Regional tax competition: Evidence from French Regions

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Abstract

Two mechanisms can lead to fiscal strategic interactions between local jurisdictions. The first one is due to the tax base mobility. Authorities use fiscal variables to attract new resources. The second one is related to information asymmetries between the politicians and the constituency. To reduce these asymmetries, voters can compare their fiscal situation to the one in neighboring jurisdictions. These two channels lead to what we can refer to as "mobility-led" and "information-led" tax competition. This paper aims at discriminating among these two tax competition models in the case of the French regions. The econometric tests suggest that when taxes are paid by voters the politicians in office seem to be involved in an "information-led" tax competition, while in the case of taxes paid by firms, the mobility of the tax base seems to be the best way to explain strategic fiscal interactions.

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1. Introduction

Since the late nineties many studies have dealt with the strategic interactions between tax policy among countries or local governments. There are two main channels through which interactions take place. The first one is based on the mobility of tax bases. Under this assumption, stressed among others by Wildasin (1988), an action chosen by a jurisdiction affects the budget constraint of another jurisdiction, by means of a policy-driven resource flow among localities, leading to strategic interactions in local public decisions. The second channel due to Salmon (1987) and Besley and Case (1995) consists of information. Some of the politicians are supposed to be opportunist and hold private information not available to voters. The latter

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have the possibility to compare their situation to the one prevailing in the nearby jurisdictions and to gauge the relative performance of their representatives. Anticipating this yardstick behavior, the politicians take into account not only the program of their competitors in their own jurisdiction but also decisions made in the neighboring communities. These two channels lead to what we can refer to as "mobility-led" tax competition (commonly known as tax competition) and "information-led" tax competition (also known as yardstick competition).

In both cases, we can establish a theoretical correlation between the tax rates of neighboring jurisdictions. Indeed, in order not to suffer a tax base shrinking, or not to be considered as bad politicians, decision-makers rationally adopt mimicking behaviors. Empirical studies have found the existence of such correlations at the decentralized level of government in Europe. It is, for example, the case in Germany (Buettner, 2001), Finland (Kangasharju et al, 2006), Spain (Bosh and Sole Olle, 2007), Switzerland (Feld and Kirchgässner, 2001), France (Feld, Josselin and Rocaboy, 2003), and the Netherlands (Allers and Elhorst, 2005).

A point remains however widely unexplored. What is the origin of these empirical results? Are they due to "mobility-led" or "information-led" inter-jurisdictional competition? Few authors have focused on this question. For instance Besley and Case (1995) and Bosh and Sole Olle (2007) by uncovering that the electoral results in a jurisdiction depend both on own tax rates and on neighboring jurisdictions' tax rates, suggest that yardstick competition drives local government fiscal decisions. On the other hand, Buettner (2001) and Brett and Pinkse (2000) present results which corroborate the "mobility-led" tax competition theory by testing the hypothesis that one tax base of jurisdiction i is affected by the policy enacted in jurisdiction i as well as the policy in neighbouring jurisdictions.

In this paper we examine this question but in a rather different way. We use the features of the French local tax system to discriminate among the two competing theories. There are two kinds of local taxes in France: taxes paid by firms and taxes paid by voters. Firms are potentially mobile while voters are not. *A priori* if interaction exists for both kinds of taxes, mobility would be the best way to explain it for taxes paid by firms, whereas information would be responsible for interaction concerning taxes paid by voters. Moreover in that latter case, we assume that inferring the right tax level from observing the fiscal situations in the neighboring jurisdictions may be a complicated task for voters, particularly when tax rates are very different from one jurisdiction to another. As a result, the opportunist politicians may take advantage of the complexity of the comparison to increase tax rates in their own jurisdictions. In that case, under the "Yardstick competition" hypothesis, there should be a positive correlation between the variance of the nearby tax rates and the tax rates of a jurisdiction, *ceteris paribus*. We investigate this question in the case of the local taxes at the regional level in France. We find that the taxes paid by voters in one French region - a housing tax (Taxe d'habitation) and a property tax (Taxe foncière) - depend positively on the average tax rates of geographically neighboring regions and on the standard-deviation of these tax rates. The larger the standard deviation of neighboring tax rates, the more complicated the comparison is, and the easier it is for politicians to increase tax rates. However, this "complicated comparison effect" is not significant when the business tax (Taxe professionnelle) is considered. This strengthens the idea that comparison would be an important element of the local tax system for voters, whereas the tax base mobility would be the channel of the interactions among jurisdictions in the case of taxes addressing firms. Section 2 briefly summarizes these arguments, section 3 presents the econometric tests and the last section concludes the paper.

