"Tax mimicking among regional jurisdictions",

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Abstract:

Yardstick competition has recently gained attention in the analysis of fiscal interactions among regional or local governments. Voters compare the fiscal policy of their government to that in other or neighboring jurisdiction to evaluate the fiscal performance of their representatives. This may lead the latter to adopt the fiscal policy of other jurisdictions. The difference with tax competition is that such a "copycatting" may also lead to a convergence of tax rates at a level higher than the competitive one. In this paper, such a model of yardstick competition is developed and empirically tested using data for tax setting behavior of the French regions since the decentralization process of 1986 to 1994.

Keywords: Yardstick Competition, Taxation, French Regions.

JEL Classification: H72, H73, D72, D78, H24, H25.

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1. Introduction

Since Tiebout (1956), the focus of models of fiscal federalism has been mainly on the mechanisms and properties of market-like competition between institutions or jurisdictions. In a survey on the literature, Wilson (1999) has pointed out that such a competition for mobile production factors between jurisdictions may well lead to a race to the bottom in tax rates. However, authors like Salmon (1987) and Besley and Case (1995) have used alternative or complementary explanations of public decision-making processes in a setting of fiscal federalism. A tool of labor economics (Holmstrom, 1982) and of the economics of the firm (Shleifer, 1985), yardstick competition thus has gained attention as a very insightful concept in the field of public economics.

In a world of imperfect and asymmetric information, voters have restricted possibilities to assess the performance of the representatives in their polity. Selfish representatives aim at gathering political rents and hence have incentives to keep information about their opportunistic behavior hidden 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 worse performance in their own jurisdiction compared to other jurisdictions leads to a punishment of representatives by throwing them out of office in the next elections. In such a concept, public choice would not only be driven by information gathering from neighboring jurisdictions, but also by mimicking behavior. Because representatives anticipate the yardstick mechanism, they are able to stay in power by adapting to the policies of their neighbors.

As this intuition has progressively made its way, a number of significant articles (Ladd, 1992; Case, 1993; Case, Rosen and Hines, 1993; Besley and Case, 1995; Heyndels and Vuchelen, 1997; Figlio, Kolpin and Reed, 1999; Brueckner and Saavedra, 1999; Saavedra, 2000) has contributed to the better understanding of the mechanism of yardstick competition in public decisions.[1] The empirical relevance of the hypothesis in the political market has also been assessed, particularly in the American case (e.g. Besley and Case, 1995).

The present paper follows this wake and its contribution is original in three ways. First, we start with a glance on the actual development of tax rates of regional taxes in France since the decentralization of 1986 in order to derive some information as to whether a race to the bottom in tax rates can be observed (Section 2). If a race to the bottom cannot be found in the data, other explanations than the traditional tax competition reasoning have to be developed. In order to derive such an explanation, the theoretical part of the paper proposes an agency model in the spirit of Besley and Case (1995) which depicts a multi-period relationship be-

1. For a survey on mimicking behavior of competing jurisdictions in the case of the U.S. welfare system see Brueckner (2000).

tween some decisive voter and its agent, the elected representative (Section 3). Yardstick competition with neighboring jurisdictions induces an interference in this agency setting. The agent in one jurisdiction wants to take advantage of shocks that are not observed by principals. The claimed shock on the cost of provision of the public goods would then be forwarded in an increase in the tax rate without endangering the prospects of re-election. However, the ability of the principal to observe the situation in neighboring jurisdictions affected by similar shocks threatens to alleviate the possible strategic use of private information by the agent. Our model here substantially differs from that of Besley and Case (1995) since opportunistic or ”bad” behaviors are not constituent of the nature of the agents (they being ”bad” or ”good” in the model of Besley and Case). Opportunism is here simply one of the possible strategies that can be checked by comparison with the behavior of agents in other jurisdictions.

The third contribution of the article is to provide an econometric test with data on French regions (Section 4). The French decentralized level is particularly interesting, because *régions*, *départements* and local jurisdictions have non-negligible tax setting power since the decentralization of 1986. Thus, the analysis in this paper is (to our knowledge) the first empirical test of tax mimicking in a country engaged in a significant devolution process. Section 5 offers concluding remarks.

