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# Inter-Municipal Cooperation and Public Employment: Evidence from French Municipalities

Touria Jaaidane\*, Sophie Larribeau†, Matthieu Leprince‡

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## Abstract

Studies of public municipal employment are surprisingly scarce though municipalities are major employers in many countries. To address this issue, we build an original panel dataset of 8,421 municipalities (more than 1,000 inhabitants) in France over the 2002-2008 period, during which inter-municipal cooperation (IMC) was fostered.

Using event study techniques to identify the causal effect of entry into an IMC body on municipal employment, we first show that cooperation triggers personnel downsizing at the municipal level. Second, using an IV method, we evidence a causal impact of employment at the inter-municipal community level on municipal employment. This effect is positive for municipalities with a short experience in cooperation, but becomes negative for more experienced municipalities, suggesting that substitution between the employment at the two tiers takes time to operate. Finally, cooperation leads mayors to increase municipal employment when unemployment is higher and this effect is greater for municipalities nested in high-employment communities than in small ones.

Keywords: Public Sector Size, Municipal Employment, Inter-Municipal Cooperation, Event Study, Instrumental Variables.

JEL Classification: H70, J45, C23

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# 1 Introduction

Since municipalities are significant employers in many countries, it is important to understand what explains public employment<sup>1</sup>. We address this question using French data over the 2002-2008 period which witnessed the promotion of inter-municipal cooperation. There are different reasons for tackling this issue as regards local public sector size. First, the French municipalities represent 64% of total employment at the local government level in 2002 and 57 % in 2008. Second, French municipalities' wage bill<sup>2</sup> increased on average by 3.5% each year over the period. As governments are operating on tight budgets, the sources of this increasing trend should be identified in order to reduce or control this expenditure. Third, as one of the inter-municipal cooperation justifications was the cost savings, it is interesting to consider the relationship between employment decisions at municipal and inter-municipal levels. The overlap effect on employment is ambiguous, as it might lead either to expansion or contraction, reflecting a rationalization process.

We study an original balanced panel dataset of 8,421 French municipalities of over 1,000 inhabitants. Over the period of study, French municipalities were given incentives to join an IMC body. As a result, their voluntary entry was staggered over time, a feature that we examine to conduct an event study to measure the causal impact of entry on municipal employment. Moreover, we are interested in the impact of IMC employment on municipal employment taking into account that, first, mayors decide to transfer prior competencies to the IMC, and second, they send delegates to represent the municipality on the IMC council. In order to identify the causal impact of IMC employment on municipal employment, we follow an identification strategy taken from the empirical industrial organization literature and apply it to local public finance. The idea is to build instruments that obviate local unobservable factors by using the environment of IMCs. In short, for a given IMC, we look at IMCs that are comparable in terms of the characteristics relevant to the provision of local public services and compute the average IMC employment on these neighbors. Below, we provide arguments justifying that our instruments are appropriate, i.e., that the exogeneity

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<sup>1</sup> To avoid any confusion, we call municipal employment the number of public employees working for the municipality.

<sup>2</sup> The wage bill represented around 50% of the current expenditure over the period.

and relevance conditions are met. Our approach, therefore, departs from spatial econometrics as we do not define the neighborhood according to geographical distance and do not use a spatial autoregressive model, thereby avoiding the spatial/lag IVs simultaneity concerns (Gibbons and Overman (2012)).

First, using event study techniques (De Chaisemartin and d’Haultfoeuille (2022)) to identify the causal effects of entry into an IMC body on municipal employment, we show that cooperation triggers staff downsizing at the municipal level, regardless of the IMC employment level at the moment the municipality enters. Next, focusing on the relationship between the two employment levels, we find a causal impact of IMC employment on municipal employment. More precisely, the two tiers of public employment level are complementary for municipalities having a brief experience in cooperation. However, a substitution effect takes over in municipalities having longer experience in an IMC.

The underlying mechanism combines two effects playing in opposite directions. On the one hand, mayors have access to additional resources within the IMC and hence might offer new municipal public services. On the other hand, the transfer of municipal responsibilities to the IMC level produces a substitution effect. In the short term, the net positive impact reflects the dominance of the resource-increased effect over the substitution effect, while later on the reverse holds. Cooperation seems to need time to allow economies of scale and induce cost savings, probably due to organizational change.

Third, since unemployment is a major concern, we focus on the interplay between unemployment in the municipality, IMC membership, and the extent of cooperation at IMC level. We show that mayors of municipalities in an IMC body hire more people when local unemployment is higher. Coping with unemployment may be easier for mayors, as they are released from the responsibility of the transferred public services and benefit from additional resources. Controlling for the magnitude of IMC employment, this effect is greater for municipalities in high-employment IMCs than in small ones.

The research devoted to inter-municipal cooperation has developed along two lines: the analysis of its determinants and consequences. First, the reasons for entry into communities

have been studied by Di Porto et al. (2017) and Tricaud (2021). The latter study uses a natural experiment—the 2010 reform<sup>3</sup> that forced municipalities to join an IMC by 2014—to evidence how the determinants of the reluctance to cooperate vary across French municipalities. Understanding the impact of inter-municipal cooperation on different economic outcomes is a common concern in Europe (Hulst and van Montfort (2007) and Luca and Modrego (2021)). Using French data Charlot et al. (2015) and Ly and Paty (2020) analyze the effect of cooperation on local taxation. Although the French legislative Acts promoting cooperation insist on the rationalization objective, the list of competencies to be transferred to the IMC suggests that legislators had an implicit objective in mind: better coordination of public goods supply, which could lead to downsizing, but also to an increase in the range of public services depending on the size of the jurisdiction (on this so-called zoo effect see Oates (1988) and Frère et al. (2011)).

Our analysis relates to the literature on the effects of overlapping jurisdictions on public sector size and composition. Brennan et al. (1980), Oates (1985) and Zax (1989) point out the “natural expansion” of the local public sector in this context and argue that constitutional fiscal rules or competition among jurisdictions might help tame the Leviathan. Turnbull and Djoundourian (1993) and Campbell (2004) model the strategic interaction between county and municipal expenditure. Although the result of the interaction is theoretically ambiguous, they empirically confirm the expansion hypothesis. Evidencing unambiguous effects is however difficult due to the complex institutional structure of local governments (see Goodman (2015) and Berry (2008) for analyses on US data). Our causal impact of IMC employment on municipal employment contributes to this literature. Our finding on the deferred substitution between the two employment levels echoes results evidenced by Ferraresi et al. (2018) on Italian municipalities: being in a community reduces the total per capita current expenditure without affecting the level of local public services. This effect is persistent and increases up to six years after entry.

We also mention the more developed literature on municipal mergers, since the two consolidation processes, while different, are both justified along the same lines. Blesse and Baskaran

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<sup>3</sup> Unfortunately, we are unable to take into account this reform. Our dataset covering the 2002-2008 period is constrained by the annual survey on municipal employment that ended in 2008.

(2016) study German data and show that mergers decrease municipal administrative expenditure. Harjunen et al. (2021) analyze the distributional impact of mergers on local public sector jobs. They find that small and politically marginalized municipalities experienced a substantial reduction in local public jobs in health and social care services relative to the municipalities with stronger representation.

Finally, regarding the link between unemployment and public employment, two strands of the literature are worth noting. First, studies of the impact of public employment on the labor market and unemployment both at the aggregate level and the local level (Algan et al. (2002), Jofre-Monseny et al. (2020) and Caponi (2017)) exhibit a crowding-out effect: hiring more public employees leads to lower private sector employment. On this issue, Faggio and Overman (2014) do not find an overall crowding-out effect, but a change in the sectoral composition of local employment. Second, Clark and Milcent (2011) and Clark and Milcent (2018), two contributions on employment in French hospitals, are more directly linked to our work. The latter find a highly significant and positive impact of unemployment on employment in public hospitals headed by mayors.