2. The tax competition theories

The numerous models of local strategic interactions based on capital mobility have the same theoretical foundations (Wildasin, 1988). Local public decision-makers are supposed to maximise a welfare function positively related to the local public good level. Voters are assumed to be immobile and to consume both a private good and a local public good. The latter is financed by a tax on capital. Since capital is assumed to be perfectly mobile across local jurisdictions, when a given government raises its tax rate, net return on capital located there falls and then capital chooses to relocate. Marginal productivity of capital within the jurisdiction of departure increases, while marginal productivity of the jurisdiction of arrival decreases. Capital flows carry on until the net return on capital becomes identical everywhere. Formally, $f_l'(k_l) - t_l = \rho$, $l = 1,..,L$ and $\sum_{l=1}^{L} k_l = \bar{k}$ where f_l' is capital marginal productivity in jurisdiction l, ($f_l' > 0 > f_l''$), k_l is the stock of capital located in l, t_l is the tax rate on capital in l, $\bar{k}$ is the total amount of capital in the economy and L the number of jurisdictions. From this system of equations, we can easily compute the change in capital in jurisdiction i that results from altering marginally the tax rate in i, ceteris paribus. This change is given by:

$$\partial k_i / \partial t_i = 1 / \sum_{l=1}^{L} f_l'' < 0 \tag{1}$$

A jurisdiction may be induced to lower tax rate in order to attract capital and then to increase local public expenditures. For instance, if we assume that the goal of the decision maker in i is to maximise the tax revenue coming from the taxation on capital, the tax rate in i results from the following maximisation program:

$$\max_{\{t_i\}} R_i = t_i k_i(t_1,..,t_i,..,t_L) \tag{2}$$

The first order condition which is also the Cournot-Nash reaction function of jurisdiction i is given by:

$$k_i(t_1,..,t_i,..,t_N) \sum_{l=1}^{L} f_l''(k_l(t_1,..,t_i,..,t_N)) + t_i = 0 \tag{3}$$

Consequently, under the assumption of perfect mobility of capital, a change in tax rate in one jurisdiction systematically alters the allocation of capital in the region and results in a change in tax rates in the other jurisdictions. This is the "mobility-led" tax competition hypothesis.

Salmon (1987) and more recently Besley and Case (1995) have used alternative or complementary explanations of public decision-making processes in a setting of fiscal federalism. These authors dropped the concept of mobility as explanation for fiscal interactions. In their framework fiscal interactions are mainly based on information asymmetries between voters and their representatives. In a world of imperfect and asymmetric information, voters have restricted possibilities to evaluate the performance of the representatives. Selfish representatives aim at gathering political rents and hence have incentives to withhold information about their opportunistic behavior from voters. However, voters can draw inferences on politicians' behavior, by comparing it to the performance of governments and parliaments in neighboring jurisdictions. Other things being equal, these neighbors serve as yardsticks for the voters' evaluation. A bad performance in their own jurisdiction compared to other jurisdictions will penalize representatives, and their chance of being re-elected drops. Under this theory, public choice is not only driven by information gathering from neighboring jurisdictions, but also by fiscal strategic interactions. Because representatives anticipate the yardstick mechanism, they are able to stay in power by adapting to the policies of their neighbors.

A constraint on this theory is that the voters' capacity to compare different fiscal situations may be limited. When the fiscal or institutional situations in the neighboring jurisdictions are very complex, it may be difficult for the voters to decipher the right tax level from comparison. For example, Alt et alii (1998) show in the case of the US States, that when the executive and the legislative power are controlled by different parties, increasing tax rate does not result in electoral sanction. This may be because the voters find it difficult to identify the politicians responsible for this tax increase.

More generally, complexity of local tax systems may be an obstacle for yardstick competition to contain opportunistic behavior. The following simple model is an illustration of this hypothesis. Suppose the (re)-election probability function of politicians in jurisdiction i is written as: $p_i = p_i(t_i, t_i^v, \sigma_i^v)$, and $\partial p_i/\partial t_i < 0$, $\partial p_i/\partial t_i^v > 0$, where t_i^v is the average tax rate of i's neighbors and σ_i^v is the standard deviation in i's neighbors' tax rates which measures the complexity of the comparison. An opportunistic politician is assumed to maximize the expected gain G extracted from the time spent in office:

$$\max_{\{t_i\}} G_i = (t_i - \underline{t}) + p_i(t_i, t_i^v, \sigma_i^v)\Delta \tag{4}$$