2. The Development of Tax Rates in the French Regions

Since the decentralization of 1986, the French sub-national administrations are allowed to set tax rates in a widened band fixed by the central government in Paris. The taxes that can be varied are the *taxe d'habitation* as a tax on housing, the *taxe professionelle* as a local business tax, and the *taxes foncières sur les propriétés bâties et non-bâties* as two property taxes on properties with and without buildings. The *taxe d'habitation* is independent from the property status. It is also levied on apartments of renters and thus basically a tax on revealed demand for housing as an income elastic good. Figure 1, where the development of the *taxe d'habitation* is drawn for the seven regions Alsace, Bourgogne, Bretagne, Centre, Franche Comté, Ile de France and Rhône-Alpes, reveals an interesting pattern. Immediately after the decentralization of 1986 the variance of the *taxe d'habitation* increases considerably. The coefficient of variation of this tax for all 22 regions increases from 37.78 in 1985 to 46.85 in 1987. After the decentralization that allowed regions more discretion in tax rate changes, a slight convergence is observable for the six regions in figure 1. For all 22 regions the coefficient of variation decreases from 46.85 in 1987 to 23.13 in 1995 which corresponds to a reduction of about 51 percent. Hence, in the ten years after decentralization, tax rates of the *taxe d'habitation* have considerably converged. Most importantly, and in contrast to the predictions of the theory of tax competition, no race to the bottom occurs, but these tax rates converge to a higher and still increasing level.

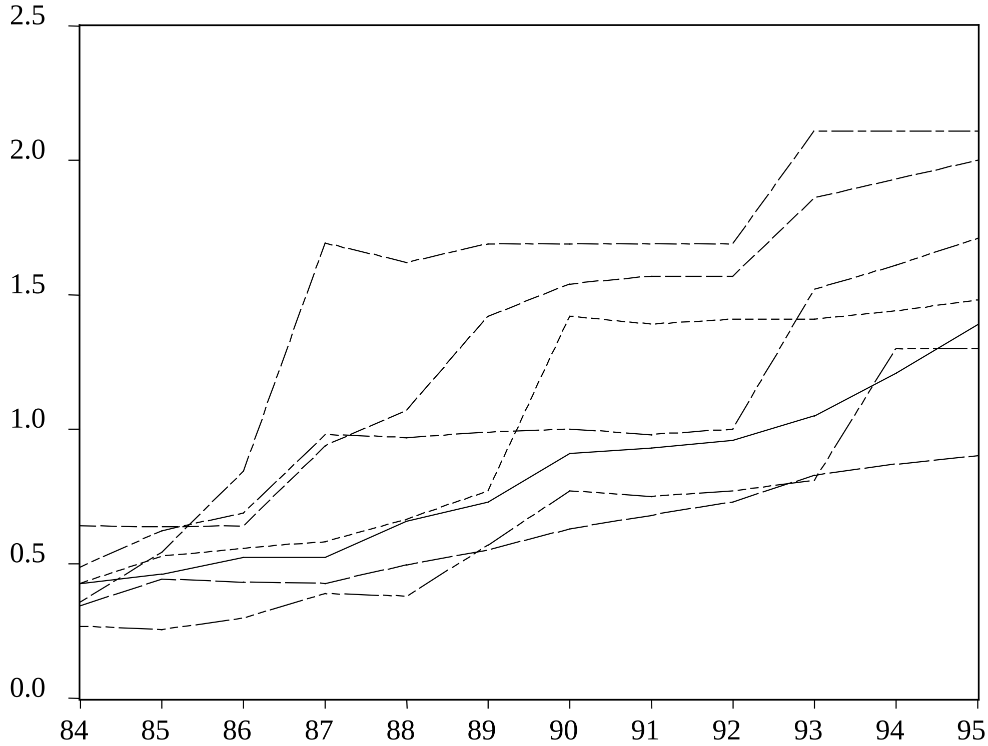


Figure 1: Tax Rates of the taxe d'habitation in Selected French Regions, 1984 to 1995

A similar pattern of tax rate convergence between the French regions is observable in the case of the local business tax. Figure 2 illustrates this convergence for the same seven regions as before. For all 22 regions, the coefficient of variation increases from 39.84 in 1985 to 40.98 in 1987 and decreases afterwards to 19.92, which corresponds to a reduction of 51 percent as well. Like the *taxe d'habitation*, the local business tax increases continuously during this time. While a convergence of tax rates is also observable for both property tax rates, convergence is less pronounced than in the two previous cases, as figures 3 and 4 indicate. For all 22 regions, the coefficient of variation decreases from 53.43 in 1987 to 37.55 in 1995, a reduction of 30 percent in the case of the property tax on property with buildings, and decreases from 47.68 in 1987 to 34.31 in 1995, a reduction of 28 percent in the case of the property tax on property without buildings. Both tax rates increase as well continuously over time. Given this development of tax rates at the French regional level, an explanation on the basis of traditional tax competition models does not seem to be appropriate. An alternative explanation is necessary in order to be able to explain such a race to the top.

