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Inter-municipal cooperation and fiscal disparities

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Abstract

In France, the Law of the 12th of July 1999 has enabled to simplify and to reinforce inter-municipal cooperation. Whereas a reduction of tax pressure and of expenses was expected, some argue that inter-municipal cooperation has led to the opposite. When municipalities decide to create an inter-municipal authority, they choose between two fiscal regimes implying tax-base sharing or a uniform tax. Fiscal externalities then appear and the theoretical explanation for an increase of the fiscal pressure can be twofold. First, inter-municipal cooperation can lessen the horizontal externalities arising from tax competition between municipalities. Second, the share of the same tax base induces vertical externalities. Using the differences in differences method with a quasi-exhaustive panel for French municipalities over the 1994-2010 period, we show that cooperation among municipalities clearly leads to an increase in each of the four local taxes. This effect is reinforced when inter-municipal authorities share the same tax bases as the municipalities. Due to fiscal integration, this effect gets stronger with time. We then study the causal effect of the creation of inter-municipal cooperation on tax rate dispersion among municipalities within an EPCI: cooperation induces a higher convergence of each tax rates, especially in the case of a single business tax. Therefore, cooperation via a given tax instrument does not lead to fiercer tax competition via the other tax instruments.

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1 Introduction

Municipalities are the only local authority common to every European countries and it is also the oldest one. Over the last decades, they have encountered difficulties related to their capacity to meet their inhabitants' needs in local public services, either because of the requirement of a larger scale of production, or because of their difficulty to raise enough resources to finance them. Therefore, in order to cope this situation, there has been an increasing development of inter-municipal cooperations in Europe.

In this perspective, France constitutes a very interesting example with a highly fragmented territory and very significant fiscal disparities. Indeed, France consists of more than 36,000 municipalities (i.e. 40% of the municipalities in the European Union), which face a very unequal distribution of tax revenues. This is mainly due to the local business tax (taxe professionnelle) which accounts for 30% of local tax revenues and whose 80% of the tax base is concentrated in only 5% of local authorities (about 1800 municipalities). Public inter-municipal cooperation establishments (EPCI) have therefore been created to face this particular situation. More specifically, we can distinguish two main motivations to the creation of EPCIs: to encourage the share of fiscal resources as well as the solidarity between rich and poor municipalities.

Although the creation of inter-municipal authorities is a phenomenon which started more than a century ago (Law of the 22nd of March 1890), it is only recently that inter-municipal structures have really developed. Among the different Laws (1992, 1999 and 2004) which promoted this new territorial organization, the Law of the 12th of July 1999, known as the "loi Chevènement", has been a very important one: it was voted by 80% of the National Assembly and the Senate, which gave it a large legitimacy and showed that there was a strong will to develop this upper-municipal authority. This Law has enabled to simplify and to reinforce inter-municipal cooperation, providing for instance fiscal incentives to municipalities. Only three years after the implementation of the law, more than 800 additional inter-municipal cooperation were created and in this perspective it was very successful. In 2010, there are 2611 EPCIs, which cover 95% of the municipalities. However some effects have not been anticipated. Cooperation among municipalities has been rather based on the resemblance, the cooperation between rich and poor municipalities being the exception. And whereas a

reduction of tax pressure and of expenses was expected, some argue that inter-municipal cooperation has led to the opposite. This is this last issue that we analyze in this paper.

EPCIs are subject to common and homogenous rules that are comparable to those of local authorities and carry different blocks of competencies. Moreover some of those structures, on which we focus in this paper, have a tax-levying power. When municipalities decide to form an EPCI, they choose between two different fiscal regimes: the additional tax system or the single business tax regime (taxe professionnelle unique , TPU). A municipality is mainly financed by four direct taxes (known as the "4 old"): the built and unbuilt property tax, the residence tax and the local business tax. In an additional taxation regime, the EPCI shares the tax base with the municipalities and can collect the four taxes on his own. But in the case of the single business tax, municipalities loose one instrument of taxation which is totally transferred to the inter-municipal level. In both cases, municipalities decide jointly the tax rates of the upper-level.

In this framework, fiscal externalities appear and thus the theoretical explanation for an increase of the fiscal pressure can be twofold. First, inter-municipal cooperation can lessen the horizontal externalities arising from fiscal competition between municipalities. This externality has been highlighted by Flatters, Henderson and Mieszkowski (1974) in the case of household mobility and by Wildasin (1989) in the case of capital mobility. It results from the fact that with a mobile local tax base, local governments, by manipulating their instruments, induce an outflow or inflow of the tax base to the other region. Fiscal competition results then in a inefficiently low tax rate. In the same framework, Hoyt (1991) demonstrated that tax rates on mobile capital –and thus public good provision– increase as the number of jurisdictions decreases. This result comes from the reduction in the externality produced by a jurisdiction that changes its tax rate, where the externality corresponds to the capital inflow in other jurisdictions that become more attractive when a jurisdiction increases its tax rate. Decreasing the number of jurisdictions reduces capital movement; thus, increasing its tax rate is less harmful for a jurisdiction. Likewise cooperation between municipalities should lead to the same result.

Second, in the case of the additional tax system, the share of the same tax base induce vertical externalities. As shown by Keen (1998), Hoyt (2001) or Keen and Kotsogiannis

(2002), an excessive taxation in a two-tier setting results from the fact that jurisdictions ignore the depressive effect that a rise in their tax rate has on the common tax base.

As far as we know, only two empirical papers address the issue of the impact of the creation of public inter-municipal cooperation establishments on local taxation in the case of France. In this aim, Leprince and Guengant (2002) use the model of the median voter to estimate the fiscal choices of municipalities with cross-sectional data of year 1997. Later, Charlot et al. (2008) investigated the same question using a panel data set covering the 1993-2003 period. They use spatial and dynamic econometrics techniques with a model of tax setting.

In this paper, we extend the literature in two ways. First, we use a different econometric approach, the differences in differences method, in order to determine empirically the causal effect of the creation of public inter-municipal cooperation establishments after the Law of 1999, on each of the four direct tax rates. We then study this effect in terms of convergence, by looking at the evolution of tax rate dispersion among municipalities belonging to each EPCI. We use a quasi-exhaustive panel for French municipalities, that contains information about 36,530 municipalities observed over the 1994-2010 period.

The paper is organized as follows. Section 2 presents the data and how inter-municipal cooperation is organized in France. Section 3 describes the econometric methodology and the results. Section 5 concludes.

2 The data

2.1 The organization of inter-municipal cooperation in France

France is a unitary country, which is administratively divided into three tiers of jurisdictions, i.e. 26 regions ("régions") at the top tier, 100 counties ("départements") at the middle tier, and more than 36,000 municipalities ("communes") at the bottom tier. The size of the municipalities varies greatly from one to another: the largest city (Paris) has more than 2,000,000 inhabitants, whereas 75% of municipalities have less than 1,000 inhabitants. Several initiatives have been made to compensate for this territorial dispersion, with the aim of creating more solidarity among municipalities so that they could satisfy their citizens by providing

public goods and services that they couldn't have afforded alone. A first step was made with the law of 22nd March 1890 by giving municipalities the option of creating a "syndicat de communes". First designed to manage a unique public service like the distribution of the water or the collection of household garbage, these "syndicats de communes" were allowed to manage several public services of general interest from 1959. For new cities created in the late '60s, special structures called "syndicats d'agglomérations nouvelles" emerged from 1983. A further step was made in 1992 with the creation of two structures, i.e. the "communautés de communes" –which federate rural municipalities– and the "communautés de villes" –which federate cities grouping together more than 20,000 inhabitants. A last step was made in 1999 with the "Loi Chevènement", which has simplified the inter-municipal architecture around three types of inter-municipal cooperation, i.e. the "communautés de communes" (CC) established in 1992, the "communautés d'agglomération" (CA) –which group together more than 50,000 inhabitants all in one piece– and the "communautés urbaines" (CU) –which group together more than 500,000 inhabitants all in one piece– and has organized the disappearance of the unsuccessful "communautés de villes" (CV), of the "syndicats d'agglomérations nouvelles" (SAN) and of the "districts". This law has contributed to standardize the rules applicable to the inter-municipal structures and to simplify the inter-municipal cooperation scene.