The paper is organized as follows. Section 2 presents institutional facts related to French municipalities and focuses on the process of IMC. Section 3 lays out the data and the expected effects. The event study is developed in section 4 to analyze the impact of the entry into an IMC body on municipal employment. In section 5 we complement the analysis by estimating the causal impact of the IMC employment level on municipal employment. Section 6 concludes.

## **2 Institutional facts about French municipalities**

### **2.1 Budgets**

Municipality resources consist mainly of tax revenues and grants from the central government, borrowing being used only to finance investment spending. More precisely, municipalities decide on four direct local taxes: the residence tax, the property tax on developed land,

and the property tax on undeveloped land are levied on households. The business tax falls on firms. The biggest government transfer is the *Dotation Globale de Fonctionnement* (DGF), a lump-sum grant allocated to municipalities to help them with their operating budgets. Other targeted subsidies are granted to local governments by different State Departments, under so many different rules that the different grants were merged in 2004. The former DGF (in 2003) represented half the new DGF in 2004 at the national level.

## 2.2 Local government architecture in France

Three tiers of local governments, the regions, *départements* and municipalities form the French local public sector. Municipalities are responsible for a wide range of local public services: education (pre-and elementary school), care for the elderly, water distribution, waste collection, and local roads, among others. The responsibility for economic development, urban policy, social housing planning, and space management is shared between the three tiers of local governments. Over our period of study (2002-2008) the number of municipalities is almost constant (36,569 in 2008, excluding overseas). Considerable fragmentation at the municipal level—20,200 municipalities have less than 500 inhabitants—has spurred governments to foster inter-municipal cooperation. The objectives were to reduce tax competition between municipalities, reduce the costs of local public services via economies of scale, and create new public services. This movement, initiated by the 1992 Act, followed by the 1999 Act, has successfully promoted the creation of many IMCs. While in 2002, around 70% of municipalities were part of an IMC, this number reached around 90% in 2008.

IMCs differ according to their jurisdictional type, fiscal regime, population size and the scope of competencies that may be transferred. The main groups of competencies, which by law have to be transferred to the IMC, are economic development, space management, social housing planning, and urban policy. The larger the set of compulsory competencies transferred, the more integrated the IMC. When a municipality transfers a competency to its IMC, it also transfers the staff dedicated to that competency<sup>4</sup>. IMCs and their municipality members might also proceed to an exchange of staff and create shared functional services

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<sup>4</sup> Municipalities remain responsible for those competencies that have not been transferred.

(human resources, computer maintenance services, finance, procurement services), resulting in bottom-up and top-down personnel transfers<sup>5</sup>. There are two IMC taxation regimes. In the additional taxation regime (ATR), the IMC and member municipalities share the four tax bases, *i.e.* both the IMC and the municipalities can set the rates for each of the four taxes. Under the single business tax regime (SBT), the IMC sets the business tax rate that applies to all IMC members. This business tax is levied on pooled business tax bases. IMC members remain responsible for the other three taxes. Note that the IMC body does not receive any contribution from its municipality members. However, under the SBT regime, the IMC body obtains an additional amount of transfer collected on the grants to municipalities. Over the period of study, IMCs were created and others disappeared: in net terms, their number increased from 2,160 in 2002 to 2,567 in 2008. They also shifted from the ATR to the SBT regime as a response to the fiscal and financial incentives provided by the 1999 Act.

These institutional details suggest that the allocation of competencies and employees between the municipal and inter-municipal levels is the result of interdependent decisions taken by the two tiers.

## 3 Data

### 3.1 Dependent and independent variables

The dependent variable denoted  $e$ , is the employment rate defined as the number of municipal public employees<sup>6</sup> per 1,000 inhabitants. Our main explanatory variables are the public employment rate at the IMC level, denoted  $I$ , and the municipal unemployment rate denoted  $u$ . We control for other relevant variables following the literature on the determinants of municipal employment (see Courant et al. (1979), Ehrenberg and Schwarz (1986), Gregory and Borland (1999) and Alesina et al. (2000)). As for municipality revenues, we first consider

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<sup>5</sup> Our data do not allow us to distinguish between them: we only have their net result, *i.e.* the employment levels, respectively for the municipalities and the IMCs.

<sup>6</sup> We consider total municipal employment. Neither the distinction of employees according to their status (civil servant or not) nor the allocation of employees across services are possible with our data.



the per capita grant  $g$ . Both the tax capacity<sup>7</sup> and the tax ratio help to capture the wealth of the municipality. We consider the tax ratio, denoted  $\tau$  and defined as the ratio of the residence tax base to the total municipal tax base<sup>8</sup>. This tax ratio reflects the marginal cost in terms of increased taxes of getting an additional unit of public good. Naturally, the median household income  $y^m$  plays a key role. We count for public services provision costs using the wages of public employees,  $w$ . Following Buch and Lipponer (2010), we compute the mean personnel expenditure per municipal employee by dividing the total wage bill by the number of employees. We also control for the principal socio-demographic characteristics of the municipalities.

### 3.2 Expected effects on municipal employment

As explained above, the net impact of  $I$  on  $e$  is a priori unknown. It is reasonable to expect a positive impact of unemployment  $u$ , p.c. grant  $g$  and the citizen's income  $y^m$  on  $e$ . Moreover, we should have a negative relationship between  $e$  and both the municipal employees' wage  $w$  and the tax ratio  $\tau$ .

### 3.3 Variables and sources

First, employment data in the municipalities and their IMCs come from the COLTER annual survey handled by INSEE<sup>9</sup> until 2008. We examine the full-time equivalent employment which controls for the widespread use of part-time jobs by municipalities. Second, we use the INSEE database to generate the population<sup>10</sup> level in each municipality. We retain the median income per unit of consumption, an indicator that controls for the number of people in the household. Third, we compute a municipal unemployment rate, defined as the ratio of job-seekers to the municipal population using data from DARES<sup>11</sup>. In addition, the DG-

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<sup>7</sup> The municipal tax capacity is defined as the tax revenues that could be obtained out of the local tax bases if the national average tax rates were applied in the municipality.

<sup>8</sup> We implicitly assume a classical median voter framework (see Downs (1957)) where the median voter is a household occupying a house subject to the residence tax.

<sup>9</sup> Institut National de la Statistique et des Etudes Economiques

<sup>10</sup> We exploit the 1999 and 2006 legal municipal population variables and generate the annual data thanks to a linear interpolation from 2002 to 2005 and use the legal census population figures from 2006 to 2008.

<sup>11</sup> Direction de l'Animation de la Recherche et des Etudes et des Statistiques, Ministère du Travail.

FIP<sup>12</sup> database provides us with the municipal employee payroll. We use the DGCL<sup>13</sup> annual database, to calculate per capita grant, tax ratio, population density, shares of subsidized housing and of second homes and share of young people (3-16).

All the monetary data are expressed in real values (2018 thousand €).

We consider municipalities with more than 1,000 inhabitants as of 1999. We lost around 250 municipalities<sup>14</sup> in the matching process and the merging of all the datasets. We eventually built an original balanced panel database of 8,421 French municipalities over the 2002-2008 period. Summary statistics are provided in table 7 in Appendix 7.1. We just mention two sample descriptive statistics to get an overview. The average municipal and IMC employment levels computed over the period are respectively 10.95 and 1.89 employees per 1,000 inhabitants.

## 4 An event study to identify the causal impact of entry on municipal employment

Table 1 describes how important the dynamics of entry are over the period 2002-2008, during which municipalities opted for cooperation voluntarily. The allocation of sample municipalities in IMCs shows that the entry process, initiated in 1992, is staggered over time.

Table 1: Allocation of sample municipalities in IMCs across time

	2002	2003	2004	2005	2006	2007	2008
In an IMC body	6353	7012	7332	7524	7658	7770	7786
# Entries		659	320	192	134	112	16

The setting calls for an event study design to estimate the effects of joining an IMC structure on municipal employment. This type of analysis allows us to consider heterogeneous treatment effects and to check for pre-trends. We conduct the study following the recent literature on staggered difference-in-differences and heterogeneous treatment effects developed in

<sup>12</sup> Direction Générale des Finances Publiques

<sup>13</sup> Direction Générale des Collectivités Locales

<sup>14</sup> We have also lost observations because of a lack of information and/or abnormal values (overseas municipalities were excluded).

