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Inter-Municipal Cooperation and Municipal Employment: Evidence from France

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Abstract

While in many countries municipalities are major employers, studies of their labor demand are surprisingly scarce. We build an original panel dataset of 8,421 municipalities (more than 1,000 inhabitants) in France over the 2002-2008 period, during which the inter-municipal cooperation (IMC) was fostered.
We show that wages, grants, median income and tax capacity explain the labor demand. We evidence a positive causal impact of the IMC employment on municipal employment. Moreover, IMC leads mayors to increase municipal employment when unemployment is higher and this effect is greater for municipalities nested in large employment cooperation bodies than in small ones.

Keywords: Inter-municipal cooperation, Municipal employment, Median voter model, Instrumental variables, Panel data.

JEL Classification: H70, J45, C23

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1 Introduction

Since municipalities are important employers in many countries, it is an important issue to understand what explains their labor demand (see Bergström et al. (2004) and Lundqvist et al. (2014) for studies on Swedish data). Our objective is to address this question using French data over the period 2002-2008, which to the best of our knowledge has not been studied yet.

There are different reasons to tackle the question of disentangling the driving forces of municipal labor demand. First, the French municipalities represent 64 % of total employment at the local governments level in 2002 and 57 % in 2008. Second, the French municipalities' wage bill[1] increased on average by 3.5% each year over the period. As governments and specially local ones are operating in tight budgetary contexts, the sources of this increasing trend should be identified in order to reduce or control these expenditures. Third, as one of the inter-municipal cooperation (IMC) justification was the costs savings, it is interesting to consider the relationship between the employment decisions at the municipal and inter-municipal levels. If the competencies transfer from municipalities to IMC bodies leads naturally to an increase of employment at the IMC level, the way it translates in terms of employment at the municipal level remains unknown at first glance. Finally, since unemployment is a major concern, we also investigate whether the local unemployment has an impact on municipal employment.

We exploit an original balanced panel dataset of 8,421 French municipalities of more than 1,000 inhabitants over the 2002-2008 period. We estimate our labor demand equation using a 2SLS method assuming fixed municipal effects. Our results are obtained using an IV estimation method owing to endogeneity issues. Indeed, the IMC employment level can not be considered as exogenous since, first, mayors decide to transfer to the IMC level some competencies that they used to have, and second, they send delegates chosen among municipal counsellors to represent the municipality in the IMC council.

In order to identify the causal impact of IMC employment on municipal employment, we exploit two partitions of the French territory: the geographical partition in terms of employ-

[1] Over the period the wage bill weighed around 50% of the operating budgets.

ment zones (EZs)–based on the flows of workers' commuting journeys–used to study local labor markets and the geographical allocation of the IMC bodies. We build instruments inspired from the industrial organization methodology (Hausman et al. (1994) and Azar et al. (2019)). More precisely, we compute the average IMC employment and the average share of second homes considering the IMC body's neighborhood. The IMC neighbors are defined as those having the same population size and fiscal regime as the considered IMC body and located within the same county, but excluding those in the same EZ. As endogeneity might be generated by local unobservable factors, these neighboring averages are likely to reflect movements that are independent of local circumstances.

We first give causal estimates of municipal employment elasticities with respect to the main factors identified in the literature[2], such as the public employees' wages, grants received from the central government, the tax capacity and households median income. We show that the impact of wages on municipal labor demand is highly significant, with an estimated elasticity of less than one in absolute value. This makes wages the main driving force behind labor demand. As far as we know, this is the first work on French data providing an estimate of this elasticity. The effect of the main central government transfer is significant and positive although the magnitude of the elasticity is rather small. The median income estimated elasticity is found positive and significant and its magnitude is large compared to grant elasticity (more than four times higher). The data exhibit a political cycle effect[3], in line with the traditional public choice point of view that politicians in office tend to have opportunistic behavior in order to maximize their chances of re-election. We show that mayors have their own self-serving agenda: they increase municipal employment in pre-electoral periods.

Second, we study explicitely the relationship between employment at the municipal and inter-municipal levels. We find a positive causal impact of IMC employment on municipal employment, which makes them complements. This impact, called *direct IMC effect*, reveals that IMC does not lead to municipal personnel downsizing, although IMC, according to its advocates, is expected to allow economies of scale inducing cost savings. This positive impact could be the result of a combined effect of IMC membership. The transfer of municipal

[2] See Ehrenberg and Schwarz (1986), Gregory and Borland (1999).

[3] Local elections were held on 2001 and 2008.

responsibilities to the IMC level leads to a substitution effect. However, mayors are allowed to offer new municipal public services thanks to an income effect, which dominates the substitution effect.

Third, we focus on the interplay between unemployment in the municipality, IMC membership and the extent of cooperation at the IMC level. We show the existence of an *indirect IMC effect*: mayors hire more people when local unemployment is higher. This suggests that when mayors control a reduced range of local public services due to the transfer to the IMC level, as members of an IMC, they tend to be more sensitive to local unemployment. Moreover, they have access to additional resources within the IMC body so that they are more inclined to seek to cope with unemployment.

Controlling for the magnitude of the inter-municipal employment, it turns out that the *indirect IMC effect* is greater for municipalities nested in large employment cooperation bodies than in small ones.

Fourth, we study whether the dynamics of IMC membership matters and show that, once entered in an IMC body, the *direct IMC effect* holds. Moreover, it seems like a minimal experience of cooperation is needed for the complementary relationship to be enhanced.

Among the rare studies on local governments' labor demand, the closest to our analysis focus on municipal labor demand in Sweden. Bergström et al. (2004) studied the effects of grants and wages on municipal labor demand over the period 1988-1995. They also investigate the effects of a reform in 1993 which changed the grants from targeted to general. They find that intergovernmental grants affected municipal labor demand more before the reform than afterwards. Lundqvist et al. (2014) looked at Swedish local public employment over the period 1996-2004, and showed that the impact of grants on total local employment is not statistically significant. Running the estimation to evaluate the impact on the different sectors (childcare, schools, elderly care and social welfare...) they found no impact on employment in the latter sectors but a positive and significant impact on administrative personnel. Dahlberg and Mörk (2006) exploited data on employment in Swedish municipalities over the period 1990-2002, and showed that increased wages for bureaucrats have a smaller effect on labor demand than increased wages for other types of public employees.

These different papers analysing municipal labor demand in Sweden, and those published earlier by Courant et al. (1979) and others (see surveys by Gregory and Borland (1999) and Alesina et al. (2000)) give contrasting empirical results on the explanatory factors of municipal demand.

The comparison of the magnitude of the respective effects of the median income and the grant on public spending is a common issue in the literature. It has led to the existence of the fly-paper effect[4], according to which, an extra euro of grant leads to larger public spending than would an extra euro of the median voter's income. Our results show that this effect does not hold when municipal employment is studied, whereas former French studies have shown this to be the case when considering total municipal spending.

We find a political cycle effect in line with the abundant literature both theoretical on the effect of elections on policies decided by incumbents (Besley and Case (2003)) and empirical (Veiga and Veiga (2007) on Portuguese data, Dahlberg and Mörk (2011) on Scandinavian data and Foucault et al. (2008) on French data).