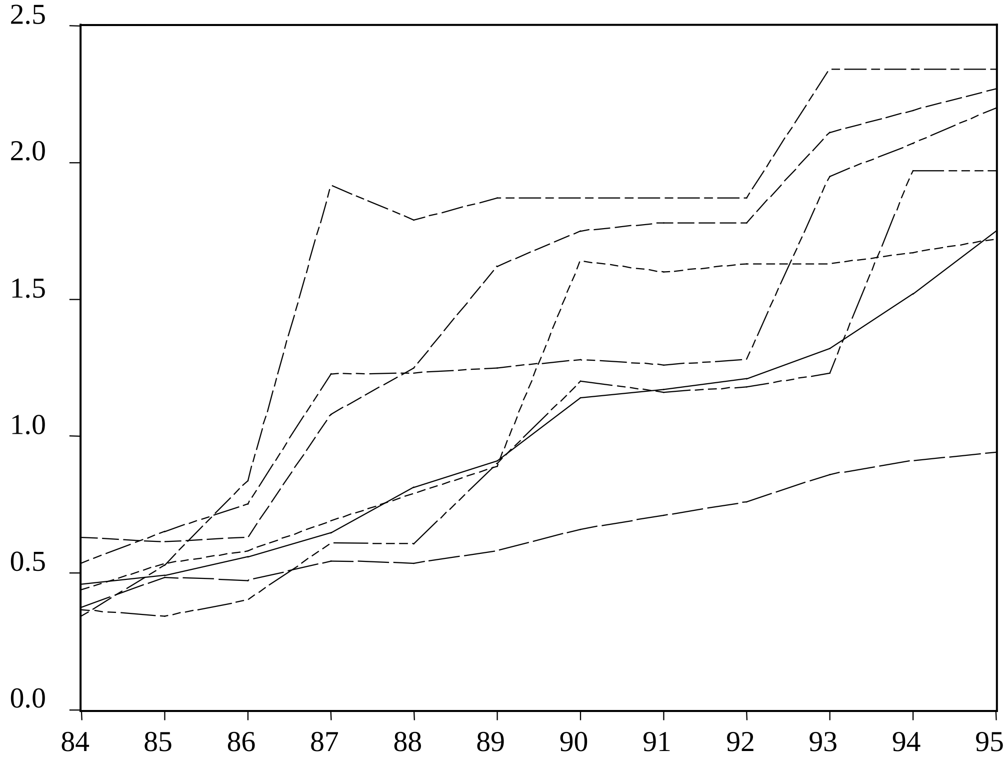


Figure 2: Tax Rates of the Local Business Tax in Selected French Regions, 1984 to 1995

3. Basic Theoretical Framework

Such a model is developed in this section. The framework of the model consists of two jurisdictions providing public goods financed through local taxation. In each of them, an agency mechanism describes the working of collective decisions. The decisive voter is the principal while the local government is mandated as the agent. Rather than strictly focussing on the largely discussed principal agent relationship, the model examines how decisions within a given agency are influenced by the observation of what happens in the other community. If the principals have the opportunity to compare the actions of their respective agents, how will it shift their strategies? How will the agents take this possible comparison into account? What will be the results of the corresponding game? In order to answer these questions, the first step of the analysis consists in the description of the assumptions of the model (3.1). In this setting, the agents will develop strategies (3.2) whose interactions will provide the outcome of the game (3.3).

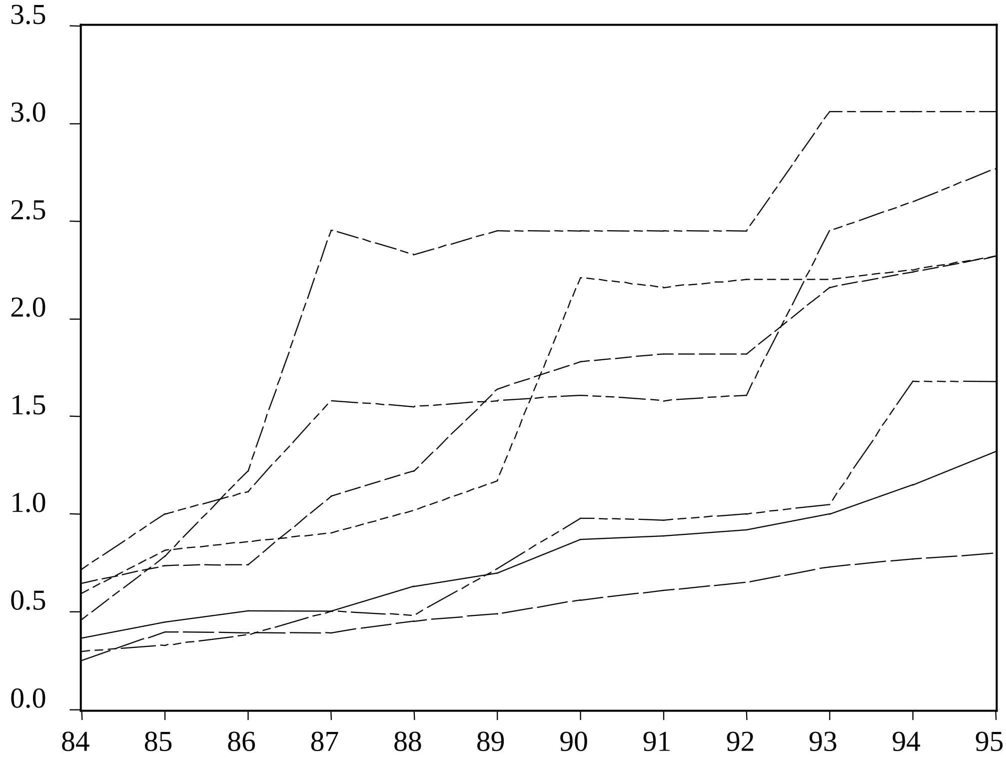


Figure 3: Property Tax Rates (With Buildings) in Selected French Regions, 1984 to 1995