TABLE 1: EPCIs and their legal status

Year	CA	CC	CU	CV	DISTRICT	SAN	Total
1994	0	562	9	4	291	9	875
1995	0	761	9	4	323	9	1106
1996	0	902	10	4	317	9	1242
1997	0	1103	11	5	317	9	1445
1998	0	1231	12	5	311	9	1568
1999	0	1346	12	5	306	9	1678
2000	50	1532	12	0	242	9	1845
2001	90	1732	14	0	155	8	1999
2002	120	2032	14	0	0	8	2174
2003	143	2194	14	0	0	8	2359
2004	155	2285	14	0	0	6	2460
2005	162	2341	14	0	0	6	2523
2006	164	2388	14	0	0	6	2572
2007	169	2399	14	0	0	5	2587
2008	171	2392	14	0	0	5	2582
2009	174	2405	16	0	0	5	2600
2010	181	2408	16	0	0	5	2610

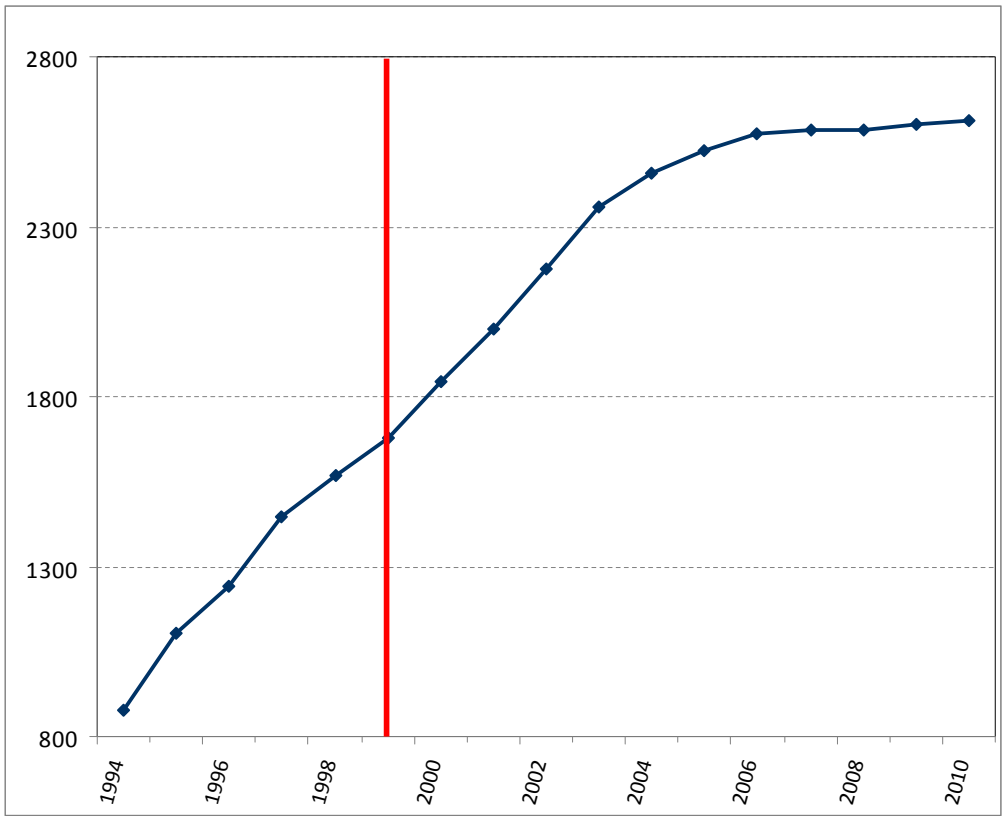
Our analysis exclusively focuses on inter-municipal structures allowed to raise tax revenues, i.e. "établissements de coopération intercommunale à fiscalité propre", which include the "communautés de communes" (CC), the "communautés d'agglomération" (CA), the "communautés urbaines" (CU), the "communautés de villes" (CV), the "syndicats d'agglomérations nouvelles" (SAN) and the "districts". The development of EPCIs has been particularly sustained over the period 1994-2005 and then has been strongly slower (see figure 1). In 2005, France is well-covered by EPCIs: 88% of the municipalities, which represents 86% of the territory and 83% of the population, cooperate through an EPCI (see table 2). Only 87 EPCIs –which will constitute what we will call later our control group– were created between 2006 and 2010 (see table 1).

TABLE 2: EPCIs and their development

Year	% of municipalities in EPCI	% of area in EPCI	% of pop in EPCI
1994	24,50%	20,65%	36,24%
1999	52,11%	52,32%	54,87%
2005	88,07%	86,42%	83,65%
2010	94,78%	93,15%	88,97%

Note that old districts and unsuccessful CVs disappeared by being transformed into CCs or CAs. The SANs have also progressively disappeared by being transformed into CAs. Most EPCIs are CCs (92% in 2010), owing to the high predominance of rural municipalities over urban municipalities (85% against 15% of French municipalities).

FIGURE 1: Evolution of the number of EPCIs



2.2 The sample

In order to evaluate the impact of inter-municipal cooperation, we use a quasi-exhaustive panel for French municipalities, that is 36,530 municipalities. 71 municipalities that merged in the studied period and 9 municipalities called "villages morts pour la France" –which were completely destroyed during the first world war and administratively kept in memory of the killed inhabitants– were excluded from the database. In addition, because of the lack of reliable information for many variables relative to overseas territories, we also excluded the

112 overseas municipalities. For reasons that will be described below, although we have more recent data at our disposal, municipalities are observed over the 1994-2005 period, which leads to a sample containing 438,360 municipality-year observations. Inter-municipal cooperation is observed over the larger period 1994-2010, in order to build coherent control groups from structures of inter-municipal cooperation that will be created over the period 2006-2010. These data from the Direction Générale des Collectivités Locales (Ministry of the Interior) allow us to know when and by which municipalities a structure of inter-municipal cooperation was created, which municipalities joined it afterwards, the legal status of the structure – communauté de communes (CC), communauté d'agglomération (CA), communauté urbaine (CU), communauté de ville (CV), syndicat d'agglomération nouvelle (SAN) or district– as well as its fiscal regime (TPU or additional taxation). Municipalities that belong to an EPCI can indeed choose between two regimes: i) a TPU regime, where the municipalities devolve to the EPCI all the power to raise business tax[1] revenues (i.e. the business tax rate is unique and chosen by the EPCI), which lowers the horizontal tax competition, and ii) an additional taxation regime, where the EPCI can set an additional tax rate on the business tax base, each municipality keeping its fiscal sovereignty, which gives rise to vertical tax competition in addition to horizontal tax competition. In both regimes, the EPCI may also tax the three other municipal tax bases, i.e. the residence tax base, the built and the unbuilt property tax bases. Most tax revenues are generated by these "4 old" taxes. Note that tax autonomy is relatively high in France since 45% of the municipal revenues comes from their own tax revenues. These tax data, at the municipal and inter-municipal level, were collected by the Direction Générale des Impôts (Ministry of Finance). As shown by Tables 3 and 4, the composition of tax revenues and its evolution between 1999 and 2005 is quite similar for municipalities and EPCIs. We observe that the share of built property taxation and residence taxation in both municipal and inter-municipal tax revenues has increased over the period 1999-2005 contrary to the one of business taxation and unbuilt property taxation.