The developing research on the impact of IMC on different economic variables reveals it is a major concern worldwide and especially in Europe (Hulst and van Montfort (2007) and Luca and Modrego (2020)). Among the contributions using French data, Tricaud (2019) exploits a natural experiment–the 2010 reform that forced municipalities to join an IMC body by 2014– and evidences how the determinants of the reluctance to cooperate vary across municipalities. Unfortunately, we are unable to take into account this reform: our dataset covering the period 2002-2008 is constrained by the annual survey on municipal employment that ended in 2008. Other contributions address the impact of IMC on local taxation (Charlot et al. (2015), Ly and Paty (2020)) or local spending (Frère et al. (2014) and Leprince and Guengant (2002)).

Our *direct IMC effect* is congruent with the literature on the "natural expansion" of the local public sector with overlapping jurisdictions (Brennan et al. (1980)), which focus on the interplay of spendings at the upper and lower tiers). We obtain a similar result, expressed in terms of employment levels, therefore validating the Leviathan hypothesis.

As for the relationship between unemployment and public employment, two strands of the literature are worth noting. First, studies of the impact of public employment on the la-

[4] Hamilton (1986) and Hines and Thaler (1995).

bor 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, two important contributions on employment in French hospitals are more directly linked to our work. Clark and Milcent (2018) found 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 identification strategy and provides an analysis of the instruments validity. The empirical results are given in Section 4 and Section 5 concludes.

2 Institutional facts about French municipalities

2.1 Municipalities' budgets

The municipalities' resources consist mainly of tax revenues and grants from the central government, borrowing being used only to finance investment spending. More precisely, the 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 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.

The major transfer received from the central government is the *Dotation globale de fonctionnement* (DGF), a lump-sum grant allocated to municipalities in order to help them in their operating budget. It also has a fiscal equalization objective. It is a general grant so that local governments can freely use it. Its allocation is based on a set of criteria reflecting the characteristics of municipalities, among them tax capacity. Besides this DGF, many targeted subsidies are granted to local governments by different State Departments, according to so many different rules that a reform was called for. Therefore, a merging of the different grants was implemented in 2004, the former DGF (in 2003) representing half the new DGF in 2004 at the national level. This could have led the municipalities to the misleading perception that the central government was more generous in 2004 than in 2003.

2.2 Local government architecture in France

France is a unitary country with three layers of local governments: the regions, counties, *i.e. départements* and municipalities—from the largest to the smallest—form the local public sector. Though decisions taken at the national level have to be implemented at the local level, local authorities are also responsible for childcare, pre-school and elementary school, care for the elderly, water distribution, waste collection and local roads. The law leaves them free to develop a wide range of additional and optional local public services such as tourism, sports and culture. Moreover, the principle of free administration permitted by the French Constitution allows the local authorities to set public employment at the level they wish.

Over our period of study (2002-2008) the number of municipalities is almost constant (36,569 in 2008, excluding overseas). The high fragmentation at the municipal level—20,200 municipalities have less than 500 inhabitants—has motivated governments to foster IMCs. The objectives were to reduce tax competition between municipalities in the same employment zone, to reduce the costs of local public services via economies of scale, and to create new public services that were not provided before. This movement, initiated by a 1992 Act, followed by a 1999 Act, has successfully promoted the creation of many IMC structures. While in 2002, around 70% of municipalities were part of an IMC, this number reached around 90% in 2008. The 2010 Act required every municipality to be a member of an IMC structure by 2014.

IMC structures differ according to their jurisdictional type, fiscal regime, population size and the scope of competencies that may be transferred. The principal jurisdictional types are the *communautés de communes* (hereafter CC), chosen in majority by municipalities in rural areas, the *communautés d'agglomération* (CA) and the *communautés urbaines* (CU) preferred by municipalities in urban areas.

The main groups of competencies, which by law have to be transferred to the IMC body, are the economic development, space management, social housing planning and urban policy. Choosing to be part of a CC is less demanding in terms of transfer than choosing a CU. As a result, the CU is the most integrated form of cooperation leaving the fewest degrees of freedom to its members.

There exist two IMC taxation regimes. In the additional taxation regime (ATR), the IMC body 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 body sets the business tax rate that applies to all IMC members. This business tax is levied on the municipalities' pooled business tax bases. IMC members remain responsible for the other three taxes.

IMC bodies can be created and may disappear (in net terms, their number increased from 2,160 in 2002 to 2,567 in 2008) and their scope may also change when, for instance, they admit a new member. They also shifted from the ATR to SBT regime as a response to the fiscal and financial incentives provided by the 1999 Act. Table 1 describes the IMC bodies classification.

Table 1: Description of IMC structures

Jurisdictional Type	Fiscal regime	Size (inhabitants)	Transferred competencies
CC	ATR or SBT	no restriction	2 compulsory and 1 optional
CA	SBT	$> 50,000$	4 compulsory and 3 optional
CU	ATR or SBT	$> 500,000$	7 groups of competencies

For CC, the composition of each set of competencies is freely determined.

Last, the jurisdictional type of the IMC structure, its fiscal regime and the will of its members determine the set of competencies that a municipality eventually transfers to the IMC level. Therefore, the allocation of local competencies between the municipal and inter-municipal levels is highly diversified and changes over time. The distribution of local employees between the two layers differs across IMC bodies and is the result of interdependent decisions taken at the municipal and inter-municipal levels.

3 Empirical test of the municipal labor demand

3.1 Theoretical predictions

As predicted by the theoretical model, see appendix 6.1, the principal driving forces of municipal labor demand are the median voter's income y^m, the per capita grant g, the public workers' wage w and the tax ratio τ:

$$e^* = e(w, g, y^m, \tau), \tag{1}$$

where e^* is the optimal per capita public employment.

We should expect a negative relationship between e^* and both the municipal employees wage w and the tax ratio τ. It is likely that there will be a positive relationship between e^* and both the per capita grant g and the citizen's income y^m.

3.2 The dependent and independent variables

The dependent variable, denoted e, is the employment rate defined as the ratio of the number of employees per 1,000 inhabitants. We consider total municipal employment[5].

Municipal labor demand is governed by the following set of variables. The resources of municipalities are central to explaining differences in municipal employment. Total municipal revenues come from taxation and a grant g from the central government. We consider the tax ratio τ, defined as the ratio of the median voter tax base to the average tax base in the municipality. Naturally, the households' median income y^m plays a key role.

Public services provision costs also matter: the wages of public employees, w, are crucial. Following Bergström et al. (2004) and Buch and Lipponer (2010), we compute the mean personnel expenditure per municipal employee dividing the total wage bill by the number of employees.

Finally, we exploit the municipality's membership in an IMC body and the public employment rate at the IMC level, denoted I.

We also control for other variables of interest such as the principal characteristics of the

[5] 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.

municipalities. We consider the population, both in density and structure. We also compute the respective shares of social housing (subsidized) and of second homes as well as the unemployment rate.

3.3 The Data

First, employment data in the municipalities and their IMC structures come from the COLTER annual survey[6] handled by INSEE until 2008. We exploit the full-time equivalent employment which controls for the widespread use by municipalities of part-time jobs.
Second, we use the INSEE database to generate the population[7] 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, the DGFIP[8] database provides us with the municipal employees' payroll.
We use the DGCL[9] annual database, to calculate per capita grant, population density, shares of subsidized housing and of second homes, share of young people (3-16) and tax ratio.
We make use of a DARES[10] dataset and compute a municipal unemployment rate, defined as the ratio of job-seekers to the municipal population.
All the monetary data are expressed in real values (2018 thousand euros).
We consider municipalities of more than 1,000 inhabitants, this threshold being observed in 1999. In the matching process and the merging of all the datasets, we lost around 250 municipalities[11]. We eventually built an original balanced panel database of 8,421 French municipalities over the 2002-2008 period.
Summary statistics are provided in table 2.