Callaway and Sant’Anna (2021), De Chaisemartin and d’Haultfoeuille (2022), Lichter et al. (2021) and Schmidheiny and Siegloch (2023). Each municipality  $i = 1, \dots, N$  receives at most one single treatment (entry into an IMC body) at some unit-specific time  $T_i$ . All treated units receive treatment at different points in time as the entry process is staggered over time. Treatment effects are assumed to be homogeneous across cohorts. We seek to estimate the dynamic effects of the entry on our dependent variable  $e_{it}$ , the municipal employment level. The standard event study specification is given by:

$$e_{it} = \sum_{j=-5}^{j=5} \gamma_j D_{i,t-j} + \mu_i + \theta_t + \omega_{it} \quad (1)$$

where  $D_{i,t} = \mathbf{1}[T_i = t]$  is an event indicator that takes the value 1 in the period of the entry,  $T_i$ , and zero otherwise. Municipality-fixed effects are denoted by  $\mu_i$  and time-fixed effects by  $\theta_t$ . The parameter  $\gamma_j$  is the dynamic treatment effect  $j$  time periods after ( $j \geq 0$ ) or before ( $j < 0$ ) the entry. In particular, we assume effect homogeneity in the parameters  $\gamma_j$ ,  $\mu_i$  and  $\theta_t$ , independence across municipalities  $i$  and strict exogeneity of the treatment indicators  $D_{i,t}$ . Dynamic treatment effects  $\gamma_j$  are typically expressed relative to some reference period, here one period prior to the entry, and the corresponding coefficient is normalized to zero,  $\gamma_{-1} = 0$ . Our dataset spanning over the period 2002-2008 imposes the choice of maximum lags and leads as -5 and +5. The never-treated units (municipalities that never entered an IMC body over the period of observation) will serve as a control group, which uniquely identifies the secular time trends  $\theta_t$  if there is at least one control group observation for each period  $t$ . In order to identify the dynamic effects  $\gamma_j$ , we need to observe at least one treated unit for each lag and lead  $j$  of the effect window. No additional identifying assumptions are required in the presence of a never-treated control group. Our treated groups are the municipalities that entered (and never exited) an IMC body from 2003 to 2007<sup>15</sup>, as described in table 1. The control group is composed of 626 municipalities that never entered either before 2002 or during the period. The parallel trend assumption says that, if no treatment had occurred, the difference between the treated groups and the control group would have stayed the same in the post-treatment period as it was in the pre-treatment period.

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<sup>15</sup> Municipalities that entered in 2002 or before are excluded from the analysis since there is no available data on their period of entry. Moreover, municipalities that entered in 2008 are also excluded as they are not numerous enough.

We now display the analysis using the Callaway and Sant’Anna (2021)’s procedure. The following figures plot the point estimates  $\hat{\gamma}_j$ , for  $j = -5, \dots, +5$ , and the corresponding 90% confidence intervals of an entry into an IMC body on municipal employment, using the event study model as defined in Equation 1. Standard errors are clustered at the municipal level. The corresponding regression coefficients are provided in Table 8 in Appendix 7.2.

Figure 1 presents the dynamic effects of an entry on municipal employment. Pre-trends are flat and statistically insignificant, confirming that the parallel trend assumption holds. Post treatment, an entry exerts a negative and statistically significant effect on municipal employment. Compared to the reference period  $t - 1$ , the effect builds from the entry period  $t$  and lasts thereafter. More precisely, compared to the control group, municipal employment reduces from 0.31 employees per 1,000 inhabitants right after the entry to 1.03 employees per 1,000 inhabitants five years later.

We now look at the impact of entry on alternative outcomes such as the grant received by the municipality and its tax capacity (see figure 2 panels (a) and (b) respectively). As for the grant, panel (a) shows diverging pre-trends and post-trends, revealing it is impacted by the entry as expected from the institutional context. By contrast, no systematic pre or post-trends appear on panel (b), when considering tax capacity.

We refine the analysis by splitting the treated groups into subgroups according to the four quartiles of IMC employment ( $I$ ) distribution at the date of the entry. Figure 3 shows that the effects differ depending on staff numbers in the IMC body at the moment the municipality enters. More precisely, the post-treatment declining trend displayed in figure 1 is only significant for municipalities entering a small IMC body (panel (a)). In panel (b), the negative post-treatment effects seem to be less important while in panels (c) and (d) they are insignificant<sup>16</sup>. Building on the response of municipal employment to entry, differentiated according to the IMC employment level, we complement the analysis by measuring the elasticity of municipal employment to IMC employment.

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<sup>16</sup> Unfortunately, for data availability reasons, we can not study the effect of entry beyond five years after the entry.

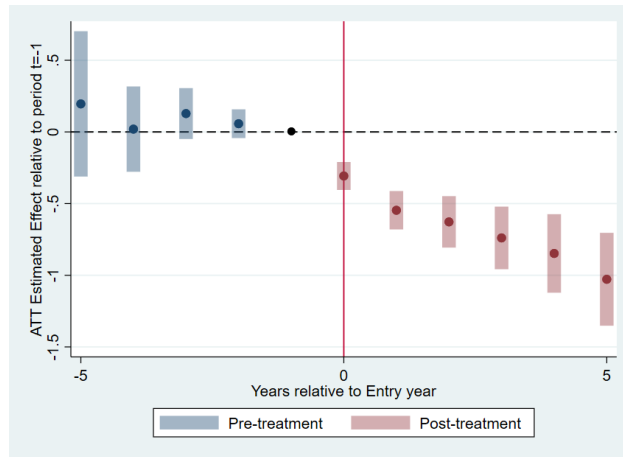
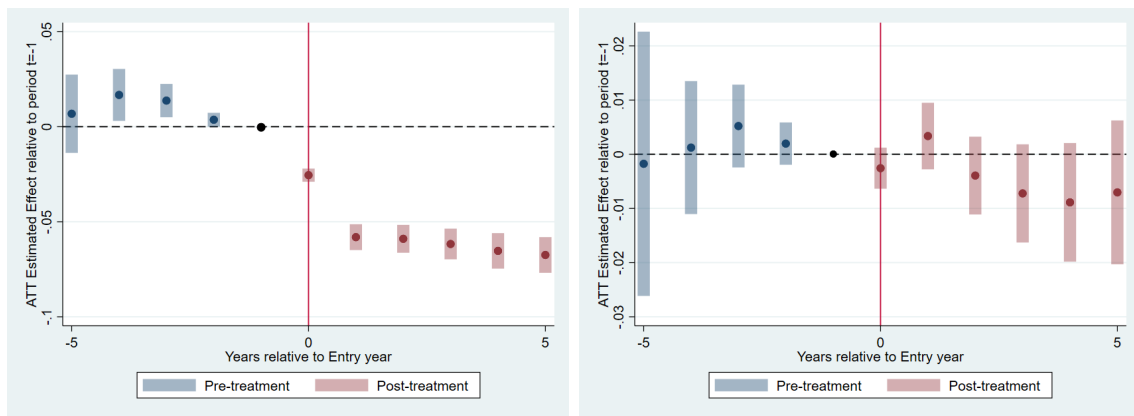