[1] This business tax, called "taxe professionnelle", was replaced in 2010 by both a tax on the rental value of properties and a tax on value added.

TABLE 3: The composition of inter-municipal tax revenues

	1999	2005
% of intermunicipal tax revenues from built property taxation	27,30%	29,48%
% of intermunicipal tax revenues from unbuilt property taxation	20,14%	18,60%
% of intermunicipal tax revenues from business taxation	26,64%	23,59%
% of intermunicipal tax revenues from residence taxation	25,92%	28,33%

TABLE 4: The composition of municipal tax revenues

	1999	2005
% of municipal tax revenues from built property taxation	28,34%	29,44%
% of municipal tax revenues from unbuilt property taxation	23,17%	21,09%
% of municipal tax revenues from business taxation	21,29%	20,40%
% of municipal tax revenues from residence taxation	27,21%	29,07%

Other data used in our paper, i.e. the population in 1990, 1999 and 2006 (from the population census) and the classification of municipalities in terms of rurality are provided by the National Institute of Statistics (INSEE).

As regressions will be done for different sub-samples in terms of population, rurality, fiscal status and legal status, basic statistics concerning the characteristics of the municipalities and EPCIs are presented in tables 5 and 6.

TABLE 5: Characteristics of the municipalities

	1994	1999	2005	Mean
% of rural municipalities	83,7	83,7	83,7	83,7
% of mun. with a population < 500	59,44	58,32	58,32	58,78
% of mun. with 500 <= pop < 2000	28,82	29,36	29,36	29,135
% of mun. with 2000 <= pop < 10000	9,52	10	10	9,8
% of mun. with pop >= 10000	2,22	2,32	2,32	2,28
% of mun. in a CC	15,16	41,34	79,61	47,89
% of mun. in a TPU	1,07	2,75	39,23	14,06

TABLE 6: Characteristics of the EPCI

	1999	2005	Mean
% of rural EPCI meth.A	85,39	80,16	82,07
% of rural EPCI meth.B	75,28	62,21	65,74
% of EPCIs with pop < 10000	76,4	64,41	67,75
% of EPCIs with 10000 <= pop < 50000	21,35	29,11	26,87
% of EPCIs with pop >= 50000	2,25	6,18	5,21
% of CC in the EPCIs	98,88	94,22	95,69
% of EPCIs in TPU	7,87	44,87	33,47

To sum up, the variables at the municipal level that we have at our disposal are the following:

- dates of adhesion / withdrawal of a municipality to an EPCI
- the 4 local direct tax rates (the "4 vieilles")
- distinction rural / urban municipalities
- classes of population in 1990, 1999 and 2006 (from the population census).

At the EPCI level, our variables are:

- dates of creation / dissolution of an EPCI
- the 4 local direct tax rates for the additional taxation regime and the local business tax for the TPU regime
- the legal status of an EPCI
- the fiscal regime.

3 Empirical strategy

3.1 Econometric framework

In order to measure the causal effect of inter-municipal cooperation on the level and dispersion of the four local direct tax rates, we use differences-in-differences (DD) estimation procedures.

The general specification of such models is the following :

$$Y_{it} = \beta * E_{it} + \delta_t + \alpha_i + \varepsilon_{it} \tag{1}$$
$$i = 1, ..., N; t = 1, ..., T$$

where individuals are indexed by i and time is indexed by t. Let δ_t and α_i be time and individual fixed effects and ε_{it} be an unobserved error term. E_{it} is the "treatment variable", which takes a value of 0 in all periods prior to the treatment, and a value of 1 in all periods after the treatment. The subscript i for the treatment variable comes from the fact that the timing of the treatment is not the same for all individuals[2].

[2]Note that this model could also include additional explanatory variables.

Y_{it} is the outcome variable. We concentrate on two outcomes : i) the level of each of the 4 cumulative tax rates (Model 1), i.e. the sum between the municipal and inter-municipal tax rate.; ii) the dispersion of each of the 4 cumulative tax rates among municipalities belonging to the same EPCI (Model 2). We measure the impact of inter-municipal cooperation (E_{it}) on those outcomes (both the level and the dispersion of the tax rates).
The parameter of interest is $\widehat{\beta}$, the causal effect of the treatment on the outcome variable, Y_i. It measures the difference between the average change in the outcome of the "treated" (i.e. individuals who receive the treatment) and the average change in the outcome of the control group (i.e. individuals who do not receive the treatment).

3.1.1 Model specification, control and treated groups

Although inter-municipal cooperation (date of the creation of each EPCI, composition of each EPCI...) is observed over the 1994-2010 period in our database, regressions will be done over the period 1994-2005, so as to satisfy two constraints. First, the control group must be large enough for a robust econometric analysis. Since only 10 EPCIs were created in 2010, we need to enlarge the period over which control groups are created, going back to 2006. The control group therefore contains the 161 EPCIs created from 2006 to 2010. Second, the trend of the variable of interest before the treatment must be comparable for both the treated group and the control group. The treatment, i.e. the inter-municipal cooperation after the "Loi Chevènement", being proposed from 1999, the pre-treatment period goes from 1994 to 1998. All the municipalities that joined an EPCI before 1999 are dropped out of the sample. We only keep observations (over years 1994 to 2010) about inter-municipality structures created after 1999. The date of the creation is then used to define what we call "treated" and "control" groups.

We now describe more precisely each model. In Model 1, we measure the impact of inter-municipal cooperation on the cumulative tax rates. Before joining an EPCI, the variable of interest is the municipal tax rate whereas, once the municipality joined an EPCI, the variable of interest is the sum of the municipal and inter-municipal tax rates chosen by both the municipality and its EPCI. The four outcome variables are thus the four local direct tax rates: the cumulative residence tax rate (RT), the cumulative built property tax rate (BPT),

the cumulative unbuilt property tax rate (NBPT) and the cumulative local business tax rate (LBT). Note that in a TPU regime, only the local business tax is a cumulative tax. They are denoted by T_k, $k = RT$, BPT, $NBPT$ or LBT). These tax rates are observed each year at the municipal level as well as –after the adhesion– at the EPCI level. The model is the following :

$$\log(T_{kit}) = \beta * E_{it} + \delta_t + \alpha_i + \varepsilon_{it} \qquad \text{(Model 1)}$$
$$k = RT, BPT, NBPT, LBT; \quad i = 1, ..., N; \quad t = 1994, ..., 2005$$

where k is the tax rate, i the municipality and t the year.

The treatment variable E_{it} is the membership of the municipality to an EPCI. The municipalities in the treated group are municipalities that joined between 1999 and 2005 an EPCI created over the same period. All municipalities that joined after 2005 an EPCI created before 2005, are excluded from the sample, as well as all municipalities that joined an EPCI created before 1999.
The municipalities in the control group are municipalities that joined an EPCI created after 2005. Note that we also used an alternate control group composed of municipalities that never joined an EPCI over the 1999-2010 period. Since the estimated treatment effects are not sensitive to the choice between those two control groups, we do not keep this alternate control group, for consistency with the control group used in Model 2 (we explain this point later on). The characteristics of the model and the different groups are summarized in table 7.