[6] Institut National de la Statistique et des Etudes Economiques

[7] 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.

[8] Direction Générale des Finances Publiques

[9] Direction Générale des Collectivités Locales

[10] Direction de l'Animation de la Recherche et des Etudes et des Statistiques, Ministère du Travail.

[11] We have also lost observations because of a lack of information and/or of abnormal values (overseas municipalities were excluded).

Table 2: Summary statistics

Variable	Panel	Mean	sd	min	max	Observations
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
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
g	Overall	.2126703	.0810653	0	1.629625	N = 59850
	Between		.0760626	.0476884	1.144168	n = 8550
	Within		.0280472	-.9306368	.8672906	T = 7
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
τ	Overall	.2814205	.1069798	.010888	.5926805	N = 59850
	Between		.106245	.0130079	.5424203	n = 8550
	Within		.0125622	.1301398	.5295436	T = 7
dumIMC	Overall	.8741688	.3316619	0	1	N = 59850
	Between		.2827983	0	1	n = 8550
	Within		.1732995	.0170259	1.731312	T = 7
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	Overall	.0343148	.0140631	0	.3493544	N = 58961
	Between		.0129556	.0103769	.3030764	n = 8423
	Within		.0054718	-.0462552	.0955155	T = 7
Density	Overall	5.036541	13.48594	.0539444	262.3444	N = 59850
	Between		13.48267	.0553576	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	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
$\overline{w}$	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
$\overline{I}$	Overall	1.626745	1.402731	0	28.37391	N = 59087
	Between		1.20057	0	16.21	n = 8540
	Within		.7255549	-11.98615	19.07294	T = 6.9188
$\overline{SH}$	Overall	.1975229	.3153695	.0001	1	N = 59080
	Between		.2706421	.0043219	1	n = 8540
	Within		.1619304	-.6477655	1.048535	T = 6.918

3.4 Methodology and identification strategy

Following Hamermesh (1996) we choose a log-linear specification of equation (1) that allows to interpret directly the coefficients as elasticities:

$$\begin{aligned} ln(e_{it}) = \beta_w ln(w_{it}) + \beta_g ln(g_{it}) + \beta_m ln(y^m_{it}) + \beta_\tau ln(\tau_{it}) + \beta_I ln(I_{it}) \\ + \sum_j \gamma_j ln(X^j_{it}) + u_i + \delta_t + \epsilon_{it} \end{aligned} \tag{2}$$

where i denotes the municipality index and t denotes time and variables X are control variables. u_i and δ_t denote respectively the municipal and time effects.

3.4.1 Endogeneity issue

It is worth recalling that the transfer of competencies by municipalities to the IMC body is the result of a combination of political and/or economic motivations. Therefore, the IMC employment I should be treated as an endogenous regressor.

In order to define instruments, we exploit two geographical partitions of the French territory. First, we use the changing over time mapping of IMC bodies[12]. Second, we use local job markets exploiting the INSEE dataset available at the EZ level. We believe that the commuting zone is relevant to analyze the local labor market at the municipal and inter-municipal levels. Indeeed, an EZ is a geographical space in which the workers live and work and where firms can find a large share of their labor force. The partition is based on the flows of workers' commuting journeys. We use the 2010 geographical partition that provides information for 304 EZs of Metropolitan France. As the workers' mobility is unconstrained by borders between territories, this zoning escapes from administrative [13] zoning and reflects the actual flows.

Since endogeneity might stem from local unobservable factors, the instruments must reflect movements of I that are independent of local circumstances. We take the average[14] IMC

[12] Source: DGCL

[13] There were 22 regions and 95 *départements* during the period under study.

[14] We compute the average logarithm of the IMC employment levels and of the share of second homes.

employment $\overline{I}$ and the average share of second homes[15] $\overline{SH}$ in the neighboring IMC bodies. More precisely, the IMC neighbors are those having the same population size and fiscal regime as the considered IMC body and located within the *département* of the IMC chief town, but excluding IMC bodies within the same EZ as the considered IMC body. Dropping IMC bodies within the same EZ ensures that the instruments are uncorrelated with local economic factors. We considered four categories for the IMC population size: less than 5,000 ; between 5,000 and 10,000 ; between 10,000 and 20,000 and over 20,000 inhabitants. We obviously take the changing partition of the IMC bodies over time into account. This identification strategy is inspired from the industrial organization literature (Hausman et al. (1994) and Azar et al. (2019)).

As far as the municipal wage is concerned, it is reasonable to ask whether it should be treated as an endogenous regressor. Our analysis, given in the appendix 6.2, shows it can be considered as an exogenous regressor.

3.4.2 Instruments validity

As it will turn to be relevant for the analysis of the instrumentation of I, we distinguish the IMC bodies according to their jurisdictional type and fiscal regime. Table 3 displays the distribution of the municipalities over the period according to these characteristics.

Table 3: Allocation of municipalities in IMC bodies in our sample

	ATR	SBT	Total
No IMC	0	0	7,512
CC	16,979	19,785	36,764
CA	0	12,298	12,298
CU	169	1,965	2,134
SAN	0	239	239
Total	17,148	34,287	58,947

Note that the Syndicat d'Agglomération Nouvelle (SAN) is the fourth jurisdictional type of IMC structures. It has specific features that makes it different from the others. However, they are too few over the period of study to be considered.

[15] The computation of the grant is based on the number of municipal inhabitants and the latter is augmented by the number of second homes.

To explore instrument validity, we investigate whether a change in a municipality's neighborhood in terms of average IMC employment ($\overline{I}$) has an impact on the employment at the municipal (e) and IMC (I) levels. To do so, we proceed as if the change in the environment resulted from a treatment and follow the Difference-in-Differences approach. The treatment is defined as the shift from a "stunted" neighboring IMC employment to a large one which we call an "inflated" neighborhood. To be more precise, we consider that the average employment in the IMC body's environment increases substantially. We have a sub-sample gathering 1,925 municipalities whose IMC neighboorhood in 2002 is below the first quartile of the $\overline{I}$ distribution, and observed in 2002 (before the treatment) and 2008 (after). The control group is composed of 1,079 municipalities remaining in 2008 below the first quartile. The 846 treated municipalities are those that moved in 2008 from below the first to above the third quartile.

Table 4 gives the results of the diff-in-diff estimations. The coefficient of the interaction term 2008*"inflated" is significant both when the dependent variable is e and I. This confirms the change in one's municipality environment in terms of IMC employment influences e and I. These diff-in-diff results support that neighboring IMC's employment affects a municipality own's employment through the employment of its own IMC. We will use $\overline{I}$ as an instrument for I for the estimation of the municipal labor demand. Moreover, table 4 suggests that the environment impact differs strongly with the jurisdictional type. More precisely, for the municipalities in CC, the impact is positive, and negative for CA and CU. These results will be useful to conduct our robustness analysis.

Table 4: Impact of the neighboring averaged IMC employment $\overline{I}$

Dependent variable	e	I
2008	0.0359	0.0409
	(0.0232)	(0.0325)
“inflated”	-0.0251	0.379***
	(0.0270)	(0.0343)
“inflated”*CC	-0.162***	-0.656***
	(0.0338)	(0.0805)
“inflated”*CA	0.146*	0.516***
	(0.0644)	(0.107)
2008*“inflated”	-0.158*	1.968***
	(0.0661)	(0.0867)
2008*“inflated”*CC	0.213**	-1.185***
	(0.0698)	(0.118)
2008*“inflated”*CA	0.0408	-2.111***
	(0.0939)	(0.148)
constant	2.381***	-0.189***
	(0.0161)	(0.0207)
N	3,850	3,850
Cities	1,925	1,925
R^2	0.017	0.166

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Diff-in-diff method. OLS. Robust standard errors.