Fig. 1: Effect of entry on municipal employment



(a) Effect on grant

(b) Effect on tax capacity

Fig. 2: Alternative outcomes

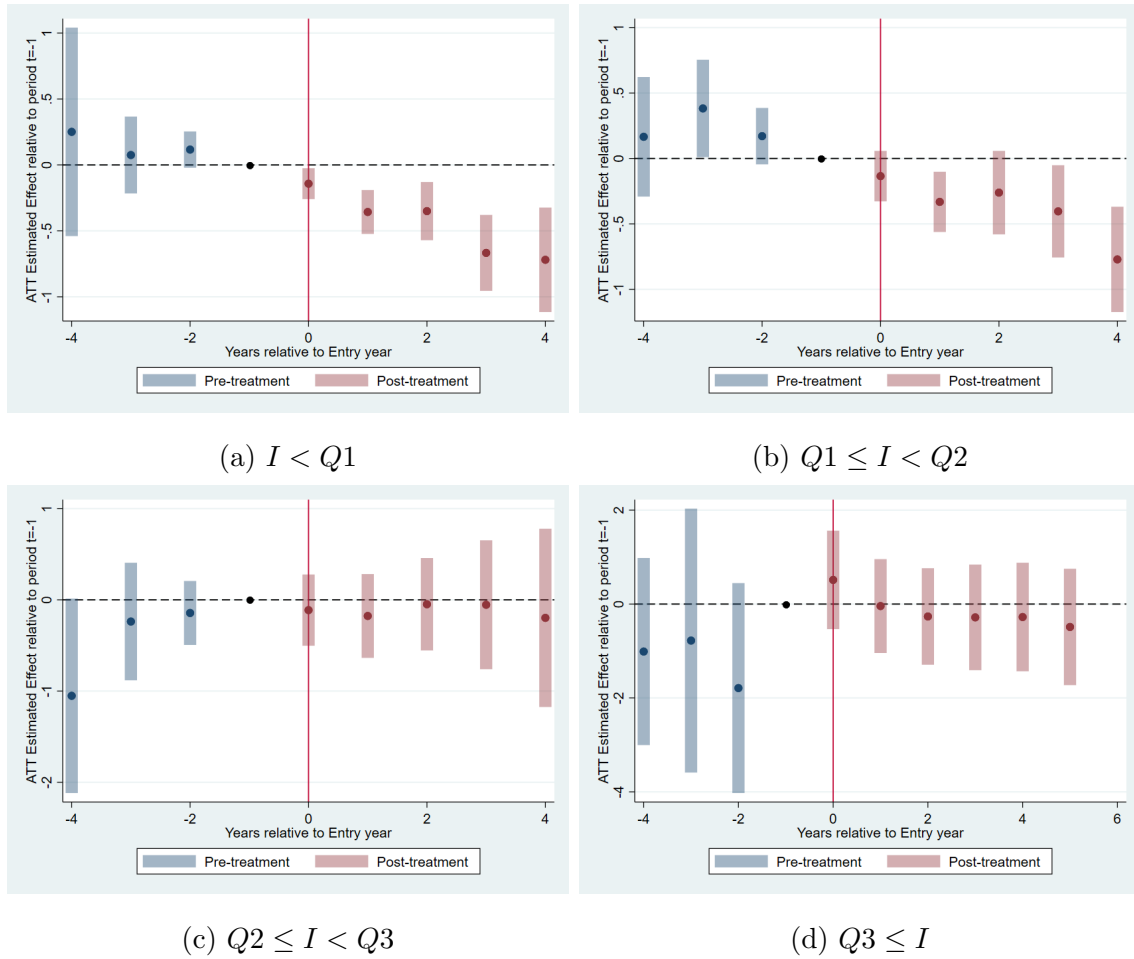


Fig. 3: Effect of entry on municipal employment according to IMC employment quartiles at the entry date

# 5 Estimating the elasticity of municipal employment to IMC employment

## 5.1 Methodology and identification strategy

Following Hamermesh (1996) we choose a log-log specification that allows direct interpretation of the coefficients as elasticities:

$$\begin{aligned} \ln(e_{it}) = & \beta_I \ln(I_{it}) + \beta_u \ln(u_{it}) + \beta_w \ln(w_{it}) + \beta_g \ln(g_{it}) + \beta_m \ln(y_{it}^m) + \beta_\tau \ln(\tau_{it}) \\ & + \sum_j \delta_j \ln(X_{it}^j) + \nu_i + \xi_t + \epsilon_{it} \end{aligned} \quad (2)$$

where  $i$  denotes the municipality index and  $t$  denotes time and variables  $X$  are other control variables.  $\nu_i$  and  $\xi_t$  denote respectively the municipal and time effects.

### 5.1.1 Endogeneity issue

Owing to the institutional context and its consequences, the IMC employment  $I$  should be treated as an endogenous regressor. In order to identify the causal effect of IMC employment on municipal employment, we adopt an IV strategy inspired by the empirical industrial organization literature (Hausman et al. (1994) and Azar et al. (2022)) also used in other fields such as finance (see Karpoff et al. (2017) and Gogineni et al. (2020)). This approach was recently applied to local public finance in Jaaidane and Larribeau (2023) to identify the causal effect of IMC personnel expenditure on French municipal personnel expenditure.

More precisely, we use the IMC neighborhood to build two instruments for the IMC employment level. A "natural" instrument candidate is the average IMC employment,  $\bar{I}$ , computed on its comparable neighbors. We also consider the average proportion of young people,  $\bar{Y}$ , as a second instrument, since it is likely to have an impact on the need for local public services such as kindergartens, elementary schools and extracurricular activities, which are labor intensive.

We examine two geographical sections of French territory to define the IMC neighborhood. We first use the evolving mapping of IMCs. Over the period of study, IMCs have spread and shifted toward the SBT regime. Second, as employment is concerned, the employment zones

(EZ) are relevant to consider. The EZs are geographical zones<sup>17</sup> where workers live and work and where firms can find a large proportion of their labor force. This zoning reflects the actual flows of workers. As a consequence, EZ mapping partitions<sup>18</sup> the local labor markets. For a given IMC, we choose comparable neighbors that have the same population size<sup>19</sup>, the same fiscal regime and are located within the same *département*<sup>20</sup>, but excluding neighbors located within the same EZ.

The conventional approach to selecting an appropriate instrument requires the following two conditions. First, the excluded instrument must be distributed independently of the error process (exogenous). Second, the excluded instrument must be sufficiently correlated with the included endogenous regressor (not weak). As a result, the exclusion restriction is met when the excluded instrument is shown to exert indirect influence on the dependent variable only through the endogenous regressor. In what follows we give the arguments that support the exclusion restriction in our case.

Our approach does not consider that the behavior of comparable IMC neighbors can affect directly the given IMC or the municipal employment levels. On the contrary, to be a valid instrument it should not impact them. A given IMC does not strategically react to the employment choices made by IMCs located outside its EZ. Should interactions exist, they would operate within the same EZ. Our argument is that similar IMCs are likely to have similar patterns in terms of employment policies. These neighbors are used to provide for a proxy<sup>21</sup> for the IMC employment policy. By definition, our instrument can thus only be correlated to IMC employment but not municipal employment. Moreover, the borders of the local labor markets, identified by the EZ official mapping, reflect the actual flows of workers, and the movements of labor forces across EZs borders are very unlikely. We therefore believe that there cannot be unobserved factors that can influence similar IMCs outside the EZ and

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<sup>17</sup> We use the 2010 partition (INSEE) providing information for 304 EZs in Metropolitan France.

<sup>18</sup> In other words, two EZs are separate in the sense that there are no flows of workers between them.

<sup>19</sup> We consider four categories for IMC population size: under 5,000; between 5,000 and 10,000; between 10,000 and 20,000 and over 20,000 inhabitants.

<sup>20</sup> More precisely, within the *département* of the main IMC town, since an IMC can spread over several *départements*.

<sup>21</sup> To justify the use of averages on similar neighbors, we mention that this approach is frequently adopted by the French administration in respect of local public finance policies.



at the same time affect municipal employment under normal circumstances. However, exceptional shocks related to immigration, environment, health—that can change expenditure needs—, labor market or public pension schemes reforms—that can change preferences for public sector—would likely impact the entire labor market, and in particular the public sector. For instance, over our period of study, a government measure (Accords Jacob in 2006) led to an increase in public wages. This impacted all the municipalities and IMCs directly and there is no reason why the impact on municipal employment should have channeled through IMCs.

As for  $\bar{Y}$ , similar arguments can be used to justify that it is also an appropriate instrument. IMCs that have the same proportion of young people are likely to have similar hiring needs, all other things being equal. The neighborhood excluding the EZ ensures its exogeneity. As a result, our two instruments will impact municipal employment indirectly, only through endogenous IMC employment.