where $\underline{t}$ is the tax rate which balances the quantity of local public goods provided in the jurisdiction and Δ is the political rent extracted by the representative from the last time in office if re-elected. The first order condition of this maximising program which is also the politician i Cournot-Nash reaction function is:

$$1 + \Delta \partial p_i(t_i, t_i^v, \sigma_i^v)/\partial t_i = 0 \tag{5}$$

and the second order condition:

$$\partial^2 p_i(t_i, t_i^v, \sigma_i^v)/\partial t_i^2 < 0 \tag{6}$$

From the first order condition 5 and using the implicit function theorem we can deduce the effect of an increase in σ_i^v on t_i:

$$dt_i/d\sigma_i^v = -(\partial^2 p_i/\partial t_i^2)/(\partial^2 p_i/\partial t_i \partial \sigma_i^v) \quad (7)$$

Therefore, if the marginal probability of being (re)-elected ($\partial p_i/\partial t_i$) depends positively on σ_i^v ($\partial^2 p_i/\partial t_i \partial \sigma_i^v > 0$), or in other words if the marginal probability of being defeated depends negatively on σ_i^v, an increase in σ_i^v results in an augmentation of the tax rate in i.

Both theories conclude to the existence of fiscal strategic interactions at the local level of government, as suggested by equations 3 and 5. The decisive difference between these two models lies in the fact that firms respond immediately to a modification in the local tax rates by moving (see equation 1). The reason is that companies pay local taxes for obtaining the right to locate somewhere. If the tax rate increases relatively more in one jurisdiction, firms decide to flee that jurisdiction and relocate in one of the neighboring jurisdictions where the "location price" remains unchanged.

The situation is different in the case of voters. For the voters, increasing the tax rate means benefiting from a larger quantity of local public goods or from local public goods of better quality. The problem is that relevant information may not be available to voters. The opportunist politicians can then take advantage of this situation to collect more tax revenue than the amount required to finance the voters' optimal level of local public goods. And justifying an increase in tax rate is easier if the information held by voters is not very clear. This is the "complicated comparison effect". This effect does not exist in the case of the "mobility-led" tax competition hypothesis. In what follows we test for the existence of such an effect in the case of the French local public sector.

3. The econometric analysis

We begin with a short description of the French local public sector. By decreasing size, the three levels of local government in France are the "régions", then the "départements", the lower level being that of the "communes" (municipalities) and their co-operation structures. The regional level is the object of this study. The French regions are mainly responsible for higher education and economic development. Around 50% of the local public expenditures at the regional level are financed through taxation; the other 50% comes from grants received from the central government. There are four main local taxes in France: a tax on housing independent of the property status (*taxe d'habitation*), two property taxes on properties with and without buildings (respectively *taxe foncière sur les propriétés bâties*, and *taxe foncière sur les propriétés non-bâties*), and a local business tax (*taxe professionelle*).

Business tax accounts for 50% of total tax revenue, while the housing tax and the property tax with buildings represent respectively 23% and 25% of total revenue. The remaining 2% comes from the property tax without buildings. The rental value of housing is the tax base of the housing tax and the property taxes, while the business tax is mainly based on the capital of firms located in the jurisdiction. The housing tax and the property taxes are paid by voters, while the business tax is paid by firms.

This specificity enables us to test for the existence of a "complicated comparison effect" in the case of taxes paid by voters, namely the housing tax and the property tax, while in the case of the business tax such an effect should not exist. The fact that getting information from comparison may be a complicated task for voters is illustrated in Figure 1. This figure displays the housing tax rate for the 22 French regions for year 1989. It is probably more complicated to draw inferences on politician behavior by comparing it with neighbors' politician behavior for voters living in region Limousin than it is for voters living in region Bretagne. The tax rate in the regions bordering with region Bretagne i.e. Basse Normandie and Pays de Loire are pretty close, respectively 1.55 and 1.34. The situation is radically different in region Limousin. Tax rate in neighboring jurisdictions ranges from 0.9 to 1.69. It is certainly more politically risky for politicians in region Bretagne to unilaterally increase tax rate than it is for those in region Limousin.