4 Results

Table 5 presents the estimation of equation (2) using six different models. Model (1) corresponds to the pooled OLS method ignoring the panel structure of our sample. Model (2) is a fixed effect (FE) model using the within method, model (3) a first-differenced (FD) pooled OLS and both models neglect the endogeneity of I. Models (4) and (5) are respectively FE and FD models with an IV method using $\overline{I}$ and $\overline{SH}$ as instruments. Model (6) is an extension of model (5). In addition to regressors, we introduce time dummies in all models. Standard errors are clustered at the municipality level. We also consider the possibility of clustering at the IMC and EZ levels, and find the same results (table 14 in the appendix 6.3). Clustering at the IMC level selects the municipalities members of an IMC body, creating a sample bias. However, the *direct IMC effect* holds although only municipalities within an IMC body are used. Clustering by EZ gives very close results to those produced when we cluster at the municipality level. From the robust score Chi2 test of endogeneity in model (5), we can conclude that the IMC employment I is endogenous (p=0.0000). This confirms our study of instruments validity. We therefore concentrate on results of models (4) to (6).

4.1 The baseline results

First, table 5 evidences that both the FE and FD methods produce the same results as for the coefficient signs and significance levels. We then comment on results of models (4) and (5) since model (6), discussed in the next subsection, provides quite similar results as far as the usual determinants are concerned.

First, the impact of wage on municipal labor demand is highly significant, with an estimated elasticity of less than one in absolute value (around -0.76). As far as we know, this is the first work on French data providing an estimate of this elasticity. Bergström et al. (2004) display estimates of wage elasticities of labor demand using data from Swedish municipalities in 1988-1995: their estimates lie between -0.896 (long run elasticity) and -0.533 (short run elasticity)).

Second, the impact of the main central government transfer is positively significant but the magnitude of the elasticity is rather small. 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 internalized that the overall grant level would not increase (they anticipated that different subsidies would be rationalized into a global unchanged subsidy). Bergström et al. (2004), who studied the impact of the shift in 1993 from a targeted to a general grant, provide a basis for comparison, bearing in mind that the French grant under consideration is general. Their elasticities respectively before and after the shift range from 0.06 (short run) to 0.10 (long run) for the targeted grant and from 0.025 (short run) to 0.042 (long run) for the general grant.

The impact of the median income is congruent with the median voter model: the estimated elasticity is significantly positive and its magnitude is large as compared to the grant elasticity. Similar results are obtained by Bergström et al. (2004). The fly-paper effect does not hold when municipal employment is studied, unlike former French studies that focused on total municipal spending.

Table 5: Dependent variable: municipal employment e. Whole sample

	(1) P_OLS	(2) FE	(3) P_OLS_FD	(4) IV_FE	(5) P_IV_FD	(6) P_IV_FD
Wage (w)	-0.636***	-0.749***	-0.768***	-0.750***	-0.769***	-0.769***
	(0.0303)	(0.00788)	(0.00581)	(0.00793)	(0.00581)	(0.00580)
Grant (g)	0.287***	0.0302***	0.0118***	0.0295***	0.0118***	0.0117***
	(0.0164)	(0.00277)	(0.00213)	(0.00281)	(0.00216)	(0.00216)
Grant*Reform	-0.0417***	-0.0290***	-0.00407**	-0.0262***	-0.00423**	-0.00421**
	(0.00317)	(0.00155)	(0.00156)	(0.00166)	(0.00157)	(0.00157)
Income (y^m)	0.752***	0.202***	0.0547**	0.192***	0.0525**	0.0530**
	(0.0353)	(0.0263)	(0.0170)	(0.0264)	(0.0170)	(0.0170)
TaxRatio (τ)	-0.349***	-0.0785***	-0.0187*	-0.0723***	-0.0171*	-0.0188*
	(0.0109)	(0.0122)	(0.00740)	(0.0123	(0.00743)	(0.00746)
IMCemp (I)	-0.00354	-0.00941***	-0.00704***	0.00698*	0.00898***	0.00923***
	(0.00351)	(0.00137)	(0.00101)	(0.00328)	(0.00271)	(0.00270)
Unemp	0.392***	-0.00604+	0.00229	-0.00547	0.00101	0.000443
	(0.0171)	(0.00354)	(0.00220)	(0.00348)	(0.00221)	(0.00222)
Unemp*IMC	0.0203***	0.00336***	0.00138*	0.00309***	0.00277***	0.00319***
	(0.00293)	(0.000852)	(0.000561)	(0.000842)	(0.000618)	(0.000650)
Unemp*IMC*Q1						-0.000880*
						(0.000360)
Unemp*IMC*Q3						0.00180***
						(0.000488)
Density	0.129***	-0.160*	-0.143	-0.163*	-0.145	-0.146
	(0.00466)	(0.0805)	(0.104)	(0.0795)	(0.105)	(0.105)
SocHouse	0.0597***	0.00161	0.000550	0.00163	0.000593	0.000590
	(0.00217)	(0.00107)	(0.000687)	(0.00108)	(0.000690)	(0.000691)
Young	-0.179***	0.0436***	0.0244**	0.0411**	0.0241**	0.0238**
	(0.0217)	(0.0132)	(0.00892)	(0.0132)	(0.00901)	(0.00903)
SecHome	0.0862***	-0.269***	-0.0686+	-0.259***	-0.0702+	-0.0716+
	(0.00412)	(0.0508)	(0.0390)	(0.0504)	(0.0394)	(0.0395)
2004	-0.129***	-0.0430***	0.000763	-0.0396***	0.000246	0.000420
	(0.00515)	(0.00233)	(0.00274)	(0.00243)	(0.00276)	(0.00276)
2005	-0.114***	-0.0284***	0.0159***	-0.0260***	0.0159***	0.0159***
	(0.00489)	(0.00190)	(0.000977)	(0.00197)	(0.000984)	(0.000984)
2006	-0.111***	-0.0159***	0.0148***	-0.0145***	0.0144***	0.0144***
	(0.00428)	(0.00143)	(0.000966)	(0.00146)	(0.000972)	(0.000972)
2007	-0.0410***	0.00231**	0.0205***	0.00286***	0.0203***	0.0204***
	(0.00271)	(0.000809)	(0.000902)	(0.000814)	(0.000903)	(0.000903)
constant	3.742***	3.515***	0.00360***	3.585***	0.00273**	0.00294***
	(0.128)	(0.159)	(0.000824)	(0.158)	(0.000834)	(0.000837)
N	50,526	50,526	42,105	50,526	42,105	42,105
Cities	8,421	8,421	8,421	8,421	8,421	8,421
R^2	0.516	0.463	0.604	0.457	0.598	0.598
Robust score χ^2					33.789 (p=0.000)	

$^+$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors clustered at the municipality level.

(1), (2), (4) do not display the same number of observations as (3), (5) and (6) due to the FD operator.

As expected, the tax ratio elasticity is negative and significant.

Thanks to model (5) in which the interpretation of the time dummies coefficients makes sense[16], we see there is an impact of the political cycle on municipal labor demand. We choose 2008, when municipal election was held, as the reference year [17]. At mid-term, the mayor begins to hire municipal employees until the next election in 2008. As suggested by electoral competition models, as elections become closer the prospect of being re-elected gives incentives to increase municipal labor.