To illustrate our methodology, let us take the example of the Aveyron *département* which is covered by four EZs as described in figure 4. Among the 28 IMCs existing in 2008, we consider the IMC CC Millau Grands Causses located in the Millau EZ. It has an SBT regime and 29,195 inhabitants and its employment level  $I$  is equal to 1.58 for 1,000 inhabitants. To find neighbors for the IMC under scrutiny, we select those IMCs that are outside the Millau EZ that have the same fiscal regime and population size. We obtain two neighbors<sup>22</sup> in the Rodez EZ and in the Figeac EZ which have respectively  $I = 3.71$  and  $I = 0.51$  employment levels.

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<sup>22</sup> The number of neighbors is variable across IMCs since the *départements* are heterogenous for different reasons. The number of EZs and IMCs vary across *départements* as well as IMC population size and tax regime. If no neighbor satisfying the 3 criteria is found for a given IMC, the rule is relaxed to allow for 2 criteria. In such a case, we choose as neighbors IMCs in the same *département* that have the same fiscal regime.



Fig. 4: Employment zones. Aveyron *département*

As for the municipal wage  $w$ , there are reasons to believe it is endogenous since mayors are free to choose the composition of their personnel though the pay ladder is fixed at the national level. We provide a discussion on the choice of the instrument  $\bar{w}$  (see Appendix 7.3). Finally, the endogeneity issue could also be raised for the central grant. However, to remain focused on the role of IMCS, we assume the grant is exogenous. We actually tackle this question in Jaaidane and Larribeau (2023), based on the literature on partisan alignment through intergovernmental transfers (see for instance Solé-Ollé and Sorribas-Navarro (2008) and Padovano (2012) on Spanish and Italian data respectively).

### 5.1.2 Experience in an IMC body

Given the event study developed earlier, we investigate how the impact of  $I$  on  $e$  might evolve with time and whether it takes time for the expected substitution effect to appear. In order to count for the experience as an IMC member, we construct a variable called Experience which takes the value 1 for the year of entry in an IMC, the value 2 for the second year, and so on. This variable is 0 when the municipality is outside an IMC. Moreover, for those whose experience is the longest (7 years), we do not observe their date of entry since our

observations start in 2002. Their experience is left-censored as the date of entry could have occurred since 1992. These municipalities have therefore had heterogeneous experiences that cannot be verified. For the latter, we are forced to consider that the Experience variable takes the value 1 in 2002. We also neglect observations corresponding to entries followed by exits and concentrate on observations reflecting uninterrupted membership.

In order to test whether the magnitude of the causal impact of  $I$  on  $e$  can change according to the duration of experience, we add an interaction term between  $I$  and Experience in Equation 2. We also refine the effect by distinguishing between municipalities with experience between 1 and 6 years (i.e. that joined an IMC from 2003 to 2008) and municipalities with seven years or more of experience (i.e. that joined an IMC in 2002 or before).

## 5.2 Results

Table 2 presents the estimation of Equation (2) using three different models. Model (1) corresponds to a fixed effect (FE) model using the within method which fails to take account of the potential endogeneity of  $I$  and  $w$ . Models (2) and (3) are FE models with an IV method to instrument  $I$  and  $w$ . Model (3) counts for experience in an IMC body. Standard errors are clustered at the municipality level<sup>23</sup>. From the Chi2 test of endogeneity in model (2), we can firmly reject the null hypothesis that IMC employment  $I$  and municipal wage  $w$  are both exogenous regressors ( $p=0.00$ ). Moreover, the over-identifying restrictions test (Hansen J test) reveals that our set of instruments is exogenous ( $p=0.75$ ). The Kleibergen-Paap LM test concludes with clear rejection ( $p=0.00$ ) of the null hypothesis that the model is under-identified and the weak identification hypothesis is also rejected since the Cragg-Donald Wald F statistic is much higher than the 10% critical value<sup>24</sup>.

### 5.2.1 IMC Effects

We use  $\bar{I}$ ,  $\bar{Y}$  as instruments for  $I$  in the IMC employment first stage regression<sup>25</sup> of the model (2), the results of which are displayed in table 3. We find highly significant coeffi-

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<sup>23</sup> Clustering at the IMC and EZ levels produces the same results.

<sup>24</sup> Cragg-Donald Wald F=33.60 and Stock-Yoko 10% critical value =13.43.

<sup>25</sup> First stage regression for  $w$  is given in Table 9 in Appendix 7.3.

icients of  $\bar{I}$  and  $\bar{Y}$ , confirming that they can be reasonably considered good predictors of  $I$ . The computation of the Sanderson-Windmeijer (SW)  $R^2$  (=0.071) and the SW F test leads us to reject (p=0.00) the weak instruments hypothesis. The SW Chi2 test concludes also to reject (p=0.00) the under-identification of the endogenous regressor  $I$ . From the Chi2 test of endogeneity, the null hypothesis that  $I$  is exogenous cannot be accepted (p=0.00).

Regarding the impact of the IMC employment level ( $I$ ) on municipal employment ( $e$ ), model (2) reveals positive and highly significant elasticity<sup>26</sup>. This positive effect suggests the dominance of the resource-increased effect over the substitution effect. Within an IMC, municipal employment might either decrease if municipalities transfer responsibilities (substitution effect) or increase when municipalities supply new public services and provide for additional facilities (resource-increased effect). However, the results in model (3) mitigate this finding since the positive causal effect that holds for municipalities with a short experience in IMC becomes significantly negative for those having a long experience. It is worth noting that the positive elasticity is three times smaller than the absolute value of the negative elasticity. It seems that a minimum experience of cooperation is needed for the objective of rationalizing to be met, probably because of the necessary time for organizational change. This result should be interpreted with caution since our period of study is short. Addressing the dynamics over a longer period would allow us to check whether the substitution effect strengthens over time.

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<sup>26</sup> Note that in the model (1) where  $I$  is not instrumented, this effect turns out to be significantly negative. The interpretation is that the reverse causality gives the original FE-OLS parameter sign and fixing it gives the opposite sign.

Table 2: Dependent variable: municipal employment  $e$ . Whole sample

	(1) FE	(2) IV-FE	(3) IV-FE
IMCemp ( $I$ )	-0.00995*** (0.00137)	0.00923** (0.00315)	
with Experience <7 years			0.0105** (0.00383)
with Experience $\geq$ 7 years			-0.0363* (0.0192)
$I$ *Experience			-0.000212 (0.00165)
Unemp ( $u$ )	-0.000675 (0.00359)	-0.00222 (0.00378)	-0.00354 (0.00424)
Unemp*IMC	0.00372*** (0.000854)	0.00543*** (0.00105)	0.00649*** (0.00125)
Unemp*IMC*Q1		-0.00442*** (0.000759)	-0.000712 (0.00141)
Unemp*IMC*Q3		0.00712*** (0.000919)	0.00526*** (0.00155)
Wage ( $w$ )	-0.753*** (0.00786)	-0.539*** (0.120)	-0.455*** (0.130)
Grant ( $g$ )	0.0187*** (0.00284)	0.0194*** (0.00289)	0.0177*** (0.00280)
Grant*Reform	-0.00814*** (0.00225)	-0.00721** (0.00226)	-0.0101*** (0.00255)
Income ( $y^m$ )	0.130*** (0.0272)	0.114*** (0.0292)	0.1000** (0.0312)
TaxRatio ( $\tau$ )	-0.0746*** (0.0122)	-0.0738*** (0.0122)	-0.0756*** (0.0124)
Density	-0.154* (0.0756)	-0.164* (0.0758)	-0.157* (0.0775)
SocHouse	0.00190+ (0.00107)	0.00164 (0.00107)	0.00160 (0.00109)
Young	0.0374** (0.0128)	0.0388** (0.0132)	0.0423** (0.0134)
SecHome	-0.228*** (0.0494)	-0.208*** (0.0516)	-0.198*** (0.0527)
2003	-0.0481*** (0.00453)	-0.0356*** (0.00842)	-0.0408*** (0.00876)
2004	-0.0534*** (0.00266)	-0.0424*** (0.00623)	-0.0481*** (0.00662)
2005	-0.0371*** (0.00217)	-0.0299*** (0.00423)	-0.0339*** (0.00455)
2006	-0.0226*** (0.00161)	-0.0187*** (0.00266)	-0.0208*** (0.00290)
2007	-0.00155+ (0.000864)	-0.00170+ (0.000937)	-0.00311* (0.00136)
$N$	50,526	50,310	50,299
Cities	8,421	8,387	8,387
$R^2$	0.466	0.4254	0.3926
Hansen J (OIR) $\chi^2(1)$		0.101(p=0.75)	
Kleibergen-Paap LM $\chi^2(2)$		86.87(p=0.00)	
Kleibergen-Paap Wald F		29.13	
Cragg-Donald Wald F		33.60	
Endogeneity test $\chi^2(2)$		52.58(p=0.00)	