In Model 2, we measure the impact of the creation of an EPCI on the dispersion of tax rates among municipalities that belong to the same EPCI. This dispersion is measured using a weighted Gini index[3]. The Gini index for the tax rate T_{kjt}, calculated over all municipalities i that belong to the EPCI j at year t is denoted G_{kjt}. It is computed as follows:

[3]In an EPCI, the size of the different municipalities can vary greatly from one to another. This is taken into account by weighting all Gini indices by the number of inhabitants of the municipalities.

$$G_{kjt} = \frac{\sum_i \sum_{i'} |T_{k,jit} - T_{k,ji't}| \, R_{jit} R_{ji't}}{2\overline{T}_{jt} R_{jt}^2}$$

where R_{jt} is the total number of inhabitants in the EPCI j, R_{jit} is the number of inhabitants in municipality i in the EPCI j, $T_{k,it}$ is the tax rate k of municipality i in the EPCI j and $\overline{T}_{jt}$ is the average tax rate measured at the EPCI level, at the date t. Gini indices are calculated for the four tax rates[4].

The model is the following :

$$G_{kjt} = \beta * E_{jt} + \delta_t + \alpha_j + \varepsilon_{jt} \qquad \text{(Model 2)}$$

$$k = RT, BPT, NBPT, LBT; \quad j = 1, ..., M; \quad t = 1994, ..., 2005$$

where k is the tax rate, j the EPCI and t the year.

The treatment variable E_{jt} is the creation of an EPCI.

EPCIs in the treated group are EPCIs created between 1999 and 2005. All EPCI created before 1999 are dropped out of the sample.

EPCIs in the control group are EPCIs created between 2006 and 2010. The structure of this control group is imposed by our methodology, as we calculate Gini indices of local tax rates among municipalities at the EPCI level (like in the previous model, the tax rate considered is either the municipal tax rate or the cumulated tax rate, depending on the adhesion of the municipality to an EPCI). The control group cannot contain all municipalities that never joined an EPCI, because otherwise, we would not have the structure on which to calculate the Gini indices of tax rates. Therefore, we calculate the Gini indices of tax rates between municipalities at the EPCI level, using the "future" structure of EPCIs, i.e. the structure of EPCIs that is observed at the time of their creation (which is comprised between 2006 and 2010). All characteristics of the model and the different groups are again summarized in table 7.

[4]One criticism to the use of such Gini indices is that they can be calculated on a very small number of municipalities. For example, 16% of EPCI are composed of 5 municipalities or less.

TABLE 7: Description of the two models estimated

	MODEL 1	**MODEL 2**
Level	Municipality level	EPCI level
Outcome variable	4 outcomes: the logarithm of 4 different cumulative tax rates at a given year	4 outcomes : the gini index of the 4 different cumulative tax rates of municipalities belonging to an EPCI at a given year
Treatment	Adhesion between 1999 and 2005 of a municipality to an EPCI created between 1999 and 2005	Creation of an EPCI between 1999 and 2005
Treated group	All municipalities that join an EPCI between 1999 and 2005 → number of municipalities: 11 936 → outcome observed over years 1994 to 2005 → number of observations: 143 232	EPCI created 1999 and 2005 → number of EPCI: 1 034 → outcome observed over years 1994 to 2005 → number of observations: 12 375
Control group	All municipalities that join an EPCI between 2006 and 2010 → number of municipalities: 1 600 → outcome observed over years 1994 to 2005 → number of observations : 19 200	EPCI created between 2006 and 2010 → number of EPCI : 161 → outcome observed over years 1994 to 2005 → number of observations : 1 936

3.1.2 Estimation methodology

Contrary to most studies that use DD estimators, we use a panel data set in which tax rates of municipalities and EPCIs are observed over the 1994-2005 period. Therefore, equation (1) can be estimated using classical estimation procedures relative to panel data models.

The most general specification of the model used for DD can be written as in (1). In this model, the individual effect α_i is likely to be correlated with some of the explanatory variables of the model, and in particular, with the treatment variable E_{it}. Pooled OLS on equation (1) would therefore lead to inconsistent estimates and $\widehat{\beta}$ would not be the causal effect of the treatment. Panel data provide means of transforming the model so that the individual fixed effect α_i disappears, as well as the correlation between this term and E_{it}. This model can be estimated using the first-differenced estimator or the within-group estimator. The latter is usually preferred, as it gives more efficient estimates, as long as E_{it} is strictly exogenous (i.e. $corr(E_{it}, \varepsilon_{it}) = 0, \forall i$ and t).

The estimated model is the following:

$$(Y_{it} - Y_{i.}) = \beta * (E_{it} - E_{i.}) + \gamma_t + (\varepsilon_{it} - \varepsilon_{i.}) \quad (2)$$
$$i = 1, ..., N; \quad t = 1994, ..., 2005$$

where $Y_{i.}$and $E_{i.}$ are the individual means and γ_t are time fixed effects.

The estimations of such models rely on the validity of several identifying assumptions.

The first "fundamental identifying assumption" is that changes (or trends) in the outcome variable would have been the same for both groups (treated and control groups) without any treatment. As it is not possible to observe this counterfactual (the evolution of the outcome for the treated group, in the absence of any treatment), the validity of this assumption can be checked by looking at the trend in the outcome variable of both groups in the pre-treatment period. Therefore, for both models, we present the trend of the outcome variables both before and after treatment. To get robust evidence that both groups have the same trend before the treatment, we estimate a fixed-effect regression over the pre-treatment period. The explained variable is the outcome and explanatory variables are time dummies as well as interactions between time dummies and the dummy that equals 1 if the observation belongs to the treated group. The tests of significance of the interaction terms allow us to conclude on whether the outcome of the control group is significantly the same as the one of the treated group, or not. We do not present results of these regressions in this paper, but we comment them.

The second assumption is the absence of any correlation between E_{it} and the remaining error term ε_{it}.The violation of this hypothesis leads to inconsistent estimates of the treatment effect. However, it is impossible to check empirically the validity of this hypothesis.

For Bertrand, Duflo and Mullainathan (2004), DD estimates are very likely to lead to an underestimate of standard errors (and therefore a too frequent rejection of the null hypothesis that the treatment effect is not significant) if we do not control for the correlation of the error term ε_{it} over time for a given individual (municipality or EPCI). This has to be taken into account in the estimates. The default standard errors assume that the regression errors are independent and identically distributed (iid). In all estimations we therefore use standard errors that are clustered at the individual level. Another way to control part of this serial correlation would be to include the lagged dependent variable as an explanatory variable.

However, this lagged variable should be instrumented in order to get consistent estimates (as it is, by construction, correlated with the error term), but instruments can be hard to find. This is left for future research. Note that this serial correlation is very likely to happen in our case. For example, the coefficient of correlation of the four local direct tax rates between 2 years is always higher than 0.95.

In addition to the simple Model 1 and Model 2, we estimate two more sophisticated models. First, we allow treatment effects to vary over time as in Laporte and Windmeijer (2005). The specifications of Model 1 and Model 2 rely on the assumption that the effect of the treatment is immediate : when the variable E_{it} (resp. E_{jt}) switches from 0 to 1, it is accompanied by a change in $\log(T_{kit})$ (resp. G_{kjt}) of an amount β. In our case, the effect of inter-municipal cooperation is likely to increase over time, which leads us to use a more flexible model in which we allow the treatment effect to vary over time. To do so, we include in the model variables relative to the number of years that passed since the treatment. More precisely, the specification is the following :

$$\log(T_{kit}) = \beta * E_{it} + \sum_{\tau=1}^{2005-da_{ij}} d_\tau I_{it+\tau} + \delta_t + \alpha_i + \varepsilon_{it} \qquad \text{(Model 1 bis)}$$

$$k = RT, BPT, NBPT, LBT; \quad i = 1, ..., N; \quad t = 1994, ..., 2005;$$

$$da_{ij} = \text{ date of adhesion of } i \text{ to EPCI } j$$

$$G_{kjt} = \beta * E_{jt} + \sum_{\tau=1}^{2005-dc_j} d_\tau I_{jt+\tau} + \delta_t + \alpha_j + \varepsilon_{jt} \qquad \text{(Model 2 bis)}$$

$$k = RT, BPT, NBPT, LBT; \quad j = 1, ..., M; \quad t = 1994, ..., 2005;$$

$$dc_j = \text{ date of creation of EPCI } j$$

where $I_{it+\tau}$ equals 1 if τ years passed since the individual received the treatment for the first time. Therefore, $\beta + d_\tau$ gives the impact of the treatment τ years after the first year of the treatment.