As a concluding remark, we run partial regressions of model (5) in order to identify the respective contributions of our key variables in explaining the municipal employment variance; it turns out, as shown in table 15 in the appendix 6.4, that wages are the main driving force of municipal labor demand.

4.2 IMC effects

Given that, on average over the period studied, 87.42% municipalities were members of an IMC body, it is a central issue to control for this cooperation effect. We now study the direct impact of IMC taking into consideration the IMC employment level.

Since I is endogenous, we use $\overline{I}$ and $\overline{SH}$ as instruments in the IMC employment first stage regression of model (5), the results of which are displayed in table 6. The computation of the partial R^2 (0.132) and the robust partial F test (p=0.000) for the joint significance of the instruments leads to reject the weak instruments hypothesis. Moreover, the overidentifying restrictions robust score test reveals that our set of instruments is exogenous (p =0.5735). We find a highly significant and positive effect of $\overline{I}$ on I confirming our conclusion that the environment matters. When the neighbors increase their employment level, the IMC reacts by increasing its own employment level. $\overline{SH}$ turns out to have a negative and highly significant impact on I. The larger the share of second homes in the IMC body's neighborhood, the smaller is its own employment level. As the share of second homes increases, the local public services usually provided by the IMC body turn to be less

[16] In our FD models the time dummies are not first-differenciated.

[17] Note that 2002 and 2003 dummies are dropped because of first differences and the unemployment first lag.

consumed, which translates into less IMC employment. These comments suggest a similarity in the behavior of IMC bodies within a same neighborhood.

Table 6: First stage regression of model (5)

	IMC employment (I)
Neighboring averaged IMC employment $\overline{I}$	0.07304***
	(0.01153)
Neighboring averaged IMC second homes $\overline{SH}$	-0.1793***
	(0.00913)
Exogenous regressors	yes
Time dummies	yes
N	42,105
Cities	8,421
Partial R^2	0.132
Robust Partial F	203.93 (p=0.000)
OIR score χ^2	0.317 (p=0.5735)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Pooled IV in first-differences.
Standard errors clustered at the municipality level.

Regarding the impact of the IMC employment level on municipal employment, models (4) and (5) reveal positive and highly significant elasticities, which we call a *direct IMC effect*[18]:

Higher IMC employment induces higher municipal employment.

This result echoes the literature on the "natural expansion" of the local public sector with overlapping jurisdictions (Brennan et al. (1980)). Closer to our work, Turnbull and Djoundourian (1993) and Campbell (2004) model the strategic interaction between county and municipal expenditures. Though the result of the interaction is ambiguous theoretically, they empirically conclude to a complementary relationship. Their empirical finding of a positive effect reveals the dominance of the income effect over the substitution effect. Our result is similar as municipal and inter-municipal employment levels are complements. Within an IMC body, municipal employment might decrease if municipalities transfer responsibilities (substitution effect). It might also increase (income effect) when municipalities supply new public services and provide for additional facilities.

Our second focus is to understand how local unemployment impacts municipal labor demand

[18] Remark that in models (2) and (3) where I is not instrumented, the direct IMC effect turns out to be significantly negative.

and investigate whether IMC plays a role in this unemployment effect. The first-lagged unemployment avoids endogeneity issues and displays a coefficient with a larger significance level than its contemporaneous value. Models (4) and (5) show that only municipalities within an IMC body 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 structure. Outside an IMC body, it could be the case that mayors directly provide enough services to their electorate so that they can avoid fighting unemployment without being sanctioned. Moreover, as a member of an IMC structure, mayors are endowed with more resources provided by the IMC structure to its members, which could give them the opportunity to cope with unemployment, though this issue is mainly a central government concern. This provides evidence of an *indirect IMC effect*:

IMC leads mayors to employ more people when unemployment is higher.

This interplay between unemployment and IMC calls for the consideration of the extent of cooperation to obtain more refined results. In model (6) of table 5 we focus on two types of municipalities: those belonging to IMC structures either with a small employment level (below the first quartile Q1) or with a large employment level (above the third quartile Q3). In municipalities with small inter-municipal employment level –which could be called "empty shell" IMC bodies (West (2007))– the impact of unemployment is mitigated: mayors are less sensitive to unemployment, although the total effect of unemployment on municipal employment is still significant and positive. The reverse holds for municipalities with large inter-municipal employment levels–"inflated" IMC structures– where the impact of unemployment on municipal labor is strengthened. This suggests that mayors in these IMC structures, due to the loss of direct control over many public services, could use municipal employment to cope with issues such as unemployment. We therefore give additional evidence in support of the *indirect IMC effect*. Not only IMC *per se* changes the reaction of mayors to unemployment, but also the magnitude of the IMC employment level.

Indirect IMC effect is mitigated in "empty shell" IMC bodies and strengthened in "inflated" IMC structures.

4.3 IMC membership dynamics

We study whether the dynamics of IMC membership could have any impact on the municipal employment level and on the relationship between e and I. Is it reasonable to expect that it will take time for IMC membership to have an impact on municipal employment? Indeed, municipalities that have joined an IMC might behave differently than municipalities that joined several years earlier. We address this open question by sketching out an analysis permitted by our data. Table 7 describes the importance of the dynamics over the period and table 8 displays additional estimation results. The allocation of sample municipalities in IMC structures shows that the entry process, initiated in 1992, has not slowed down. It also evidences that the municipalities that entered from 2002 and onward chose mainly CC and CA as jurisdictional types.

Table 7: Allocation of sample municipalities in IMC bodies across time

	2002	2003	2004	2005	2006	2007	2008	Total
No IMC	2,068	1,409	1,089	897	763	651	635	7,512
CC	4,607	5,005	5,232	5,370	5,488	5,533	5,529	36,764
CA	1,400	1,656	1,765	1,819	1,834	1,903	1,921	12,298
CU	302	303	304	304	305	307	309	2,134
SAN	44	48	31	31	31	27	27	239
Total	8,421	8,421	8,421	8,421	8,421	8,421	8,421	58,947

First, we construct a variable called Experience which takes the value 1 the year of entry in an IMC body, 2 the second year and so on. This variable is 0 when the municipality is outside an IMC structure. 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. Therefore, there is an uncontrolled for heterogeneity in terms of experience for these municipalities. For the latter, we are forced to consider that the variable experience takes the value 1 in 2002.

We also neglect observations corresponding to entries followed by exits and concentrate on observations reflecting an uninterrupted membership.

Second, to capture the membership dynamics we introduce in our model (5) an interaction term between I and Experience. Column (a) of table 8 is based on the whole sample and shows that the *direct IMC effect* still holds, but the coefficient of the interaction term is not statistically significant. The IMC membership dynamics does not seem to influence the impact of I on e. Column (b) uses the sub-sample of municipalities that never joined an IMC body during the period, that is, for which the experience is 0. This column (b) replicates the main results of model (5). Column (c) considers the sub-sample of municipalities that joined an IMC body from 2003 to 2008 and remained member of an IMC body, i.e, whose experience is between 1 and 6 years, and shows similar results as column (a): there is no impact of the experience. Column (d) deals with the sub-sample of municipalities members of an IMC body whose experience is of seven years or more. It evidences an experience effect on the impact of I on e. It says that an increase in the experience strengthens the complementarity between I and e. However, one should be careful in the interpretation since the comparison of columns (c) and (d) suggests that it takes a minimum duration of experience for the impact of I on e to be enhanced.