Notes. Significance levels :+  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Standard errors (in parentheses) are clustered at the municipality level. (1) do not display the same number of observations as (2) and (3) due to missing values when computing the instruments. All variables in logarithms except dummies.

Table 3: First stage regression of model (2)

	IMC employment ( $I$ )
Instruments for $I$	
Averaged IMC employment $\bar{I}$	0.05587*** (0.01286)
Averaged IMC share of young people $\bar{Y}$	0.65900*** (0.03362)
Exogenous regressors	yes
Time dummies	yes
$N$	50,310
Cities	8,387
SW $R^2$	0.07108
SW F	421.08(p=0.0)
SW $\chi^2(2)$	842.56(p=0.0)
Endogeneity Test $\chi^2(1)$	43.861(p=0.0)

Notes: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . IV-FE estimation. All variables in logarithms except dummies. Standard errors clustered at the municipality level. Averages are computed on IMC neighbors.

Our second focus is to understand how local unemployment impacts municipal employment and investigate whether cooperation plays a role. The first-lagged unemployment avoids endogeneity issues and displays a coefficient with a larger significance level than its contemporaneous value. Models (2) and (3) show that only municipalities within an IMC react positively and significantly to unemployment, even though the magnitude of the elasticity is rather small. There is no impact of unemployment on municipalities outside an IMC. Outside an IMC, it could be the case that mayors directly provide enough services to their electorate so that they can avoid fighting unemployment without adverse effects. Moreover, as members of an IMC, mayors are granted more resources, which could give them the opportunity to cope with unemployment. Differentiating according to IMC employment level, we consider municipalities belonging either to an IMC with a small employment level (below the first quartile Q1) or with a large employment level (above the third quartile Q3). In municipalities with low IMC employment level—which could be called “empty shell” IMCs (West (2007))—the impact of unemployment is mitigated: mayors are less sensitive to unemployment. The reverse holds for municipalities with large IMC employment levels—“inflated” IMCs— where the impact of unemployment on municipal labor is strengthened<sup>27</sup>. This sug-

<sup>27</sup> In model (3), the same result holds except for municipalities with low IMC employment level which

gests that in these IMCs, mayors could use municipal employment to cope with issues such as unemployment because they lose direct control over many public services. Not only does cooperation *per se* changes the reaction of mayors to unemployment, but it also changes the magnitude of IMC employment.

### 5.2.2 Other results

We now comment on models (2) and (3) in table 2 focusing on other determinants identified in the literature and control variables. First, the impact of wage on municipal employment is highly significant, with an estimated elasticity of less than one in absolute value. As far as we know, this is the first work on French data providing an estimate of this elasticity. However, a cautious interpretation is required because, strictly speaking, this is elasticity in the wage bill, not the wage. Second, the impact of the main central government transfer is positively significant. Moreover, the 2004 reform—merging the main grants allocated by the central government to municipalities—mitigates this impact: it is likely that the municipalities have realized that the overall grant level would not increase (they anticipated that various subsidies would be rationalized into an unchanged, overall subsidy). Median income elasticity is significantly positive and large as compared to grant elasticity. The fly-paper effect<sup>28</sup>, according to which an extra euro of grant leads to larger public spending than would an extra euro of the median voter’s income, does not hold when municipal employment is studied. As expected, tax ratio elasticity is significantly negative. Moreover, the negative coefficient of the population density suggests that economies of density are achieved when delivering public services. Finally, note that the young people coefficient is significantly positive, confirming that it matters for municipalities and thereby supports the choice of our second instrument for  $I$ .

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effect is insignificant.

<sup>28</sup> See Hines and Thaler (1995) and Baskaran (2016) among others.

### 5.3 Robustness checks

We run model (3) on various sub-samples according to urban vs rural municipality location and population size<sup>29</sup>. First, table 4 shows that the positive causal effect of  $I$  on  $e$  holds for urban and rural municipalities. Moreover, this positive effect decreases over time for rural municipalities turning into a negative elasticity eventually. Note that our other main results are valid for both sub-samples.

Next, in table 5 the very small sub-sample covers municipalities below 1,500 inhabitants, the small one municipalities between 1,500 and 2,000, the medium one cities between 2,000 and 10,000 and the large sub-sample those with more than 10,000 inhabitants. The effect of  $I$  on  $e$  is significantly positive for small, medium, and large municipalities. For large municipalities, elasticity becomes negative after a minimum experience in cooperation.

Finally, we propose two alternative specifications as an additional robustness check. Since part of the effect of joining an IMC could come through more resources, i.e. more grants or more tax revenues, we drop the grant and tax ratio variables in column (1) of table 6. It shows that our main results still hold. Using variables in level in column (2) does not produce the same kind of results. The log-log specification offers the opportunity to directly quantify elasticities.

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<sup>29</sup> As another robustness check, we test for a specification where the IMC workers are apportioned to municipalities according to their population. This can be justified since a worker in an IMC might be shared by all the municipalities that belong to that IMC. The results are presented in the appendix section 7.4.



Table 4: Dependent variable: municipal employment  $e$ . Urban and rural municipalities subsamples

	Urban	Rural
IMCemp ( $I$ )		
with Experience <7 years	0.00821*	0.0313**
	(0.00418)	(0.0111)
with Experience $\geq$ 7 years	-0.0324	0.0127
	(0.0211)	(0.0512)
$I$ *Experience	0.00201	-0.0118*
	(0.00149)	(0.00574)
Unemp ( $u$ )	-0.00608	0.00510
	(0.00493)	(0.00947)
Unemp*IMC	0.00546***	0.0113***
	(0.00148)	(0.00267)
Unemp*IMC*Q1	-0.00147	-0.00233
	(0.00183)	(0.00264)
Unemp*IMC*Q3	0.00712***	-0.00160
	(0.00161)	(0.00435)
Wage ( $w$ )	-0.611**	-0.329 <sup>+</sup>
	(0.190)	(0.199)
Grant ( $g$ )	0.0143***	0.0327***
	(0.00311)	(0.00842)
Grant*Reform	-0.00816**	-0.00540
	(0.00274)	(0.00706)
Income ( $y^m$ )	0.151**	0.159**
	(0.0484)	(0.0513)
TaxRatio ( $\tau$ )	-0.0811***	-0.0728*
	(0.0138)	(0.0300)
Density	-0.387***	-0.0942*
	(0.0442)	(0.0480)
Control variables	yes	yes
Time dummies	yes	yes
$N$	31,098	14,655
Cities	5,184	2,444
$R^2$	0.4593	0.2797

Notes: <sup>+</sup>  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Standard errors clustered at the municipality level. IV-FE. All variables in logarithms except dummies.