Secondly, we could add additional explanatory variables in both models in order to control for characteristics of the municipality or characteristics of the EPCI. Since most characteristics

in our data set are time-invariant (geographical variables for instance) or only change twice over the period (population characteristics from the census for instance), they cannot be included as covariates in the regression. A way to get around this pitfall is to test whether there is an heterogeneity of the treatment effect between different sub-groups. To do so, we include interaction terms in Model 1 and Model 2 and estimate the following models :

$$\log(T_{kit}) = \beta * E_{it} + \gamma * (E_{it} * I_{G=A}) + \delta_t + \alpha_i + \varepsilon_{it} \qquad \text{(Model 1 ter)}$$
$$k = RT, BPT, NBPT, LBT; \quad i = 1, ..., N; \quad t = 1994, ..., 2005$$

$$G_{kjt} = \beta * E_{jt} + \gamma * (E_{jt} * I_{G=A}) + \delta_t + \alpha_j + \varepsilon_{jt} \qquad \text{(Model 2 ter)}$$
$$k = RT, BPT, NBPT, LBT; \quad j = 1, ..., M; \quad t = 1994, ..., 2005$$

where $I_{G=A}$ equals 1 if the municipality (resp. EPCI) belongs to group A (for example, a rural municipality (resp. a rural EPCI)) and 0 otherwise. The coefficients of such models must be interpreted carefully: β gives the difference between: i) the average change in the outcome of individuals belonging to both the treated group and the category B, and ii) the average change in the outcome of individuals belonging to the control group, whereas $\beta + \gamma$ gives the difference between: i) the average change in the outcome of individuals belonging to both the treated group and the category A and ii) the average change in the outcome of individuals belonging to the control group.

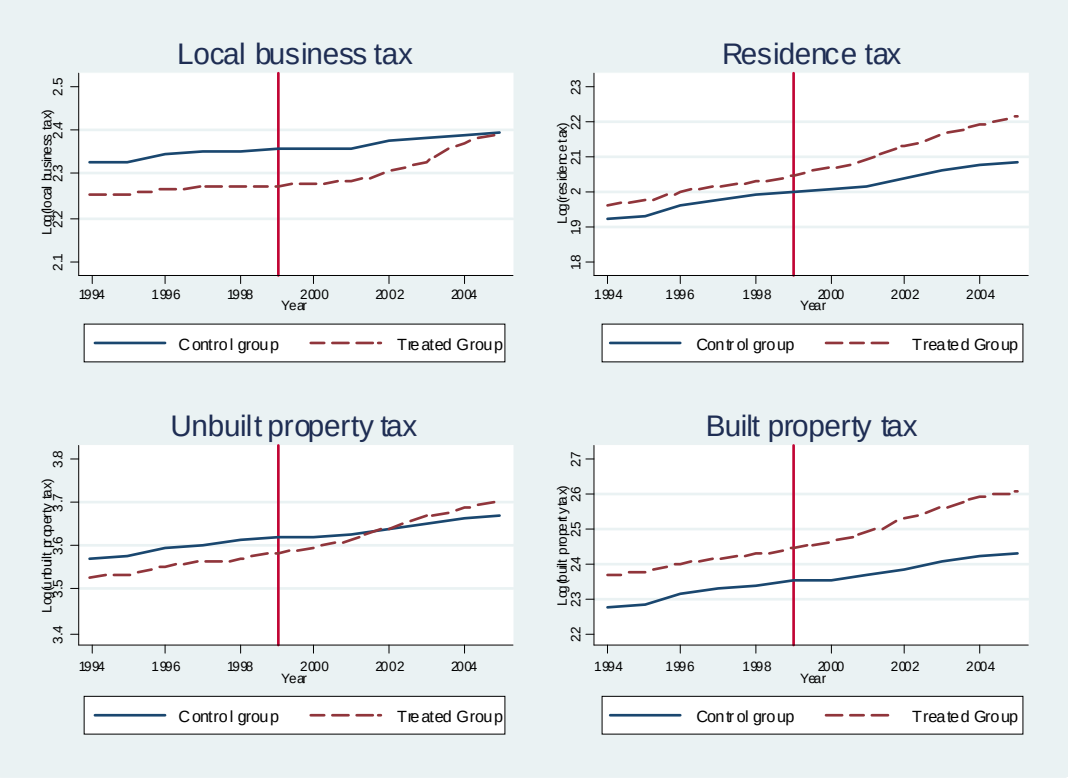
3.2 Results

3.2.1 First model : the impact of inter-municipal cooperation on the level of local tax rates

Figure 2 displays the evolution of the four tax rates for both control and treated groups, over the 1994-2005 period. A vertical line is added for year 1999, which is the year from which an individual (municipality or EPCI) can be "treated". Whatever the tax rate, the evolution between 1994 and 1999 is similar between the treated and the control group. The

estimates[5] confirm that, prior to 1999, the evolutions of the outcomes for both groups are not significantly different. This result is consistent with the identifying assumption needed to perform DD estimations. Figure 2 also shows that the treatment had a strong impact on the evolution of all average tax rates. For municipalities who joined an EPCI, all four tax rates increase significantly after 1999. Consequently, as the residence tax rate and the built property tax rate were already higher for municipalities belonging to the treated group, the discrepancy between taxes of both groups increased with time. On the contrary, the higher increase of the local business tax and unbuilt property tax for the treated group leads to decrease the gap between control and treated municipalities after 1999.

FIGURE 2: Evolution of the four tax rates between 1994 and 2005 for control and treated groups



The first results of the estimation of Model 1 are presented in table 8. All estimated models include time and municipality dummies that are not reported. For municipalities, joining

[5] The model estimated is described in the previous section.

an EPCI leads to a significant increase in all tax rates. For example, joining an EPCI leads to a 8.7% increase in the local built property tax. The highest increase are for taxation on households (i.e. BPT and RT).