To sum up, we show that, once entered in an IMC body, the impact of I on e is at play: the *direct IMC effect* holds. Moreover, it seems like a minimal experience of cooperation is needed for the complementary relationship between the municipal and inter-municipal employments to be stronger.

Table 8: Dependent variable: municipal employment e. Sub-samples by experience in IMC and starting year of IMC membership

	(a)	(b)	(c)	(d)
Wage (w)	-0.769***	-0.821***	-0.764***	-0.764***
	(0.00581)	(0.0176)	(0.0154)	(0.00653)
Grant (g)	0.0118***	0.00616	0.0115+	0.00979**
	(0.00219)	(0.00479)	(0.00619)	(0.00362)
Grant*Reform	-0.00425**	-0.00459	0.000690	-0.00566***
	(0.00157)	(0.00549)	(0.00523)	(0.00171)
Income (y^m)	0.0528**	0.139*	0.0735*	0.0492*
	(0.0170)	(0.0583)	(0.0371)	(0.0205)
TaxRatio (τ)	-0.0172*	-0.0500+	-0.0355*	-0.00939
	(0.00752)	(0.0267)	(0.0176)	(0.00862)
IMCemp (I)	0.00776*		0.00841*	-0.0358
	(0.00315)		(0.00355)	(0.0443)
I*Experience	0.0000519		0.00122	0.00469*
	(0.00130)		(0.00247)	(0.00193)
Unemp	0.00110	0.00499	-0.00540	0.00393
	(0.00221)	(0.00842)	(0.00525)	(0.00246)
Unemp*IMC	0.00266***		0.00317***	
	(0.000724)		(0.000932)	
Control variables	yes	yes	yes	yes
Time dummies	yes	yes	yes	yes
N	42,094	3,125	7,299	31,670
Cities	8,421	625	1,462	6,334
R^2	0.599	0.704	0.588	0.590

$^+$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Pooled IV. Variables in first-differences. Standard errors clustered at the municipality level.

4.4 Robustness checks: IMC bodies characteristics and municipal population size

We run model (5) on various sub-samples defined respectively by the characteristics of IMC bodies (jurisdictional type and fiscal regime) and the municipal population size. The results are given in tables 9, 10 and 11.

First, table 9 shows that our results are robust for the key variables of the labor demand (wage, grant and income), and that the degree of integration seems to mitigate the impact of IMC employment on municipal employment, as already evidenced in model (6) of table 5. The *direct IMC effect* is significatively positive for municipalities in CC. This reflects complementarity between e and I. The coefficient is not significant in CA and CU, more integrated forms than CC. Thus, there is a null impact of IMC employment on municipal employment, probably because the substitution effect offsets the income effect.

To illustrate the difference in integration degree rooted in the jurisdictional type and translates into I levels, we run a t-test to compare the mean of I in the sub-sample of municipalities in CC (mean=1.61) and the sub-sample of municipalities in CA and CU together (mean=2.57) and conclude to a statistically significant difference (p=0.000).

Table 9: Dependent variable: municipal employment e. Sub-samples with municipalities outside and inside IMCs defined by jurisdictional type

	No IMC	CC	CA	CU
Wage (w)	-0.816***	-0.758***	-0.781***	-0.754***
	(0.0157)	(0.00722)	(0.0120)	(0.0239)
Grant (g)	0.00426	0.0153***	0.00460	0.0123*
	(0.00440)	(0.00335)	(0.00315)	(0.00616)
Grant*Reform	-0.00221	-0.00416+	-0.00337	-0.0113*
	(0.00452)	(0.00246)	(0.00212)	(0.00499)
Income (y^m)	0.108*	0.0477*	0.0821*	-0.0404
	(0.0506)	(0.0204)	(0.0408)	(0.0993)
TaxRatio (τ)	-0.0478*	-0.00966	-0.0313+	0.0141
	(0.0235)	(0.00920)	(0.0161)	(0.0382)
IMCemp (I)		0.00775**	0.00468	-0.00302
		(0.00280)	(0.00933)	(0.0166)
Unemp	0.00455	0.00526*	-0.00573	0.00111
	(0.00709)	(0.00257)	(0.00460)	(0.0104)
Control variables	yes	yes	yes	yes
Time dummies	yes	yes	yes	yes
N	4,035	27,152	9,242	1,529
Cities	1,097	5,617	1,923	309
R^2	0.697	0.582	0.615	0.603

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Pooled IV. Variables in first-differences.

Standard errors clustered at the municipality level.

Next, table 10 shows that the wage and grant coefficients remain significant and that the fiscal regime is not neutral on the impact of IMC employment on municipal employment. In the municipalities which have chosen the SBT regime the *direct IMC effect* holds. Recall that, under the SBT regime, the IMC body decides alone on the business tax rate which applies to all members. This mirrors the typical vertical relationship between an upper and a lower tier where the former imposes its choices on the latter. With the employment levels being complements, there is a room for the local public sector expansion. This validates the Leviathan hypothesis expressed in terms of employment.

For municipalities under the ATR regime, which leaves them with larger degrees of freedom, the vertical relationship is less stringent and therefore, the *direct IMC effect* is not significant.

Table 10: Dependent variable: municipal employment e. Sub-samples contrasting municipalities outside and inside IMCs defined by fiscal regime

	No IMC	ATR	SBT
Wage (w)	-0.816***	-0.747***	-0.772***
	(0.0157)	(0.0104)	(0.00762)
Grant (g)	0.00426	0.0110*	0.00911***
	(0.00440)	(0.00515)	(0.00264)
Grant*Reform	-0.00221	-0.0119**	-0.00406*
	(0.00452)	(0.00390)	(0.00183)
Income (y^m)	0.108*	0.0114	0.0704**
	(0.0506)	(0.0296)	(0.0228)
TaxRatio (τ)	-0.0478*	-0.0169	-0.0123
	(0.0235)	(0.0120)	(0.0102)
IMCemp (I)		0.00240	0.0148**
		(0.00255)	(0.00515)
Unemp	0.00455	0.00656+	0.00113
	(0.00709)	(0.00378)	(0.00278)
Control variables	yes	yes	yes
Time dummies	yes	yes	yes
N	4,035	11,886	26,184
Cities	1,097	2,685	5,517
R^2	0.697	0.602	0.576

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Pooled IV. Variables in first-differences.

Standard errors clustered at the municipality level.

Finally, table 11 displays the labor demand estimation for different municipal population size. The small sub-sample covers municipalities below 2,000 inhabitants, the medium the municipalities between 2,000 and 10,000, the large the cities between 10,000 and 50,000 and the very large those with more than 50,000 inhabitants. Again, our main results remain valid when we consider size-based sub-samples. The *direct IMC effect* is significantly positive for small and medium municipalities and is null for large and very large cities. Since the latter are more likely to be members of CA and CU, more integrated structures than CC, as said above, the substitution and income effects offset. It is worth noting that the positive *direct IMC effect* evidenced on the whole sample is actually driven by the behavior of small and medium municipalities, which weigh 90% of the total observations.

