	14.71
	Personnel + EDP + Procurement	5	14.71
	Personnel + Registry + Procurement	4	11.76
	Personnel + Procurement + Financial	4	11.76
	Personnel + EDP + Financial	3	8.82
	Registry + EDP + Financial	3	8.82
	Registry + Procurement + Financial	3	8.82
	EDP + Procurement + Financial	2	5.88
	Total	34	100
four tasks	Personnel + Registry + EDP + Financial	7	28
	Personnel + Registry + EDP + Procurement	6	24
	Personnel + Registry + Procurement + Financial	4	16
	Personnel + EDP + Procurement + Financial	4	16
	Registry + EDP + Procurement + Financial	4	16
	Total	25	100

Source: Authors' calculations.

B Appendix to Chapter 4

Table B.1: Results from the hazard model on the emergence of joint business parks (odds ratios), reduced sample

VARIABLES	(1)	(2)	(3)	(4)
Business tax rate	0.998			
	(0.00377)			
Business tax rate (spatial lag)	0.992*			
	(0.00441)			
Land tax rate	1.004***			
	(0.00141)			
Land tax rate (spatial lag)	1.005**			
	(0.00238)			
Business tax rate (neighborhood median)	0.998	0.989***		
		(0.00359)		
Land tax rate (neighborhood median)		1.010***		
		(0.00220)		
Ratio business tax rate/ land tax rate			0.151***	
			(0.0756)	
Ratio business tax rate/ land tax rate (spatial lag)			0.0768***	
			(0.0635)	
Ratio business tax rate/ land tax rate (neighbor-hood median)				0.0111***
				(0.00786)
Land scarce	1.768***	1.767***	1.655***	1.633***
	(0.317)	(0.315)	(0.314)	(0.306)
No. neighbors with abundant land	1.010	1.010	1.016	1.016
	(0.0441)	(0.0442)	(0.0455)	(0.0456)
Land scarce#No. neighbors with abundant land	1.057	1.057	1.027	1.033
	(0.0376)	(0.0378)	(0.0378)	(0.0377)
Motorway access	1.244**	1.252**	1.202**	1.217**
	(0.112)	(0.113)	(0.112)	(0.113)
No. of neighbors with motorway access	1.057	1.057	1.027	1.033
	(0.0376)	(0.0378)	(0.0378)	(0.0377)
Same strongest party	0.942**	0.942**	0.941**	0.939**
	(0.0258)	(0.0255)	(0.0262)	(0.0256)
Share CDU	0.991**	0.991***	0.991**	0.991**
	(0.00361)	(0.00358)	(0.00361)	(0.00354)
Share local initiatives	0.993***	0.992***	0.994**	0.994***
	(0.00237)	(0.00235)	(0.00240)	(0.00235)
Election year	0.516***	0.512***	0.499***	0.496***
	(0.119)	(0.118)	(0.115)	(0.114)
Population size	0.848***	0.868**	0.901	0.922
	(0.0515)	(0.0533)	(0.0577)	(0.0593)
Population size (spatial lag)	0.625***	0.615***	0.698***	0.693***
	(0.0595)	(0.0594)	(0.0680)	(0.0679)
Urban cluster	1.009	0.969	0.970	0.905
	(0.142)	(0.133)	(0.142)	(0.129)
No. neighbors sim. share under 18	1.049*	1.052**	1.063**	1.067**
	(0.0264)	(0.0265)	(0.0275)	(0.0272)
IMC support	2.197**	2.216**	1.883*	1.927*
	(0.750)	(0.755)	(0.649)	(0.662)
No. neighbors in same admin. municipal union	0.912**	0.919*	0.940	0.953
	(0.0427)	(0.0423)	(0.0432)	(0.0429)
No. neighbors in same county	1.016	1.011	1.006	1.001
	(0.0280)	(0.0283)	(0.0286)	(0.0292)
Tax capacity	0.825	0.815	1.053	1.029
	(0.108)	(0.108)	(0.175)	(0.176)
Tax capacity (spatial lag)	0.906	0.915	1.095	1.103
	(0.0858)	(0.0851)	(0.126)	(0.121)
Observations	54,191	54,191	54,189	54,191

All models include state and year dummies. Robust se eform in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculations.