TABLE 8: Estimation of Model 1

	Log(BPT)	Log (NBPT)	Log (LBT)	Log (RT)
E_{it}	0.087*** (0.002)	0.065*** (0.002)	0.054*** (0.003)	0.082*** (0.002)
Year dummies	YES	YES	YES	YES
Municipality dummies	YES	YES	YES	YES
N	161,299	162,238	158,669	162,351
Within-R^2	0.35	0.28	0.09	0.37

Notes:
i) Standard errors in parentheses. They are corrected for clustering on the municipalities.
ii) * means that p<.05, ** means that p<.01, *** means that p<.001.
iii) RT stands for the residence tax; BPT is the built property tax ; NBPT is the unbuilt property tax and LBT is the local business tax

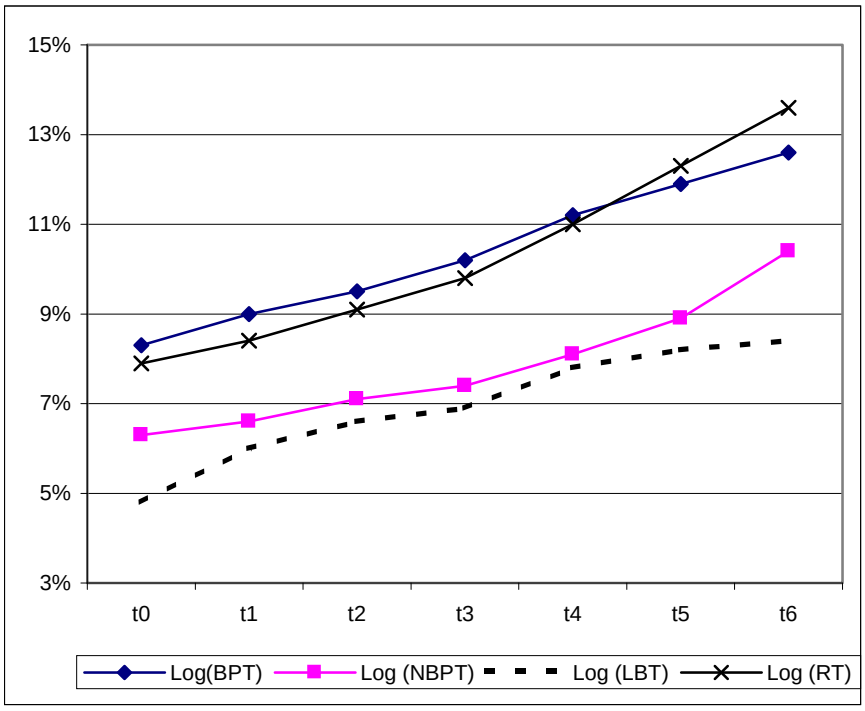
TABLE 9: Estimation of Model 1 bis with "pulse"variables

	Log(BPT)	Log (NBPT)	Log (LBT)	Log (RT)
E_{it}	0.083***	0.063***	0.048***	0.079***
	(0.002)	(0.002)	(0.003)	(0.002)
I_{it+1}	0.007***	0.003***	0.012***	0.005***
	(0.001)	(0.001)	(0.002)	(0.001)
I_{it+2}	0.012***	0.008***	0.018***	0.012***
	(0.002)	(0.001)	(0.003)	(0.002)
I_{it+3}	0.019***	0.011***	0.021***	0.019***
	(0.003)	(0.002)	(0.004)	(0.003)
I_{it+4}	0.029***	0.018***	0.030***	0.031***
	(0.004)	(0.003)	(0.006)	(0.004)
I_{it+5}	0.036***	0.026***	0.034***	0.044***
	(0.005)	(0.004)	(0.007)	(0.005)
I_{it+6}	0.043***	0.041***	0.036***	0.057***
	(0.007)	(0.006)	(0.010)	(0.008)
Year dummies	YES	YES	YES	YES
Municipality dummies	YES	YES	YES	YES
N	161,299	162,238	158,669	162,351
Within-R^2	0.35	0.28	0.09	0.37

Notes:
i) Standard errors in parentheses. They are corrected for clustering on the municipalities.
ii) * means that p<.05, ** means that p<.01, *** means that p<.001.
iii) RT stands for the residence tax; BPT is the built property tax ; NBPT is the unbuilt property tax and LBT is the local business tax

In order to check if treatment effects are constant over time, we reestimate Model 1 with a treatment variable that varies over time (model 1 bis). The results of these estimates are presented in table 9 and figure 4. We find that joining an EPCI has an immediate effect on all tax rates, but that the effect increases with time (for all tax rates). In other words, the tax integration appears to be very progressive. The fact that the evolutions of the four tax rates are linked and restricted by law may explain this progressive increase of the tax rates. In addition, the older the EPCI, the more competencies are likely to be transferred, which may be another reason for the increase of taxation over time.

FIGURE 3: Representation of the time-varying effect of the treatment



We then add interaction effects in order to measure whether the treatment effect is the same for different groups of municipalities. These results are presented in tables 10 and 11. The rurality clearly worsens the inflationary impact of the creation of EPCI on the tax rates (expect for the local business tax). For instance, the membership of a urban municipality in an EPCI increases the built property tax by 4,5% whereas the membership of a rural municipality in an EPCI increases the built property tax by 9,4%. Most rural municipalities joined CC, which explains that belonging to a CC also increases all the tax rates (expect for the local business tax). Moreover, we find that the effect of joining an EPCI decreases with the size of the municipality (for all tax rates except the local business tax rate). Before becoming members of an EPCI, small municipalities often benefited from public goods or services provided by neighboring larger municipalities without contributing to their financing. The membership of a small municipality to an EPCI often forces it to contribute more than it would have done otherwise. Finally, choosing an additional tax regime worsens the inflationary effect on all tax rates, with respect to the single business tax regime.

It is interesting to note that, even without including any other explanatory variables than the treatment effect, the explanatory power of the model is already quite high. For example, 37% of the within variation of the logarithm of the residence tax is explained by our simplest model (table 8). The explanatory power of the model does not increase very much with the use of interaction variables (tables 10 or 11).

TABLE 10: Estimation of Model 1 ter with interaction effects

	Interactions with rural				Interactions with population			
	Log(BPT)	Log (NBPT)	Log (LBT)	Log (RT)	Log(BPT)	Log (NBPT)	Log (LBT)	Log (RT)
E_{it}	0.045***	0.043***	0.068***	0.040***	0.113***	0.081***	0.054***	0.105***
	(0.004)	(0.004)	(0.005)	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)
E_{it} * rural	0.049***	0.025***	-0.016**	0.048***	-	-	-	-
	(0.004)	(0.004)	(0.005)	(0.004)				
E_{it} * pop_500_2000	-	-	-	-	-0.062***	-0.039***	0.004	-0.052***
					(0.004)	(0.003)	(0.005)	(0.004)
E_{it} * pop_2000_10000	-	-	-	-	-0.078***	-0.047***	-0.006	-0.076***
					(0.005)	(0.005)	(0.006)	(0.005)
E_{it} * pop_sup_10000	-	-	-	-	-0.109***	-0.080***	-0.041***	-0.120***
					(0.007)	(0.006)	(0.008)	(0.006)
Year dummies	YES	YES	YES	YES	YES	YES	YES	YES
Municipality dummies	YES	YES	YES	YES	YES	YES	YES	YES
N	161299	162238	158669	162351	161299	162238	158669	162351
Within-R^2	0.35	0.28	0.09	0.37	0.36	0.29	0.09	0.38

Notes:
i) Standard errors in parentheses. They are corrected for clustering on the municipalities.
ii) * means that p<.05, ** means that p<.01, *** means that p<.001.
iii) RT stands for the residence tax; BPT is the built property tax ; NBPT is the unbuilt property tax and LBT is the local business tax