3.1. Assumptions of the Model

The first assumption is that of a non cooperative framework. Neither the principals nor the agents can build coalitions. In particular, the agents cannot try collectively to deceive the principals, for instance by consciously shirking in the same way so as to blur any signals of cheating that the principals could catch. The latter, in the same way, cannot create a common agency by which they would coordinate the control of the agents.

The game has two stages, with an election taking place at each of them. The two jurisdictions are represented respectively by agents *i* and *j* and the principals wish to obtain at each stage the same quantity of public good $g_i = g_j = \overline{g}$. By assumption, this quantity is equivalent to the public expenditure. To finance it, each local government (each agent) relies on the taxation of a base *B* that can take two values according to the current budgetary conditions. The first one is low, $B = B^-$, and it corresponds to a negative shock, which may occur with probability *p*. The second value of the tax base is high, $B = B^+$, with probability *(1-p)* for this positive shock. The agents do observe this variation in their tax bases but the principals do not. However, the latter know that both jurisdictions are similarly affected by the shock whatever its direction.

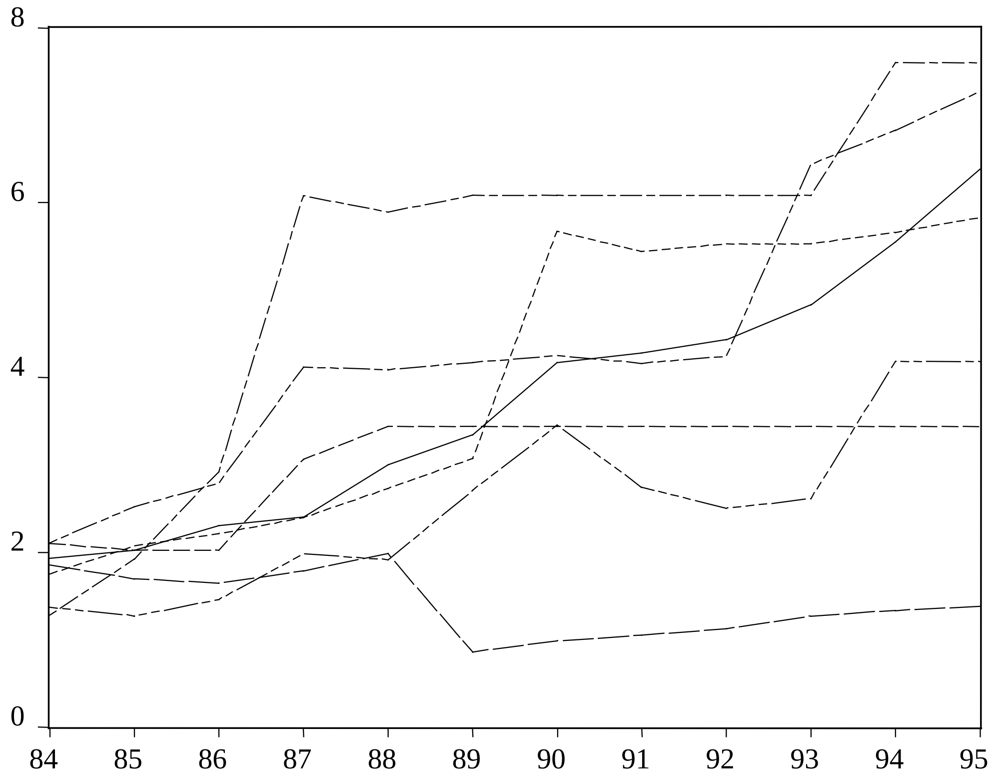


Figure 4: Property Tax Rates (Without Buildings) in Selected French Regions, 1984 to 1995

Distinctions between the two jurisdictions thus reduce to tax rate policies t_i and t_j, which helps concentrate the analysis on possible mimicking behaviors. Agent *i*, for instance, elected in period one, is by construction of the model reelected in period two if $t_i \leq t_j$. He fails to be reelected if it happens that $t_i > t_j$. Since both jurisdictions face the same budgetary conditions, the opportunism of agent *i* is exposed whenever the agent in the other community is "honest". The range of values for the tax rates is assumed to be such that, in each jurisdiction, $t \in [t^-, t^+]$ with $\bar{g} = t^+B^- = t^-B^+$. The maximum rate t^+ allows just to finance public expenditures $\bar{g}$ in unfavorable budgetary circumstances, whilst good economic conditions make it possible to use the lowest rate t^- to finance $\bar{g}$. An external and exogenous authority is assumed to have the capacity of controlling and preventing any attempt to pick a rate outside $[t^-, t^+]$.