C Appendix to Chapter 5

Table C.1: State support for IMC

State	Form of Support	Year
Lower Saxony	Directive for the promotion of inter-municipal mergers and inter-municipal cooperation	2007 - 2010
Hesse	Funding for IMC for	
	- municipalities < 18k inhabitants	2004 – 2007
	- municipalities < 30k inhabitants	2008 – 2010
	- all municipalities	since 2011
Rhineland Palatinate	No explicit Funding	
Bavaria	Funding for IMC in	
	- economically underdeveloped areas adjacent to East German states	2012
	- all municipalities	since 2015

Source: Author's compilation.

Table C.2: The effect of IMC duration on the (neighborhood) unemployment rate and (neighborhood) own tax revenues, MSM and FE

Model	Years of IMC	Unemployment	Tax Revenue	Unemployment (neighborhood)	Tax Revenue (neighborhood)
MSM	1	0.186	-0.0315	-0.564***	-0.00922
		(0.484)	(0.0201)	(0.0576)	(0.0293)
	2-3	-0.0518	-0.0136	0.149*	-0.0221
		(0.0830)	(0.0220)	(0.0854)	(0.0166)
	4-5	-0.122	0.0325	0.119**	-0.0116
		(0.111)	(0.0297)	(0.0480)	(0.0260)
	6-8	-0.0998	0.101***	-0.273***	0.117***
		(0.0892)	(0.0351)	(0.0670)	(0.0165)
FE	0-1	0.0434	0.0140	-0.0343	0.000458
		(0.112)	(0.0159)	(0.0319)	(0.00817)
	2-3	-0.108*	0.00795	-0.0121	0.0143*
		(0.0622)	(0.0144)	(0.0358)	(0.00744)
	4-5	-0.176**	-0.00395	-0.0464	0.00948
		(0.0796)	(0.0136)	(0.0434)	(0.00857)
	6-8	-0.498***	0.0140	-0.330***	0.0410***
		(0.134)	(0.0205)	(0.104)	(0.0120)

Control variables in the FE: Population size, population growth, LBD Exp., LBD neighbors, other cooperations, IMC support, share small firms, share large firms, year dummies.
Control variables in the MSM are the FE-controls, outcome variables, and their respective spatial lags at baseline, as well as, city with county rights, metro area, area, num. neighbors, border county, border state, state dummies.
Robust standard errors in parentheses, clustered on municipal level *** p<0.01, ** p<0.05, * p<0.1.
Source: Author's calculations.

Table C.3: The effect of IMC on (neighborhood) unemployment and (neighborhood) own tax revenue, truncated weights

Model	Variables	Unemployment	Unemployment	Tax Revenue	Tax Revenue
	IMC	-0.111		0.00262	
		(0.0928)		(0.0176)	
	LBD. exp. IMC		2.73e-05		0.000278**
MSM			(0.000374)		(0.000124)
	Observations	4,448	4,388	4,452	4,384
	R-squared	0.641	0.647	0.692	0.691
		Unemployment (neighborhood)	Unemployment (neighborhood)	Tax Revenue (neighborhood)	Tax Revenue (neighborhood)
	IMC	-0.0576		-0.00698	
		(0.0581)		(0.0107)	
	LBD. exp. IMC		-0.000108		0.000149*
MSM			(0.000332)		(8.98e-05)
	Observations	4,445	4,388	4,452	4,384
	R-squared	0.755	0.760	0.831	0.831

Control variables are population size, population growth, LBD Exp., LBD neighbors, outcome variables, and their respective spatial lags at baseline, other cooperations, IMC support, share small firms, share large firms at baseline, as well as, city with county rights, metro area, area, num. neighbors, border county, border state, state dummies. Robust standard errors in parentheses, clustered on municipal level *** p<0.01, ** p<0.05, * p<0.1.

Source: Author's calculations.