TABLE 11: Estimation of Model 1 ter with interaction effects

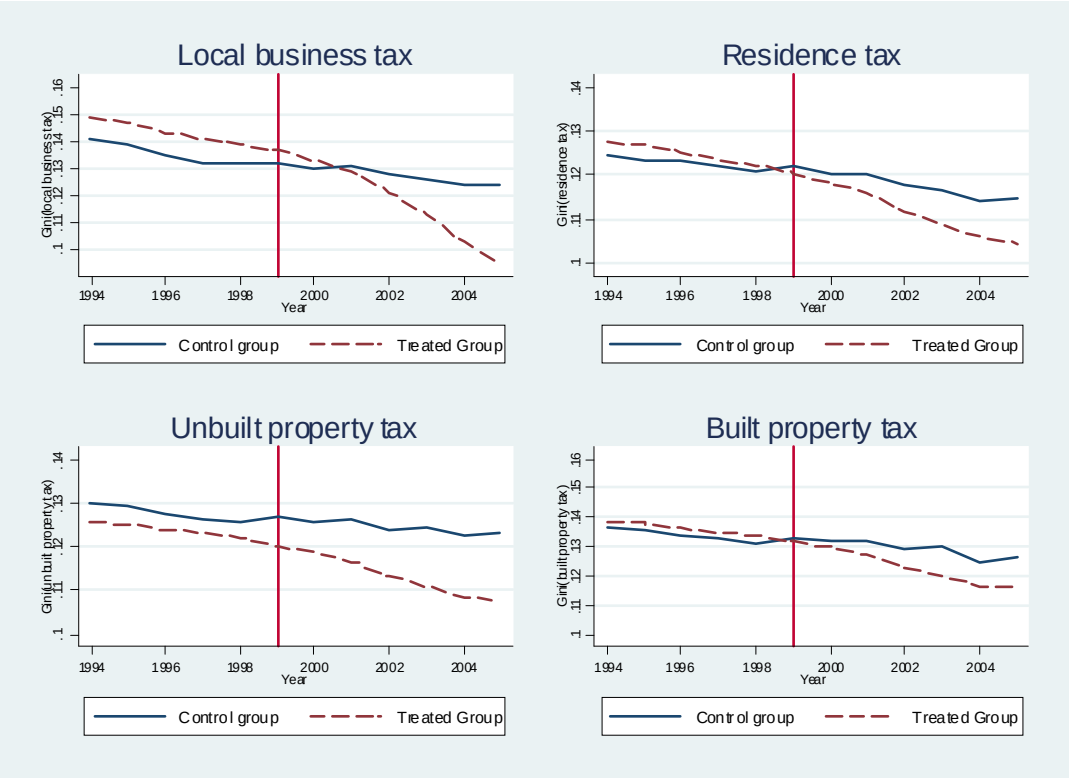
	Interactions with legal status				Interactions with fiscal regime			
	Log(BPT)	Log (NBPT)	Log (LBT)	Log (RT)	Log(BPT)	Log (NBPT)	Log (LBT)	Log (RT)
E_{it}	0.026***	0.019***	0.111***	0.016**	0.117***	0.084***	0.059***	0.108***
	(0.006)	(0.005)	(0.010)	(0.005)	(0.002)	(0.002)	(0.004)	(0.002)
E_{it} * CC	0.065***	0.046***	-0.066***	0.069***	-	-	-	-
	(0.006)	(0.005)	(0.010)	(0.006)				
E_{it} * TPU	-	-	-	-	-0.103***	-0.074***	-0.035***	-0.094***
					(0.004)	(0.003)	(0.005)	(0.003)
Year dummies	YES	YES	YES	YES	YES	YES	YES	YES
Municipality dummies	YES	YES	YES	YES	YES	YES	YES	YES
N	142227	143103	139976	143151	142227	143103	139976	143151
Within-R^2	0.36	0.28	0.09	0.38	0.39	0.31	0.09	0.40

Notes:
i) Standard errors in parentheses. They are corrected for clustering on the municipalities.
ii) * means that p<.05, ** means that p<.01, *** means that p<.001.
iii) RT stands for the residence tax; BPT is the built property tax ; NBPT is the unbuilt property tax and LBT is the local business tax

3.2.2 Second model : the impact of inter-municipal cooperation on the dispersion of tax rates among municipalities belonging to the same EPCI

In this second model, we examine tax rate dispersion among municipalities belonging to the same EPCI. Tax rate dispersion is measured by Gini indices. Figure 4 displays the evolution of the average Gini indices calculated for the four tax rates, over the 1994-2005 period, both for control and treated groups. Overall, we observe a continuous convergence of the tax rates over the whole period. However, this trend is more definite for municipalities who decided to join an EPCI. Whereas the evolution of the Gini index is smiliar for both groups before 1999 (for all tax rates, a regression shows that the trend of the Gini indices are not significantly different for the treated and the control groups), the disparities decrease at a much higher rate after 1999 in the treated goup, which means that to belong to an EPCI leads to more convergence of tax rates. Moreover, we notice that this decrease is stronger for the local business tax while it is less important for the built and unbuilt property taxes.

FIGURE 4: Evolution of the Gini index of four tax rates, between 1994 and 2005, both for control and treated groups



The results of the estimation of Model 2 are presented in tables 12 to 15. The simplest estimation is presented in table 12; it does not contain any interaction effects and the effect of the treatement is supposed to be constant over the years. As for Model 1, Model 2 includes time and municipality dummies that are not reported. We find that joining an EPCI has a positive and significant impact on the convergence of all tax rates (table 8). For all taxes, we find that there is a convergence of tax rates), which increases over time. For example, on average, joining an EPCI after 1999 decrases the Gini index of the built property tax between municipalities of 1 point; it also decrases the Gini index of the local business tax of nearly 2 points.

TABLE 12: Estimation of model (Model 2)

	Gini (BPT)	Gini (NBPT)	Gini (LBT)	Gini (RT)
E_{it}	-0.0103***	-0.0085***	-0.0188***	-0.0099***
	(0.0010)	(0.0009)	(0.0013)	(0.0010)
Year dummies	YES	YES	YES	YES
Municipality dummies	YES	YES	YES	YES
N	14021	14021	14018	14020
Within-R^2	0.21	0.17	0.40	0.21

Notes:
i) Standard errors in parentheses. They are corrected for clustering on the municipalities.
ii) * means that p<.05, ** means that p<.01, *** means that p<.001.
iii) RT stands for the residence tax; BPT is the built property tax ; NBPT is the unbuilt property tax and LBT is the local business tax

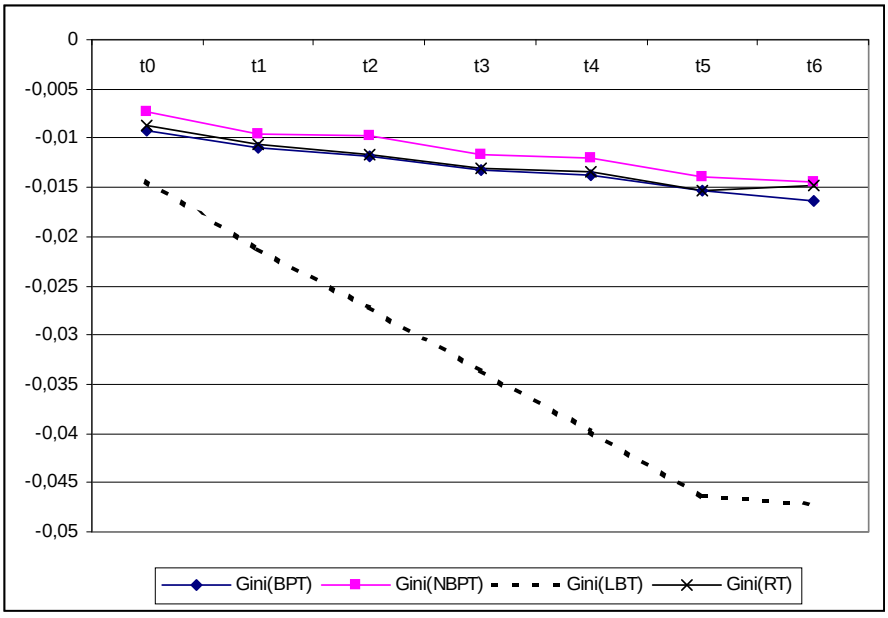
When allowing the treatment effect to vary over time, we find that the effect of joining an EPCI has an immediate effect on the reduction of inequalities but that this effect increases over time (table 13 and figure 5). Note that the most definite effect concerns the loal business tax. (is for the local business tax that the effect is the highest and the most increasing over time.