The empirical tests are performed over the period 1986-1999 for the 22 French regions. The econometric model arises from the standard tax-setting equation where strategic interactions are considered. The only difference is in the explained variable set in which we add the standard deviation in neighbors' tax rates. This variable is used to measure the difficulty of comparison. The higher the standard deviation, the more complicated the comparison is. The tax-setting model can be written in matrix form:

$$t = cU + \alpha t^{v} + \gamma \sigma^{v} + \beta X + V \tag{8}$$

where:

- t is the vector of the regions' tax rates,
- t^v is the vector of the average of regions' geographic neighbors' tax rates lagged by one period. In this paper we suppose that region i and region j interact if region i is bordering with region j. Moreover, we assume that the bordering regions have an identical influence whatever the region. Under these assumptions, the variable t^v for each region i corresponds to the average of the tax rates of the bordering regions: $t_i^v = \frac{\sum_{b_i \in B_i} t_{b_i}}{Card(B_i)}$ where B_i is the set of regions b_i bordering with i and t_{b_i} is the tax rate in region b_i[1].
- σ^v is the vector of the standard deviations in geographic neighbors' tax rates lagged by one period. The variable σ_i^v is computed as follows: $\sigma_i^v = \sqrt{\frac{\sum_{b_i \in B_i}(t_{b_i} - t_i^v)^2}{Card(B_i)}}$ for region i[2].
- U is the unity vector,
- X is the matrix of k observable regions' economic and demographic characteristics lagged by one period: Population, Population density, Average household income, Unemployment rate, grants per capita,
- V is the vector of the error terms which are assumed to be normally distributed with zero mean and constant variance.

Figure 1. The average Housing tax (Taxe d'habitation) for the 22 French regions in 1989.

Finally, we have to take into account three features of this model. First, French local governments are not completely free in the matter of tax rate setting. A few limiting rules exist which imply some links between the rates of the four taxes. In order not to bias our estimates because of the existence of such links, we use a simultaneous-equations model with four equations similar to equation 8 corresponding to the four French local taxes. Second, there is an endogeneity problem. Hausman tests reveal that the neighboring tax rates are endogenous, so that we cannot estimate this system by OLS. The structure in the panel-data allows us to use the instrumental variable method and choose as instruments the average demographic and economic characteristics of the neighboring regions as proposed by Kelejian and Robinson (1993) and Kelejian and Prucha (1998). Third, we use the Generalized Method of Moments (GMM) estimator[3] to correct for autocorrelation of errors and heteroscedasticity implied by the panel-data structure of the model. The estimation results are given in table 1.

The adjusted coefficient R^2 ranges from 49 to 69% and is greater than 60% for the three main regional taxes: the housing tax, the tax on properties with buildings and the business tax. The coefficient α of strategic interactions is individually and globally significant at the 1% significance level for the four taxes. The higher the average of the tax rates of the neighboring regions, the higher the tax rate in the region under consideration. The size of the coefficients reflects that tax mimicking occurs to a large extent for the four regional tax rates. For instance, for the business tax, a 1 point increase in the neighboring regions average tax rate leads to a significant rise of 0.798 point in the tax rate of the region under consideration. As regards the housing tax, a Wald test indicates that the interaction coefficient is not significantly different from the unity.

Regarding the impact of the other variables, population generally has a significant negative effect on tax rates. This means that the price elasticity of demand for local public goods is low. An increase in the regional population yields a decrease in the tax price for taxpayers, thus slightly increasing the local public good provision and then reducing the tax rates. The income per head variable has a significant negative impact on tax rates for three of the four regional taxes. In the same vein, the variable grants per capita is statistically significant at the 1% level for the property tax with buildings and the business tax and have a negative sign in the four tax setting equations. The unemployment rate and population density do not have any significant impact in any of the four equations.

Finally as suggested by the theory the coefficient γ of the standard deviation of the neighboring regions tax rates is individually statistically significant only for the housing tax and the property tax with buildings and they both have the expected effect. Indeed, for these two taxes paid by voters, the higher the standard deviation, the higher the tax rates, *ceteris paribus*. This is because opportunist politicians can take advantage of the complexity of the comparison to increase the tax rates.

However, the Jarque-Bera statistical tests show that the disturbances are not normally distributed. A study of the error term enables us to identify the regions with a different behavior. These regions are Corsica, Picardy, Limousin, Centre and Basse-Normandy which are mainly rural regions. After having addressed this problem, the results of the new estimations are displayed in table 2. The goodness of fit is widely improved. It is 64 to 78% of the variation which is now explained by the model. The coefficient of fiscal interactions remains statistically significant for the four regional taxes, although smaller than in the previous estimations. As for the housing tax, a 1 point increase in the average of the neighboring tax rates results in a 0.954 points increase in the rate of the region under consideration. The "complicated comparison effect" is still statistically significant for the housing tax and the property tax but not for the business tax. The results remains globally unchanged for the other variables.