Table 11: Dependent variable: municipal employment e. Sub-samples by municipal population size

	small	medium	large	very large
Wage (w)	-0.759***	-0.780***	-0.862***	-0.837***
	(0.00740)	(0.0102)	(0.0167)	(0.0472)
Grant (g)	0.00833*	0.0107***	0.0264***	0.0424**
	(0.00362)	(0.00272)	(0.00576)	(0.0158)
Grant*Reform	-0.00368	-0.00314+	-0.00912**	0.00336
	(0.00304)	(0.00176)	(0.00320)	(0.0174)
Income (y^m)	0.0528*	0.0514*	0.0207	0.400*
	(0.0227)	(0.0257)	(0.0636)	(0.179)
TaxRatio (τ)	0.00109	-0.0352***	-0.0569**	0.0601
	(0.0107)	(0.00999)	(0.0213)	(0.0406)
IMCemp (I)	0.00795+	0.00963*	0.00543	-0.000757
	(0.00449)	(0.00436)	(0.00360)	(0.00382)
Unemp	0.00546+	-0.00651*	-0.0169	-0.0657+
	(0.00283)	(0.00327)	(0.0112)	(0.0364)
Unemp*IMC	0.000869	0.00412***	0.00536**	0.00454+
	(0.000885)	(0.000968)	(0.00196)	(0.00270)
Control variables	yes	yes	yes	yes
Time dummies	yes	yes	yes	yes
N	19,125	18,750	3,720	510
Cities	3,825	3,750	744	102
R^2	0.606	0.579	0.687	0.755

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Pooled IV. Variables in first-differences.

Standard errors clustered at the municipality level.

5 Conclusion

To the best of our knowledge, our contribution is the first to address municipal labor demand on French data. Our findings reveal that increases in public employees' wages or tax ratios lead to smaller municipal employment, while increases in grants from the State level or median income lead to higher municipal labor demand.

We also find complementarity between public employment at the municipal and inter-municipal levels. Our empirical analysis of the IMC membership dynamics also suggests that it takes some experience of cooperation for this *direct IMC effect* to be strengthened. Moreover, we show that IMC leads mayors to hire more when unemployment is higher (*indirect IMC effect*) and that this *indirect IMC effect* is stronger in "inflated" IMC bodies than in "empty shell" IMC bodies.

In order to complete our study, a natural extension would exploit more recent data on municipalities. The analysis could be improved 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) and also consider the status of employees (whether tenured or not). Second, since many public services (water distribution, urban transportation and waste collection) can be outsourced, this might have an impact on the wage bill (Jaaidane and Gary-Bobo (2008) Levin and Tadelis (2010)). Finally, providing a more thorough study of the IMC membership dynamics is another way of enriching the analysis, something we leave for further research.

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6 Appendix

6.1 Theoretical background

We adopt the classical approach in public finance when dealing with matters such as fiscal choice and government spending levels. Elections are the channel through which citizens can express their desired policy. When citizens, endowed with unimodal preferences, vote on a one dimensional public good, and the majority rule is used, it is known that the electoral outcome is congruent with the median voter's preferred policy. As predicted by Hotelling (1929) and Downs (1957), electoral competition will drive policies towards the outcome preferred by the median voter. Our baseline model is adapted from Courant et al. (1979).

6.1.1 Assumptions

We consider a municipality with N inhabitants that provides public services mainly through direct employment: we assume that the production of public services is measured by the level of public employment E. The citizens have preferences defined on private consumption, denoted C with a price normalized to 1, and public consumption E. The utility function $U(C, E)$ representing these preferences is quasi-concave. The annual income of the decisive voter is denoted by y^m. The municipality levies local taxes, denoted t, and receives a grant G from the central government. Let w be the annual wage received by public employees. The total municipal resources should cover the production costs of the public services, *i.e.* the wage bill wE. We express utility as follows $U(C, e)$ where $e = E/N$ is per capita public employment. Similarly, we will denote by $g = G/N$ the per capita grant.

6.1.2 The determination of labor demand

The median voter's demands for private and public goods are derived from the maximization of $U(C, e)$ subject to his own budget constraint and that of the local government. The local tax revenues stem from the imposition of a tax rate t on the sum of tax bases in the municipality. Let B denote the total tax base (the sum of the households' tax base and the firms' tax base) of the municipality and $b = B/N$ the per capita local tax base. It follows that the local government's budget constraint is written as $tb + g = we$.

The median voter budget constraint is given by $C + tb_m = y^m$, where b_m denotes his tax base. Solving for t from the local government's budget constraint and substituting it in the median voter's budget constraint, we obtain $y^m + (b_m/b)g = C + (b_m/b)we$ showing that the citizen has an income augmented by his share of the grant, allowing him to pay for his private and public consumptions. The ratio of the median voter tax base to the average tax base in the municipality b_m/b is the tax ratio[19] that reflects the marginal cost in terms of increased taxes to get an additional unit of public good. We denote it τ.

The demand for public services is obtained by replacing the median voter budget constraint in $U(y^m + \tau g - \tau we, e)$ and maximizing it with respect to e. The median voter's desired level of public employment e^* is given by the equality of the marginal rate of substitution between public and private consumptions and the tax price, τw, *i.e.* what the individual pays for an additional unit of public services.

$$U_e(C, e^*)/U_C(C, e^*) = \tau w$$

This equality shows that the principal driving forces of municipal labor demand are the median voter's income y^m, the per capita grant g, the public workers' wage w and the tax ratio τ:

$$e^* = e(w, g, y^m, \tau)$$

6.1.3 Predictions of the model

As predicted by the theoretical model, we should expect a negative relationship between e and both the municipal employees wage w and the tax ratio τ. It is likely that there will be a positive relationship between e and both the per capita grant g and the citizen's income y^m. However, a question remains: should we retain the median voter's income y^m or the augmented median voter's income defined as $y^m + \tau g$? Empirically, it is documented that demand reacts differently to an increase (of the same amount) in income or grant. This is known as the fly-paper effect. Owing to this approach, we will distinguish the two, as in Bergström et al. (2004).

[19] Note this tax ratio is defined as the ratio of the median voter's income to the average income in Bergström et al. (2004). It is relevant for Sweden as there exists an income tax at the local level but not for France, where the income tax is set at the national level.

6.2 On the exogenous municipal wage

Though there exists a national wage scale fixing the base salary for the personnel hired under public employment contract, mayors are still able to decide on contracts under which they hire employees, on their allocation across services, and on their bonuses. See the appendix Our data show that annual wages range from 20,000 to 45,000 euros which suggests a large variance among municipalities. This could be the result of different composition of personnel skills, a different promotion process, a different share of public versus private employment contracts and/or different share of bonuses in the wages and benefits package[20]. 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[21].

It is thus difficult to find an instrument correlated with labor supply which does not affect at the same time labor demand. However, we address the question and propose an instrument for the municipal wage following the same line as we do for I.

Exploiting the partition in terms of EZs, proceeding in the same vein as for the instrumentation of I, we build a neighboring average wage. The intuition is that a job seeker is likely to compare the wage set by municipality i to the average of wages proposed by the other municipalities in the neighborhood.

We instrument the municipal wage set by a given municipality i by the average wage, denoted $\overline{w}$, set by the municipalities in the neighborhood of municipality i, but excluding municipalities in the same EZ as i. By neighborhood, we mean the municipalities members of EZs close[22] to the EZ to which i belongs, and within the same *département*. The choice for the average wage computation[23] at the *département* level generates large enough variability in

[20] A municipality that hires highly skilled personnel under private employment contract is likely to have a larger annual wage than a municipality which has low skilled employees governed by public employment contracts.

[21] Lagged values of endogenous variables are commonly used as instruments, but serious concerns have been raised about their validity (Angrist and Krueger (2001)).

[22] Two EZs are considered as close when they share a common border.

[23] In calculating $\overline{w}$, we lost 34 municipalities, thus leading to 8387 cities in our sample instead of 8421.

the instrument $\overline{w}$.

Table 12 displays the first stage results where w is regressed both in level and in first difference on the instruments $\overline{w}$, $\overline{I}$ and $\overline{SH}$ and all exogenous regressors, using pooled OLS method.