TABLE 13: Estimation of Model 2 bis with "pulse" variables

	Gini (BPT)	Gini (NBPT)	Gini (LBT)	Gini (RT)
E_{it}	-0.0093***	-0.0074***	-0.0142***	-0.0087***
	(0.0009)	(0.0008)	(0.0011)	(0.0008)
I_{it+1}	-0.0017***	-0.0021***	-0.0070***	-0.0020***
	(0.0005)	(0.0005)	(0.0006)	(0.0005)
I_{it+2}	-0.0025**	-0.0024**	-0.0129***	-0.0029***
	(0.0008)	(0.0007)	(0.0010)	(0.0008)
I_{it+3}	-0.0039**	-0.0042***	-0.0194***	-0.0043***
	(0.0013)	(0.0011)	(0.0016)	(0.0013)
I_{it+4}	-0.0045**	-0.0047**	-0.0255***	-0.0047**
	(0.0017)	(0.0015)	(0.0022)	(0.0017)
I_{it+5}	-0.0061**	-0.0066**	-0.0322***	-0.0067**
	(0.0023)	(0.0021)	(0.0030)	(0.0023)
I_{it+6}	-0.0071*	-0.0071**	-0.0330***	-0.0061*
	(0.0033)	(0.0028)	(0.0045)	(0.0030)
Year dummies	YES	YES	YES	YES
Municipality dummies	YES	YES	YES	YES
N	14021	14021	14018	14020
Within-R^2	0.21	0.17	0.43	0.21

Notes:
i) Standard errors in parentheses. They are corrected for clustering on the municipalities.
ii) * means that p<.05, ** means that p<.01, *** means that p<.001.
iii) RT stands for the residence tax; BPT is the built property tax ; NBPT is the unbuilt property tax and LBT is the local business tax

FIGURE 5: Representation of the time-varying effect of the treatment



The estimation of Model 2 with the inclusion of interaction effects shows that the effect of joining an EPCI differs according to the type of EPCI. We allow the treatment effet to depend, as in Model 1, on whether the EPCI is rural or not[6], on the legal status of the EPCI, on the fiscal regime and on the number of inhabitants in the EPCI. Results are presented in tables 14 and 15. We find that the convergence of tax rates is higher for rural EPCI and less densely populated EPCI. This result, combined with the previous one obtained on the level of tax rates (i.e. rural municipalities experienced a higher increase in tax rates) may lead to the interpretation that rural EPCIs consist of many rural municipalities organized around one market town. The other interesting result is that the adoption a single business tax reinforces the convergence of tax rates, for every local taxes (table 15).

TABLE 14: Estimation of Model 2 ter with interaction effects

	Interactions with rural				Interactions with legal status			
	Gini (BPT)	Gini (NBPT)	Gini (LBT)	Gini (RT)	Gini (BPT)	Gini (NBPT)	Gini (LBT)	Gini (RT)
E_{it}	-0.0064***	-0.0040*	-0.0145***	-0.0051**	0.0011	0.0036	-0.0046	0.0041*
	(0.0019)	(0.0018)	(0.0021)	(0.0017)	(0.0022)	(0.0021)	(0.0028)	(0.0020)
E_{it} * rural	-0.0047*	-0.0056**	-0.0052*	-0.0058**	-	-	-	-
	(0.0021)	(0.0020)	(0.0023)	(0.0019)				
E_{it} * CC	-	-	-	-	-0.0110***	-0.0119***	-0.0107***	-0.0137***
					(0.0024)	(0.0023)	(0.0028)	(0.0022)
Year dummies	YES	YES	YES	YES	YES	YES	YES	YES
Municipality dummies	YES	YES	YES	YES	YES	YES	YES	YES
N	14021	14021	14018	14020	12118	12118	12115	12117
Within-R^2	0.21	0.17	0.40	0.21	0.24	0.19	0.44	0.23

Notes:
i) Standard errors in parentheses. They are corrected for clustering on the municipalities.
ii) * means that p<.05, ** means that p<.01, *** means that p<.001.
iii) RT stands for the residence tax; BPT is the built property tax ; NBPT is the unbuilt property tax and LBT is the local business tax

[6] To define if an EPCI can be considered as rural or not, we used two different definitions: i) a rural EPCI is an EPCI in which the largest municipality of the EPCI is rural; ii) a rural EPCI is an EPCI in which more than 50% of the inhabitants live in a rural municipality. The two definitions give similar results. As a consequence, only results obtained using the second definition are presented in the paper.

TABLE 15: Estimation of Model 2 ter with interaction effects

	Interactions with fiscal regime				Interactions with population			
	Gini (BPT)	Gini (NBPT)	Gini (LBT)	Gini (RT)	Gini (BPT)	Gini (NBPT)	Gini (LBT)	Gini (RT)
E_{it}	-0.0037**	-0.0033**	-0.0098***	-0.0031**	-0.0132***	-0.0108***	-0.0213***	-0.0129***
	(0.0012)	(0.0011)	(0.0014)	(0.0012)	(0.0012)	(0.0011)	(0.0016)	(0.0012)
E_{it} * TPU	-0.0086***	-0.0066***	-0.0075***	-0.0088***				
	(0.0016)	(0.0015)	(0.0020)	(0.0016)				
E_{it} * pop_10000_50000					0.0086***	0.0057***	0.0066**	0.0078***
					(0.0017)	(0.0016)	(0.0021)	(0.0017)
E_{it} * sup_50000					0.0087*	0.0108***	0.0112***	0.0136***
					(0.0035)	(0.0027)	(0.0030)	(0.0030)
Year dummies	YES	YES	YES	YES	YES	YES	YES	YES
Municipality dummies	YES	YES	YES	YES	YES	YES	YES	YES
N	12118	12118	12115	12117	14021	14021	14018	14020
Within-R^2	0.24	0.19	0.44	0.24	0.22	0.18	0.40	0.22

Notes:
i) Standard errors in parentheses. They are corrected for clustering on the municipalities.
ii) * means that p<.05, ** means that p<.01, *** means that p<.001.
iii) RT stands for the residence tax; BPT is the built property tax ; NBPT is the unbuilt property tax and LBT is the local business tax

4 Conclusion

The cooperation among French municipalities clearly leads to an increase in each of the four local taxes over the period 1999-2005. As a consequence of fiscal integration, this effect becomes stronger with time. The highest tax rises are observable in small and rural municipalities, where cooperation has often been an opportunity to launch important investment projects. From the comparison between the two fiscal regimes offered to municipalities in EPCIs, i.e. the additional tax regime versus the single business tax regime, we show that the additional tax regime worsens the inflationary effect on all tax rates. In line with the tax competition literature, we thus confirm that reducing the number of competing jurisdictions increases the tax rates levied at the equilibrium. However, we cannot rule out that tax-base sharing reduces accountability and therefore encourages municipalities to overtax.

The study of tax rate dispersion among municipalities that belong to the same EPCI –measured by Gini indices– brings new insights as it shows that cooperation leads to a higher convergence of each tax rate. Again, rural EPCIs experienced highest convergence

effects. Rather than trying to differentiate themselves via the use of tax instruments for which municipalities still have a total control, municipal governments that belong to the same EPCI tend to resemble each other over time. As a consequence, the cooperation via a given tax instrument does not lead to fiercer tax competition via the other tax instruments.

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