Table 5: Dependent variable: municipal employment  $e$ . Subsamples by municipal population size

	Very Small	Small	Medium	Large
IMCemp ( $I$ )				
with Experience <7 years	0.00897 (0.00778)	0.0242 <sup>+</sup> (0.0134)	0.0129* (0.00572)	0.00870 <sup>+</sup> (0.00519)
with Experience $\geq$ 7 years	-0.0550 (0.0367)	0.0315 (0.0506)	-0.0358 (0.0275)	-0.0424* (0.0189)
$I$ *Experience	-0.00292 (0.00399)	-0.000955 (0.00603)	-0.000897 (0.00193)	-0.00121 (0.00225)
Unemp ( $u$ )	0.00638 (0.00758)	0.0000478 (0.00838)	-0.0138* (0.00615)	-0.0354 (0.0262)
Unemp*IMC	0.00370 (0.00253)	0.00647* (0.00301)	0.00852*** (0.00175)	0.0119*** (0.00356)
Unemp*IMC*Q1	0.00257 (0.00253)	-0.00584* (0.00284)	-0.000678 (0.00229)	-0.00282 (0.00270)
Unemp*IMC*Q3	0.000230 (0.00385)	0.00617 (0.00445)	0.00558** (0.00192)	0.00884* (0.00345)
Wage ( $w$ )	-0.460** (0.175)	-0.548 (0.337)	-0.420 <sup>+</sup> (0.233)	-0.686 <sup>+</sup> (0.367)
Grant ( $g$ )	0.0252*** (0.00739)	0.0165** (0.00625)	0.0119*** (0.00356)	0.0305** (0.0106)
Grant*Reform	-0.0212** (0.00698)	-0.00529 (0.00820)	-0.00595 <sup>+</sup> (0.00319)	-0.0172** (0.00591)
Income ( $y^m$ )	0.118* (0.0499)	0.0575 (0.0629)	0.125* (0.0540)	0.130 (0.119)
TaxRatio ( $\tau$ )	-0.0593* (0.0241)	-0.0427 (0.0288)	-0.103*** (0.0168)	-0.0854* (0.0386)
Density	-0.0987 <sup>+</sup> (0.0523)	-0.349*** (0.0996)	-0.240*** (0.0536)	-0.557*** (0.107)
Control variables	yes	yes	yes	yes
Time dummies	yes	yes	yes	yes
$N$	14,328	8,516	22,398	5,057
Cities	2,389	1,420	3,735	843
$R^2$	0.3981	0.4279	0.3647	0.5616

Notes: <sup>+</sup>  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Standard errors clustered at the municipality level. IV-FE. All variables in logarithms except dummies.

Table 6: Dependent variable: municipal employment  $e$ . Whole sample. Alternative Specifications

	Without Grant and Tax Ratio	Variables in Level
IMCemp ( $I$ )		
with Experience <7 years	0.0111** (0.00389)	-0.237*** (0.0631)
with Experience $\geq$ 7 years	-0.0429* (0.0191)	-0.612+ (0.347)
$I$ *Experience	-0.0000999 (0.00168)	-0.00106 (0.0107)
Unemp ( $u$ )	-0.00390 (0.00428)	11.11 (7.350)
Unemp*IMC	0.00638*** (0.00126)	-2.731 (1.964)
Unemp*IMC*Q1	-0.0000538 (0.00141)	0.0667 (0.0772)
Unemp*IMC*Q3	0.00495** (0.00156)	-0.157 (0.164)
Wage ( $w$ )	-0.453*** (0.131)	-0.0467 (0.0777)
Grant ( $g$ )		2.017*** (0.543)
Grant*Reform		-0.187 (0.309)
Income ( $y^m$ )	0.0948** (0.0314)	0.0588** (0.0192)
TaxRatio ( $\tau$ )		-3.617*** (0.565)
Density	-0.150* (0.0731)	-0.0558+ (0.0328)
Control variables	yes	yes
Time dummies	yes	yes
$N$	50,299	50,311
Cities	8,387	8,387
$R^2$	0.3865	0.0519

Notes: +  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Standard errors clustered at the municipality level. IV-FE. In column 1, all variables are in logarithms except dummies.

## 6 Conclusion

In this paper, we examine an understudied phenomenon: the effect of inter-municipal cooperation on municipal public employment. Based on an event study, we show that municipalities experience personnel downsizing following their entry, regardless of the personnel size of the IMC. As the latter turns out to matter, we provide a thorough analysis of its causal impact on municipal employment. We evidence a substitution effect in municipalities having minimum experience in an IMC. Moreover, we show that cooperation leads mayors to hire more when unemployment is higher and this effect is stronger in “inflated” IMCs than in “empty shell” IMCs.

In order to complete our work, a natural extension would be to use more recent data on municipalities. The analysis could be improved by considering other elements of interest. First, instead of the aggregate employment level, we could distinguish between employees operating in different types of services (Administration, Security, Technical Services, Culture and Sports, Medical and Social Services), consider the status of employees (whether tenured or not) and count for full-time versus part-time jobs. Second, since many public services (water distribution, urban transportation, and waste collection) can be outsourced, this might have an impact on the wage bill (Levin and Tadelis (2010)).

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## **7 Appendix**

## 7.1 Summary statistics

Table 7: Summary statistics

Variable	Panel	Mean	sd	min	max	Observations
MUNemp ( $e$ )	Overall	10.95483	6.407719	0	149.5427	N = 59850
	Between		6.331889	0	139.4184	n = 8550
	Within		.9849175	-5.51351	30.8668	T = 7
dumIMC	Overall	.8741688	.3316619	0	1	N = 59850
	Between		.2827983	0	1	n = 8550
	Within		.1732995	.0170259	1.731312	T = 7
IMCemp ( $I$ )	Overall	1.896307	2.073585	0	55	N = 52319
	Between		1.945588	0	28.66372	n = 7924
	Within		.6846474	-20.67704	33.8235	T = 6.6026
Unemp ( $u$ )	Overall	.0343148	.0140631	0	.3493544	N = 58961
	Between		.0129556	.0103769	.3030764	n = 8423
	Within		.0054718	-.0462552	.0955155	T = 7
Wage ( $w$ )	Overall	33.07351	4.682961	8.796075	82.22693	N = 59836
	Between		3.862128	14.5611	73.70364	n = 8548
	Within		2.648696	8.228637	62.05044	T = 7
Grant ( $g$ )	Overall	.2126703	.0810653	0	1.629625	N = 59850
	Between		.0760626	.0476884	1.144168	n = 8550
	Within		.0280472	-.9306368	.8672906	T = 7
Income ( $y^m$ )	Overall	19.83834	3.777346	9.634184	49.92582	N = 59850
	Between		3.722942	10.0587	46.79926	n = 8550
	Within		.6398721	14.66192	23.95201	T = 7
TaxRatio ( $\tau$ )	Overall	.2814205	.1069798	.010888	.5926805	N = 59850
	Between		.106245	.0130079	.5424203	n = 8550
	Within		.0125622	.1301398	.5295436	T = 7
Density	Overall	5.036541	13.48594	.0539444	262.3444	N = 59850
	Between		13.48267	.0535376	254.1972	n = 8550
	Within		.3263766	-10.12584	17.69197	T = 7
SocHouse	Overall	.0940385	.1117226	0	.9684587	N = 59850
	Between		.111402	0	.8741289	n = 8550
	Within		.0085314	-.2518411	.379663	T = 7
Young ( $Y$ )	Overall	.1737581	.0305731	.0578444	.3855488	N = 59850
	Between		.0288599	.0781704	.3205895	n = 8550
	Within		.0100948	.0830613	.353124	T = 7
SecHome	Overall	.0846523	.1385068	0	1.728029	N = 59850
	Between		.1383912	0	1.597544	n = 8550
	Within		.005825	-.0563382	.218144	T = 7
$\bar{w}$	Overall	32.64125	1.845736	25.75241	38.97648	N = 58723
	Between		1.474075	28.52955	37.72526	n = 8389
	Within		1.110886	28.8162	35.74595	T = 7
$\bar{I}$	Overall	1.62674	1.402731	0	28.37391	N = 59850
	Between		1.20057	0	16.21	n = 8550
	Within		.7255549	-11.98615	19.07294	T = 7
$\bar{Y}$	Overall	.1494864	.0600345	0	.2534525	N = 59850
	Between		.0515155	0	.2310654	n = 8550
	Within		.0308312	-.0535195	.3317727	T = 7