Table C.4: The effect of IMC duration on (neighborhood) unemployment and (neighborhood) own tax revenue, truncated weights

Years of IMC	Unemployment	Tax Revenue	Unemployment (neighborhood)	Tax Revenue (neighborhood)
1	0.414	-0.0277	-0.500***	-0.000298
	(0.649)	(0.0227)	(0.0752)	(0.0394)
2-3	-0.348*	-0.0295	-0.213	-0.0345**
	(0.180)	(0.0279)	(0.145)	(0.0150)
4-5	-0.0768	0.0219	0.142***	-0.00202
	(0.0896)	(0.0283)	(0.0549)	(0.0167)
6-8	0.0859	0.0484	-0.0222	0.0492*
	(0.177)	(0.0440)	(0.104)	(0.0282)
Observations	4,448	4,452	4,445	4,452
R-squared	0.642	0.693	0.755	0.831

Control variables are population size, population growth, LBD Exp., LBD neighbors, outcome variables, and their respective spatial lags at baseline, other cooperations, IMC support, share small firms, share large firms at baseline, as well as, city with county rights, metro area, area, num. neighbors, border county, border state, state dummies. Robust standard errors in parentheses, clustered on municipal level *** p<0.01, ** p<0.05, * p<0.1.

Source: Author's calculations.

D Appendix to Chapter 6

Table D.1: Tasks executed by inter-municipal unions included in each field according to the official register of Ministry of the Interior and Administration

Field	Task
Agriculture	tests and certification of agricultural products
	purchase and processing of agricultural products
	agro-food investments and restructuring
	agriculture protection
	development of the agricultural market
	agriculture development
	plant and animal production
Culture	care of monuments
	culture
LBD	construction and development of a telephone network
	telecommunication
	infrastructure investments
	support, development and dissemination of the local government
	promotion of municipalities
	development of rural areas
	promoting sustainable development
	collection and processing of information about social and economic development
	social and economic development
	initiatives to equalize the standard of living
	economic cooperation and regional policy
	construction and investing in objects related to the activity of the union
	obtaining domestic and foreign funds
	spatial development planning and spatial order
	land management
	thermo-modernization of public utility buildings
	development of IT infrastructure
	limiting unemployment
	programs of increasing employment of disabled people
	public works
	electronic public services
	issuance of electronic money
	provision of payment services as a national electronic money institution
	creation of a border crossing
	airport construction
	airport services
	cycle paths
	interregional public roads
	local public transportation
	maintenance and operation of the airport
	public municipal roads

	traffic and parking
Education	environmental education
	education
	development of educational infrastructure
	pre-school education - alternative forms
	setting up and running primary schools, lower secondary schools and kindergartens
Energy supply	gasification (gas networks construction and maintenance)
	gas supply
	energy management
	electricity supply
	energy network construction and maintenance
Environmental protection	rainwater channels, sewerage ditches and urban drainage
	melioration
	retention reservoir
	removal of asbestos-containing products
	sustainable energy management
	development of energy production based on renewable sources
	management of natural resources
	preventing degradation and devastation of the environment caused by industrial development
	environmental protection
	development plans in the field of environmental protection
	promoting of ecological agriculture
	forestry and hunting
	creating programs against natural disasters
	flood protection
	fire protection
	collection, operation and processing of construction aggregate
Health services	health services
	health protection
	health infrastructure
	social care for people with disabilities
	running inter-communal Care Center for the elderly people
	social care
	violence in the family counteracting
	alcoholism counteracting
	drug addiction counteracting
Heating	heating supply
	renovation and maintenance of heating infrastructure
	investment in heating infrastructure
Public order	cleanliness and order maintenance
	public order and security
	civil defence
Solid waste	waste management and disposal
	construction, operation and reclamation of landfills

	construction and maintenance of waste treatment plants
Sports	sport and recreation
	coordination of activities regarding the award of winter organization of the Olympic Games to Poland
Tourism	tourism
	hotel services
Waste water treatment	waste water treatment
	maintenance of sewage treatment plants
	sewage treatment plants - modernization and construction of new ones
	farm wastewater treatment plants - encouragement and initiation of constructing
Wastewater management	wastewater management
	wastewater disposal
	construction of and investments in sewerage networks
	renovation and maintenance of sewerage networks
Water supply	water search, water intake construction and well drilling
	water management
	water supply
	construction of and investments in water supply networks
	renovation and maintenance of water supply networks
Other	development of administrative infrastructure
	training
	cemeteries
	animal shelter, providing care to homeless animals and catching them
	neutralization of corpses of dead animals
	local marketplaces
	keeping deposit and customs warehouses

Source: Authors' compilation.

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