4. Conclusion

The empirical findings suggest that the French regions adopt strategic behavior when setting local tax rates. It seems, however, that the motivations of this behavior differ depending on wether the tax is paid by voters or by firms. On the one hand, when taxes are paid by voters (tax on properties with buildings and housing tax) the politicians in office are involved in an "information-led" tax competition. They adopt tax mimicking behavior so as to maximize their chances of being reelected. But the more complicated the comparison is for voters, the easier it is for opportunist politicians to increase tax rates. On the other hand, for the business tax, the mobility of the tax base seems to be the best way to explain fiscal interactions. The "complicated comparison effect" is not significant in that case. In addition, yardstick competition is often considered as a way to contain opportunistic politician behavior. The existence of the "complicated comparison effect" calls into question this property. When the information available to the voters is fuzzy, it is easier for the politicians to justify a tax rate increase, making more difficult the identification of bad political decisions.

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Table 1. Model of fiscal strategic interactions among the 22 French Regions, GMM, 1986 to 1999.

	Dependent variable				
	Taxe rate of the Housing tax	*Tax rate of the Property tax (with buildings)*	*Tax rate of the local business tax*	*Tax rate of the Property tax (without buildings)*	χ^2
Constant		2.161^{*} (2.37)			5.63^{*}
Tax rate of neighboring regions : t^v	1.171^{**} (5.50)	0.791^{**} (3.12)	0.798^{**} (3.62)	0.885^{**} (3.39)	53.41^{**}
Standard deviation of the tax rate of neighboring regions : σ^v	0.899^{**} (3.45)	0.971^{**} (3.26)	0.204 (0.82)	-0.185 (-0.54)	18.69^{**}
Population	-0.007^{*} (-2.56)	-0.019^{**} (-3.12)	-0.005 (-1.13)	-0.074^{**} (-4.05)	27.01^{**}
Population density	0.001 (1.10)	0.001 (0.81)	0.000 (0.41)	0.003 (1.32)	3.37
Income per capita	-0.003^{*} (-2.34)	-0.003^{*} (-1.99)	-0.002^{*} (-2.04)	-0.000 (-0.08)	7.28
Unemployment rate	-0.023 (-1.33)	0.019 (0.50)	0.001 (0.05)	0.060 (0.71)	5.74
Grants per capita	-0.002 (-0.54)	-0.42^{**} (-7.00)	-0.048^{**} (-7.30)	-0.021 (-1.51)	87.79^{**}
Fixed temporal effects χ^2	82.07^{**}	60.03^{**}	77.40^{**}	30.35^{**}	
$\bar{R}^2$	0.69	0.62	0.61	0.49	
S.E.R.	0.30	0.58	0.40	1.58	
Jarque – Bera	33.86^{**}	8.60^{*}	622.84^{**}	12.10^{**}	

*Note: The number in parentheses are the values of the estimated t-statistics. '**' ,'*', '(*)' show that the estimated parameter is significantly different from zero at the 1, 5, or 10% level respectively. SER is the standard error of the regression and Jarque-Bera the statistic of the Jarque-Bera statistical test.*

Table 2. Model of fiscal strategic interactions among the 22 French Regions, GMM, Robust estimations, 1986 to 1999.

	Dependent variable: Taxe rate of the Housing tax	Tax rate of the Property tax (with buildings)	Tax rate of the local business tax	Tax rate of the Property tax (without buildings)	χ^2
Constant	2.666** (2.85)				8.16**
Tax rate of neighboring regions : t^v	0.954** (5.01)	0.638** (2.93)	0.775** (3.95)	0.758** (2.83)	37.30**
Standard deviation of the tax rate of neighboring regions : σ^v	0.650** (3.04)	0.916** (3.26)	0.125 (0.66)	−0.010 (-0.03)	14.23**
Population	−0.007** (-2.86)	−0.001* (-2.33)	-0.004 (-1.16)	−0.006** (-3.01)	17.23**
Population density	0.001(*) (1.68)	0.001 (0.88)	0.000 (0.94)	0.003 (1.08)	4.50
Income per capita	−0.003** (-2.80)	−0.004** (-2.73)	−0.003** (-2.80)	−0.002 (-1.10)	8.00(*)
Unemployment rate	−0.023 (-1.34)	0.27 (0.82)	-0.001 (-0.04)	0.111 (1.48)	16.72**
Grants per capita	−0.004 (-0.91)	−0.060** (-6.88)	0.020** (3.89)	−0.033 (-1.42)	55.11**
Fixed temporal effects χ^2	100.43**	70.82**	100.19**	41.33**	
$\bar{R}^2$	0.76	0.73	0.78	0.64	
S.E.R.	0.26	0.49	0.30	1.33	
Jarque − Bera	3.69	2.31	2.73	0.59	

Note: see table 1, dummy variables for the following regions: Corse, Picardie, Limousin, Centre and Basse-Normandie.