We have seen that, elected in the first period, an agent can be reelected in the second one only if the tax rate he plays is lower than or equal to the one played by the agent of the other jurisdiction. By assumption, the number of mandates is limited to two. During the second one, having nothing to lose, the reelected representative is assumed to systematically behave strategically by always choosing the highest tax rate t^+, whatever the budgetary conditions. Finally, there is no discounting from one period to the other. If an agent intends to maximize his expected gain over the two periods, then which rate must he choose in the first one?

3.2. The Agents' Strategies

We consider for instance the strategies of agent *i* who must determine the tax rate t_i that will provide the best possible answer to a given tax rate t_j from agent *j*. Two cases may arise.

<u>First case: strategy of reelection</u>: $t_i = t_j + \varepsilon$ with $\varepsilon \leq 0$

Agent *i* is in this case reelected. Let EP_1 denote his expected payoff over the two periods. It can be calculated as follows. In first period, the tax base takes its low value with probability *p* for a gain of $(t_j + \varepsilon)B^- - t^+B^-$. With probability *(1-p)*, the shock on budgetary conditions is favorable and the corresponding gain amounts to $(t_j + \varepsilon)B^+ - t^-B^+$. In the second period, the agent is reelected but whether he obtains a strictly positive gain depends on the nature of the shock. In the situation of an unfavorable environment, the representative cannot take advantage of his position, even if he uses the upper value of the tax rate. Providing $\overline{g}$ yields t^+B^- but costs as much. On the contrary, a favorable shock provides a positive gain of $t^+B^+ - t^-B^+ = t^+B^+ - t^+B^- = t^+\Delta B$, this with probability *(1-p)*. On the whole, the expected payoff is:

$$EP_1 = p[(t_j + \varepsilon)B^- - t^+B^- + (1-p)t^+\Delta B] + (1-p)[(t_j + \varepsilon)B^+ - t^-B^+ + (1-p)t^+\Delta B]$$

If the elected representative maximizes this payoff, then he solves the program $\max_{t_i} EP_1 = \max_{\varepsilon} EP_1$, which implies $\varepsilon = 0$. He models his behavior on that of his counterpart in the other jurisdiction and thus obtains:

$$EP_1 = p[t_jB^- - t^+B^- + (1-p)t^+\Delta B] + (1-p)[t_jB^+ - t^-B^+ + (1-p)t^+\Delta B]$$

which amounts to:

$$EP_1 = t_jEB - \overline{g} + (1-p)t^+\Delta B$$

where $EB = pB^- + (1-p)B^+$ represents the expected tax base in the community. This strategy of reelection can be contrasted with the other option consisting in playing straightforward opportunism from the first period onwards, even if this leads to non reelection in the second period.

<u>Second case: strategy of non-reelection</u>: $t_i = t_j + \varepsilon$ with $\varepsilon > 0$

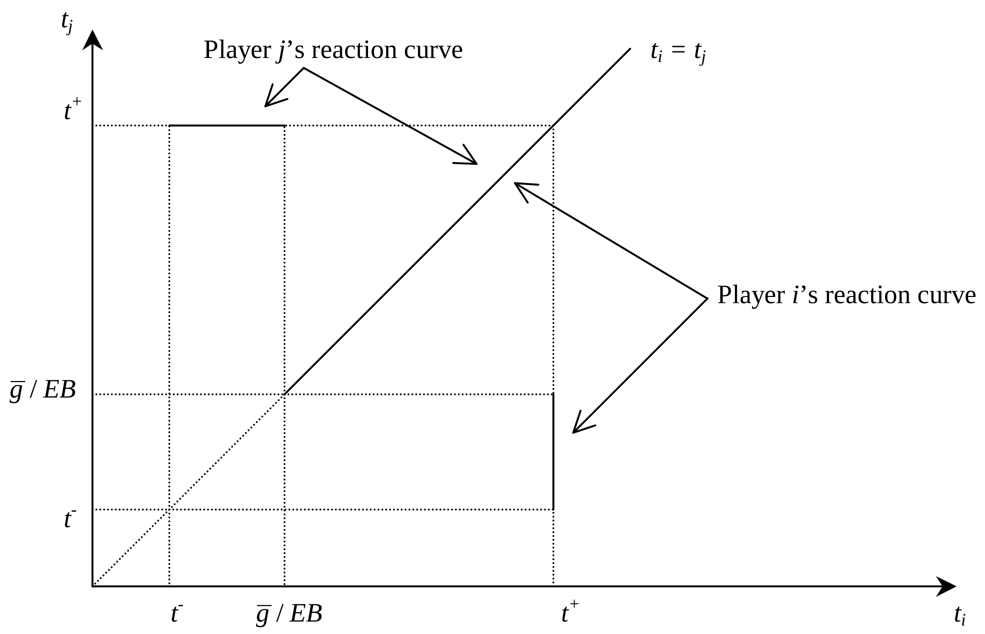
At first glance, it may seem surprising that a politician would seek defeat in an election. Everything else equal, it is nevertheless a rational strategy if it brings about a higher expected gain than what the other option can offer. If $t_i = t_j + \varepsilon$ with $\varepsilon > 0$, agent *i* is not reelected and he of course cannot expect any reward during a second mandate. At the end of the first period, the payoff is:

$$EP_2 = p[(t_j + \varepsilon)B^- - t^+B^-] + (1-p)[(t_j + \varepsilon)B^+ - t^-B^+]$$

Solving $\max_{t_i} EP_2 = \max_{\varepsilon} EP_2$, amounts to choosing $\varepsilon = t^+ - t_j$ and hence the maximum rate t^+, which brings an expected payoff of $EP_2 = (1-p)[t^+B^+ - t^-B^+] = (1-p)t^+\Delta B$.

Those strategies are of course played non cooperatively with the other agent. The actual payoffs to the representatives then depend on the possible outcomes of these interactions.

Figure 5: Nash equilibria of the game of mimicking



3.3. Interactions and Mimicking

We first construct the reaction functions in order to compute the Nash equilibria of the game between the agents in a second step.

<u>Reaction curves</u>

The strategy of reelection, namely the case where $t_i = t_j + \varepsilon$ with $\varepsilon \le 0$, rationally leads to mimicking. Should this strategy be preferred to the second one ($t_i = t_j + \varepsilon$ with $\varepsilon > 0$) where the agent plays all his cards during the first period? In the latter case, the representative cannot claim a second mandate and he rationally chooses the maximum rate t^+. The strategy of reelection is preferable if $EP_1 > EP_2$, that is to say if $t_j \geq \overline{g}/EB$. The elected agent in jurisdiction i will thus adopt a mimicking behavior ($t_i = t_j$) if the rate set in the other community is greater than or equal to the rate required to finance public expenditures, taking into account the expected tax base. On the contrary, if $t_j < \overline{g}/EB$, then $EP_2 > EP_1$ and player i should play the maximum rate $t_i = t^+$.

<u>Nash equilibria</u>

As is illustrated in figure 5, the Nash equilibria of this symmetrical game can be computed as follows. For values of the tax rate in the interval $[t^-, \overline{g}/EB]$, the Nash equilibrium is in $t_i = t_j = t^+$. If jurisdiction j plays a rate $t^- < \hat{t}_j < \overline{g}/EB$, then agent i had better play the maximum rate $t_i = t^+$ since he knows that the electors will systematically sanction any rate higher than that of the neighbor. The reaction of agent j then consists in playing the maximum rate as well. If the latter were to play $\tilde{t}_j$ such that $\overline{g}/EB < \tilde{t}_j < t^+$, then agent i would adjust his own rate so as to obtain $t_i = \tilde{t}_j$.

The computation of the Nash equilibria of the game reinforces the intuition behind the assumption of mimicking. At least, this assumption cannot be rejected. The combination of the reaction curves of the players displays an infinite number of mimicking equilibria such that $t_j = t_i$ for $[t_i, t_j] \in [\overline{g}/EB, t^+]$. Non opportunistic behaviors represented by $t_i = t_j = \overline{g}/EB$ do provide a Nash equilibrium which consists in playing the rate that finances public expenditures for the expected tax base, but it is only one of the possible equilibria. Moreover, this "honest" equilibrium is dominated by all the others in terms of Pareto efficiency (if the domain of validity of this criterion is restricted to the set of players). Any move along $t_j = t_i$ from $t_i = t_j = \overline{g}/EB$ onwards is Pareto improving and leads to a unique Pareto efficient situation in $t_i = t_j = t^+$. This provides a strong incentive to collusion, which is precluded by the non cooperative setting of the model but which real-world games cannot fully prevent.

4. An Econometric Analysis for French Regions

The theoretical model suggests that the payoffs of representatives in each region depend on tax rates of competing jurisdictions. In the case of the French regions, this means that the level and the changes in the *taxe d'habitation*, the local business tax and both property taxes in region i are a function of the respective tax levels and tax changes in the other regions. In the econometric specifications used here, we assume that those taxes in region i are influenced by the (unweighted average of) taxes in geographically neighboring regions only.[2] For in-

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2. With this specification, we follow Case (1993) in her first analysis of copycatting of tax policies. We also performed robustness tests as to whether the extent of tax mimicking would be reduced if we included the weigthed average of tax rates of all French regions using the inverse of the distance between the regional capitals (in kilometers) as a weight. The results with respect to tax mimicking are largely the same.

stance, representatives of the Île de France consider the tax policies in the regions of Haute-Normandie, Picardie, Champagne-Ardenne, Bourgogne and Centre when they decide upon changes in tax rates. By taking the unweighted average of neighbors' tax rates, we weight each neighbor of each region equally. In our example, the region of Picardie does not have more influence on tax rate decisions in the Île de France than the regions of Bourgogne or Centre.