Table 12: Dependent variable: municipal wage w.

	P_OLS	P_OLS_FD
$\overline{w}$	0.612***	0.109***
	(0.0278)	(0.0311)
$\overline{I}$	0.00491***	-0.000656
	(0.00147)	(0.00115)
$\overline{SH}$	-0.0000404	-0.000620
	(0.000751)	(0.000603)
Exogenous regressors	yes	yes
Time dummies	yes	yes
N	50,322	41,935
Cities	8,387	8,387
R^2	0.156	0.007
Partial R^2		0.0004
Robust Partial F		4.578 (p=0.0033)
OIR score χ^2		0.2356 (p=0.6274)

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Pooled OLS. Standard errors clustered at the municipality level.

This shows that the neighboring average wage has a significant effect on the municipal wage. Yet, as evidenced by the poor R^2, we are not able to explain the variance of municipal wages though we have considered all the available exogenous variables. The computation of the partial R^2 and the robust partial F test for the joint significance of the instruments leads to reject the weak instruments hypothesis. Moreover, the over-identifying restrictions robust score test reveals that our set of three instruments is exogenous (p =0.6274).

Table 13 gives the estimation of equation (2) as in table 5, but treating the municipal wage as endogenous. Column 1 assumes that only w is endogenous while in column 2 both w and I are endogenous.

Table 13: Dependent variable: municipal employment e. Whole sample

	(1) P_IV_FD_w	(2) P_IV_FD_w_I
Wage (w)	-0.535**	-0.569**
	(0.200)	(0.194)
Grant (g)	0.0134***	0.0131***
	(0.00262)	(0.00260)
Grant*Reform	-0.00447**	-0.00455**
	(0.00159)	(0.00159)
Income (y^m)	0.0489*	0.0477*
	(0.0192)	(0.0188)
TaxRatio (τ)	-0.0150+	-0.0140+
	(0.00851)	(0.00839)
IMCemp (I)	-0.00735***	0.00834**
	(0.00109)	(0.00285)
Unemp	0.00411	0.00261
	(0.00280)	(0.00276)
Unemp*IMC	0.00117+	0.00256***
	(0.000601)	(0.000651)
Density	-0.145	-0.146
	(0.104)	(0.105)
SocHouse	0.000347	0.000412
	(0.000734)	(0.000724)
Young	0.0290**	0.0281**
	(0.00970)	(0.00968)
SecHome	-0.0487	-0.0528
	(0.0421)	(0.0421)
2004	-0.00345	-0.00330
	(0.00467)	(0.00458)
2005	0.0115**	0.0121**
	(0.00392)	(0.00380)
2006	0.0114***	0.0115***
	(0.00312)	(0.00303)
2007	0.0157***	0.0163***
	(0.00426)	(0.00413)
constant	0.00381***	0.00292**
	(0.000908)	(0.000906)
N	41,935	41,935
Cities	8,387	8,387
R^2	0.549	0.558
Robust score χ^2	1.5724 (p=0.2099)	34.945 (p=0.0000)

$^+$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors clustered at the municipality level.

(1) and (2) Pooled IV in first-differences where endogenous regressors are respectively w and both w and I.

From the robust score Chi2 test of endogeneity in column (1), we can conclude that the municipal wage w can be considered as an exogenous regressor (p=0.2099). However when paired with I, as expected (see robust score Chi2 in column (2)), we reject the null hypothesis that w and I are jointly exogenous. Our econometric analysis leads us to conclude that wages in public sector are, to a large extent, determined at the national level (see Jaaidane (2010) and Clark and Milcent (2011)). Therefore, we will consider the annual wage as an exogenous regressor.

6.3 Robustness on model (5): Standard errors clustered at different levels

Table 14: Dependent variable: municipal employment e. Model (5) in table 5

	Cluster at municipality level	Cluster at IMC level	Cluster at EZ level
Wage (w)	-0.769***	-0.763***	-0.768***
	(0.00581)	(0.00630)	(0.00725)
Grant (g)	0.0118***	0.0120***	0.0117***
	(0.00216)	(0.00235)	(0.00193)
Grant*Reform	-0.00423**	-0.00486**	-0.00414**
	(0.00157)	(0.00160)	(0.00153)
Income (y^m)	0.0525**	0.0468*	0.0531**
	(0.0170)	(0.0185)	(0.0182)
TaxRatio (τ)	-0.0171*	-0.0157+	-0.0171*
	(0.00743)	(0.00807)	(0.00850)
IMCemp (I)	0.00898***	0.00875*	0.00895*
	(0.00271)	(0.00340)	(0.00358)
Unemp	0.00101	0.000747	0.00113
	(0.00221)	(0.00239)	(0.00225)
Unemp*IMC	0.00277***	0.00253***	0.00274***
	(0.000618)	(0.000752)	(0.000822)
Control variables	yes	yes	yes
Time dummies	yes	yes	yes
N	42,105	38,070	41,935
Clusters	8,421	2,161	304
R^2	0.598	0.587	0.598

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Pooled IV in first-differences.

6.4 Partial regressions

Table 15: Dependent variable: municipal employment e. Partial regressions on model (5). Whole sample

	Model (5)	(5.1)	(5.2)	(5.3)	(5.4)	(5.5)	(5.6)
Wage (w)	-0.769***		-0.769***	-0.769***	-0.769***	-0.769***	-0.764***
	(0.00581)		(0.00581)	(0.00581)	(0.00581)	(0.00581)	(0.00601)
Grant (g)	0.0118***	0.0173***		0.0118***	0.0114***	0.0118***	0.0118***
	(0.00216)	(0.00299)		(0.00216)	(0.00214)	(0.00214)	(0.00216)
Grant*Reform	-0.00423**	-0.00578**		-0.00432**	-0.00412**	-0.00414**	-0.00416**
	(0.00157)	(0.00204)		(0.00157)	(0.00157)	(0.00156)	(0.00157)
Income (y^m)	0.0525**	0.0321	0.0521**		0.0524**	0.0538**	0.0343*
	(0.0170)	(0.0282)	(0.0170)		(0.0170)	(0.0170)	(0.0158)
TaxRatio (τ)	-0.0171*	-0.00501	-0.0136$^+$	-0.0171*		-0.0180*	-0.0155*
	(0.00743)	(0.0113)	(0.00739)	(0.00742)		(0.00740)	(0.00703)
IMCemp (I)	0.00898***	0.00661$^+$	0.00947***	0.00902***	0.00903***		0.0111***
	(0.00271)	(0.00377)	(0.00274)	(0.00271)	(0.00271)		(0.00226)
Unemp	0.00101	0.00661$^+$	0.00121	0.000876	0.00106	0.00173	
	(0.00221)	(0.00374)	(0.00221)	(0.00221)	(0.00221)	(0.00219)	
Unemp*IMC	0.00277***	0.00205*	0.00282***	0.00278***	0.00272***	0.00199***	
	(0.000618)	(0.000850)	(0.000621)	(0.000618)	(0.000618)	(0.000562)	
Control variables	yes	yes	yes	yes		yes	yes
Time dummies	yes	yes	yes	yes	yes	yes	yes
N	42,105	42,105	42,105	42,105	42,105	42,105	51,288
Cities	8,421	8,421	8,421	8,421	8,421	8,421	8,421
R^2	0.598	0.000	0.597	0.598	0.598	0.602	0.585

$^+$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Pooled IV, variables in first differences.

Standard errors clustered at the municipality level.