## 7.2 Event study results

Table 8: Estimated effects of entry on different outcomes

outcome	$e$	$G$	Tax cap	$e$ $I < Q1$	$e$ $Q1 \leq I < Q2$	$e$ $Q2 \leq I < Q3$	$e$ $Q3 \leq I$
Pre_avg	0.100 (0.118)	0.0102* (0.00509)	0.00166 (0.00541)	0.148 (0.177)	0.239 (0.152)	-0.478 (0.318)	-1.193 <sup>+</sup> (0.697)
Post_avg	-0.683*** (0.0955)	-0.0562*** (0.00362)	-0.00438 (0.00399)	-0.447*** (0.109)	-0.381** (0.133)	-0.118 (0.271)	-0.140 (0.550)
t-5	0.196 (0.259)	0.00683 (0.0105)	-0.00176 (0.0124)				
t-4	0.0195 (0.152)	0.0167* (0.00697)	0.00123 (0.00626)	0.251 (0.403)	0.165 (0.233)	-1.052 <sup>+</sup> (0.544)	-1.011 (1.017)
t-3	0.128 (0.0905)	0.0137** (0.00447)	0.00520 (0.00390)	0.0753 (0.149)	0.382* (0.190)	-0.238 (0.329)	-0.778 (1.434)
t-2	0.0573 (0.0512)	0.00367* (0.00186)	0.00196 (0.00199)	0.116 <sup>+</sup> (0.0702)	0.170 (0.110)	-0.144 (0.179)	-1.790 (1.141)
t	-0.307*** (0.0497)	-0.0255*** (0.00177)	-0.00257 (0.00193)	-0.142* (0.0597)	-0.135 (0.0984)	-0.113 (0.199)	0.514 (0.535)
t+1	-0.546*** (0.0684)	-0.0581*** (0.00347)	0.00335 (0.00313)	-0.357*** (0.0849)	-0.332** (0.117)	-0.177 (0.234)	-0.0429 (0.510)
t+2	-0.628*** (0.0916)	-0.0590*** (0.00374)	-0.00394 (0.00366)	-0.350** (0.113)	-0.261 (0.163)	-0.0484 (0.258)	-0.265 (0.524)
t+3	-0.739*** (0.111)	-0.0617*** (0.00412)	-0.00723 (0.00462)	-0.667*** (0.147)	-0.404* (0.180)	-0.0540 (0.360)	-0.284 (0.574)
t+4	-0.848*** (0.140)	-0.0653*** (0.00476)	-0.00888 (0.00558)	-0.719*** (0.202)	-0.772*** (0.205)	-0.198 (0.499)	-0.276 (0.590)
t+5	-1.028*** (0.165)	-0.0675*** (0.00479)	-0.00704 (0.00677)				-0.488 (0.632)
$N$	14538	14538	14538	6721	4470	4212	6628
Cities	2,081	2,081	2,081	1,475	887	803	1,948

Notes: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Point Estimates of equation 1. Standard errors are clustered at the municipality level. Reference period: t-1. Control group: never-treated. Treated groups: entries into IMCs from 2003 to 2007.

## 7.3 On the endogenous municipal wage

Though there is a national wage scale fixing the base salary<sup>30</sup> for the personnel hired under a public employment contract, mayors are still able to decide on contracts under which they

<sup>30</sup> See Jaaidane (2010) and Clark and Milcent (2011).

hire employees, and on their allocation among services.

Our data show that annual wages range from 20,000 to 45,000 € which suggests that municipalities vary widely. This could be the result of different personnel skills, a different promotion process, a different share of public versus private employment contracts and/or different shares of bonuses in the wages and benefits packages<sup>31</sup>. Our data do not allow for the identification of the different sources of the wage variance.

In practice, as documented by Lichter et al. (2015) in their meta-analysis, many studies assume that wages are exogenous from the perspective of the individual employer (see Hamermesh (1996)). The validity of the wage exogeneity assumption is debated, and many attempts have been made to find instruments for the wage rate<sup>32</sup>.

It is thus difficult to find an instrument correlated with labor supply that does not affect at the same time labor demand. However, we address the question and propose an instrument for the municipal wage. We exploit the partition in terms of EZs, proceeding in the same vein as for the instrumentation of  $I$ . We instrument the wage of a given municipality  $i$  by the average wage, denoted  $\bar{w}$ , set by its neighboring municipalities but excluding municipalities in the same EZ. By neighborhood, we mean the municipalities that are members of EZs close<sup>33</sup> to the EZ to which  $i$  belongs, and within the same *département*. The average wage computed at the *département* level generates sufficient variability in the instrument  $\bar{w}$ .

Table 9 displays the first stage results where  $w$  is regressed on the instruments  $\bar{w}$ ,  $\bar{I}$  and  $\bar{Y}$  and all exogenous regressors, using the IV-FE method. Since  $\bar{w}$  has a highly significant coefficient, it can be seen as a good predictor of  $w$ . The computation of the SW F test leads to a clear rejection of the weak instruments hypothesis and the SW Chi2 test rejects the under-identification of the endogenous regressor  $w$ . From the Chi2 test of endogeneity, the null hypothesis that the municipal wage  $w$  is exogenous cannot be accepted (p=0.02).

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<sup>31</sup> A municipality that hires highly skilled personnel under private employment contracts is likely to have a larger annual wage than a municipality which has low skilled employees on public employment contracts.

<sup>32</sup> Lagged values of endogenous variables are commonly used as instruments, but serious concerns have been raised about their validity (Angrist and Krueger (2001)).

<sup>33</sup> Two EZs are considered as close when they share a common border.

Table 9: First stage regression of model (2)

	Municipal Wage ( $w$ )
Instrument for $w$ :	
Averaged Wage $\bar{w}$	0.26490*** (0.03134)
Exogenous regressors and Instruments for $I$	yes
Time dummies	yes
$N$	50,310
Cities	8,387
SW $R^2$	0.00240
SW F	43.69(p=0.0)
SW $\chi^2(2)$	87.43(p=0.0)
Endogeneity Test $\chi^2(1)$	5.134(p=0.02)

Notes: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . IV-FE estimation. All variables in logarithms except dummies. Standard errors clustered at the municipality level. The averages are computed on IMC neighbors.

## 7.4 Apportioning IMC employees to municipalities according to their population size

We test for another specification where the IMC workers are apportioned to municipalities according to their population. This can be justified since a worker in an IMC might be shared by all municipalities that belong to that IMC. Table 10 shows that our main results still hold. Notice that the elasticity of  $e$  to  $I$  for short-experienced is much higher<sup>34</sup> (almost 0.1) and this positive effect decreases over time, eventually becoming negative elasticity.

<sup>34</sup> This can be explained by the fact that the weight is on average equal to 17%.

Table 10: Dependent variable: municipal employment  $e$ . Apportioning the IMC workers to municipalities according to their population

	(1)
$I^*$ weight	
with Experience <7 years	0.0968*** (0.0200)
with Experience $\geq$ 7 years	-0.0245 (0.0511)
$I^*$ weight*Experience	-0.0246*** (0.00732)
Unemp ( $u$ )	0.000377 (0.00464)
Unemp*IMC	0.00717*** (0.00112)
Unemp*IMC*Q1	-0.00159* (0.000712)
Unemp*IMC*Q3	0.00298* (0.00128)
Wage ( $w$ )	-0.376** (0.131)
Grant ( $g$ )	0.0159*** (0.00283)
Grant*Reform	-0.00337 (0.00234)
Income ( $y^m$ )	0.0723* (0.0313)
TaxRatio ( $\tau$ )	-0.0692*** (0.0124)
Density	-0.176* (0.0848)
Control variables	yes
Time dummies	yes
$N$	50,299
Cities	8,387
$R^2$	0.3433

Notes: +  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Standard errors clustered at the municipality level. IV-FE. All variables in logarithms except dummies. Weights are computed as the ratio of municipal population to IMC population.