In addition to neighbors' taxes, a few other economic and demographic variables may have an impact on tax policy at the French regional level. Regional tax policies do not only depend on the capacity to generate regional revenue by taxes, but also on grants from other jurisdictions, in particular from the French central level. Thus, we include national grants in the analysis. We do not include spending variables or bond financing in order to prevent (additional) endogeneity problems from emerging. Moreover, we introduce standard control variables like average regional household incomes, the regional unemployment rate as a proxy for business cycle developments and the accompanying necessity to increase social welfare spending and financing, and demographic factors, like population density, the share of the population younger than 20 years and older than 60 years. The estimation equation is:[3]

$$t = \beta_0 t_{t-1} + \beta_1 \hat{t}_{t-1} + \beta_2 X_{t-1} + \varepsilon,$$

where t (t_{t-1}) is a [NT×1] vector of N regions' tax changes observed for T years (lagged by one period); X_{t-1} is an [NT×k] matrix of k observable regions' economic and demographic characteristics of the preceding period, $\hat{t}_{t-1}$ is a [NT×1] vector of the average of regions' geographic neighbors' taxes of the previous period for T years and ε is an error term which is assumed to be normally distributed with zero mean and constant variance. The parameter β_1 indicates to what extent a regions' tax policy is influenced by the tax policy in neighboring regions. We estimate the model in a fixed effects specification first for the levels of the four different tax rates and second for the dynamic model with the changes of tax rates as the dependent variable which is equivalent to subtract t_{t-1} from both sides of the equation and imposing the restriction that the coefficient of the lagged endogenous variable is equal to one.

Table 1 contains the results for the fixed effects model of tax mimicking among 22 French regions. The model explains the tax rates of the *taxe d'habitation*, the local business tax and both property taxes quite well. About 90 percent of the variance of the dependent variables are explained by the model. The high value of the coefficient of determination is not surprising because the lagged endogenous variable is included in the estimation model and is highly

3. See again CASE (1993) pp. 141. Since adequate instruments are not available, we cannot perform TSLS estimations although there clearly is an endogeneity problem. On the one hand, a region's tax setting behavior is influenced by taxes of neighboring regions. On the other hand, the tax setting behavior of neighboring regions is also influenced by the tax setting behavior of its neighbors, one of whom is the region under consideration.

significant in each of the four equations. The Durbin-Watson test statistic indicates that there is no autocorrelation left in the residuals.

Three of the four tax rates are significantly influenced by respective neighbors' tax rates at the one percent significance level. The higher the tax rate of the *taxe d'habitation* in the neighboring regions, the higher is the tax rate of this tax in the region under consideration. The same holds for the local business tax and the property tax on property with buildings, but not for the property tax on property without buildings. The size of the coefficients reflects that tax mimicking occurs to different extents for different tax rates. It is quantitatively most important in the case of the local business tax, followed by the tax on housing and the property tax on property with buildings. As to the other variables, usually one demographic variable has a significant impact on tax rates, and in the case of the housing tax and the property tax (with buildings), average income has a significantly positive impact at the one or ten percent significance level respectively. Other variables, notably unemployment, population density and federal grants do not have any significant impact in any of the equations.

Table 1 about here

The results of the dynamic model of tax mimicking reported in Table 2 corroborate these findings. The tax rates of the housing tax, the local business tax and the two property taxes significantly increase if geographic neighbors increase their respective tax rates as well. Like in the case of the static model, the change of the local business tax rate of the neighbors has the strongest impact quantitatively, followed by the housing tax and the two property taxes. Again, other factors, like changes in the demographic structure, in national grants, average income or in the unemployment rate, do not have any consistent impact in the four equations.

Table 2 about here

All in all, the results indicate that the levels and changes in tax rates at the French regional level are positively influenced by the tax policy in neighboring regions. Basically, this evidence is compatible with traditional tax competition models as well as with yardstick competition models. Given the fact that tax rates of the four regional taxes considered in the analysis are steadily increasing over time since the decentralization, a yardstick competition model allowing for convergence in increasing taxes is more consistent with the estimates. We thus obtain some indirect evidence for the opportunistic Nash equilibrium arrived at in the theoretical model.

5. Concluding Remarks

In a setting of yardstick competition, voters compare the fiscal policy of their government to that in other or neighboring jurisdiction to evaluate the fiscal performance of their representatives. This may generate a convergence of fiscal policies. The difference with tax competition is that such a ”copycatting” may also lead to a convergence of tax rates at a higher level. In this paper, the yardstick competition model of Besley and Case (1995) is augmented by defining opportunism here as one of the possible strategies that can be checked by comparison with the behavior of agents in other jurisdictions, instead of opportunistic or ”bad” behaviors being a constituent of the nature of the agents.

The theoretical model implies that tax rates in a jurisdiction under consideration are influenced by tax rates in neighboring jurisdictions and that this may either lead to a convergence to optimal tax rates or to inefficiently high tax rates. This implication of the model is tested econometrically with panel data of the 22 French regions from 1984 to 1995. The French decentralized level is particularly interesting, because French *régions*, *départements* and local jurisdictions have non-negligible tax setting power since the decentralization of 1986. Moreover, the relevant regional tax rates have converged on a higher level than the starting point in each case. The econometric panel results show that tax policy at the French regional level is determined by the tax policy of states that are geographical neighbors. If a neighboring region increases tax rates, the region under consideration has the possibility to do the same. Together with the overall convergence of tax rates at higher levels, this is indirect evidence for an opportunistic behavior of representatives in competing regions when additional political restraints like an inspection procedure in the form of referenda is not available to voters.

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Table 1: Model of Tax Mimicking among 22 French Regions, 1986 to 1994, Fixed Cross Sectional Effects (GLS)

Dependent Variable	**Tax rate of the taxe d'habitation**	**Tax rate of the local business tax**	**Property tax rate (with buildings)**	**Property tax rate (without buildings)**
Average household income (million French francs)	0.004** (3.17)	0.003 (1.04)	0.002(*) (1.90)	0.001 (1.64)
Unemployment rate	-0.001 (-0.76)	-0.010 (-0.70)	-0.001 (-1.62)	0.001 (0.20)
Population density	-0.002 (-1.10)	-0.003 (-1.15)	-0.002 (-1.61)	0.005 (0.56)
Share of population younger than 20 years	-0.030 (-1.05)	-0.039 (-0.50)	-0.064* (-2.26)	0.390** (3.44)
Share of population older than 60 years	0.052** (3.15)	0.068 (1.21)	0.044* (2.25)	0.689** (6.59)
Federal grants (in 1'000 FF)	0.000 (0.28)	0.000 (0.34)	-0.000 (-0.26)	-0.001 (-1.54)
Lagged endogenous variable	0.511** (7.34)	0.390** (4.34)	0.591** (8.73)	0.665** (11.21)
Tax rate of the taxe d'habitation of neighboring regions	0.144** (4.05)	–	–	–
Tax rate of the local business tax of neighboring jurisdictions	–	0.228** (5.11)	–	–
Property tax rate (with buildings) of neighboring jurisdictions	–	–	0.080** (3.10)	–
Property tax rate (without buildings) of neighboring jurisdictions	–	–	–	-0.016 (-0.30)
$\overline{R}^2$	0.89	0.85	0.91	0.91
SER	0.17	0.23	0.26	0.62
D.-W.	1.86	1.65	2.01	2.03
d.f.	168	168	168	168

The numbers in parentheses are the absolute values of the estimated t-statistics. '**', '*' or '(*)' show that the estimated parameter is significantly different from zero on the 1, 5, or 10 percent level, respectively. SER is the standard error of the regression. D.-W. is the Durbin-Watson test statistic on autocorrelation of the residuals and d.f. are the degrees of freedom of the t-statistics.

Table 2: Dynamic Model of Tax Mimicking among 22 French Regions, 1987 to 1995, Fixed Cross Sectional Effects (GLS)

Dependent Variable	**Change of the tax rate of the taxe d'habitation**	**Change of the tax rate of the taxe profes-sionnelle**	**Change of the property tax rate (with buildings)**	**Change of the property tax rate (without buildings)**
Average household income (million French francs)	-0.001 (-0.73)	0.002 (0.43)	-0.001 (-0.93)	-0.021* (-2.59)
Unemployment rate	-0.001 (-0.01)	0.017 (1.08)	0.000 (0.89)	0.001 (0.17)
Population density	0.004* (2.03)	0.005 (1.12)	0.004** (3.44)	0.034** (3.74)
Share of population younger than 20 years	0.005 (0.24)	0.031 (0.76)	0.013 (0.62)	0.294** (3.00)
Share of population older than 60 years	0.016 (0.88)	-0.005 (-0.11)	0.020 (1.06)	0.471** (5.34)
Federal grants (in 1'000 FF)	-0.001 (-1.41)	-0.002 (-1.20)	-0.001* (-2.22)	-0.001* (-2.05)
Change of the tax rate of the taxe d'habitation of neighbor-ing regions	0.124** (4.22)	–	–	–
Change of the tax rate of the local business tax of neigh-boring jurisdictions	–	0.274** (8.68)	–	–
Change of the property tax rate (with buildings) of neighbor-ing jurisdictions	–	–	0.121** (5.99)	–
Change of the property tax rate (without buildings) of neigh-boring jurisdictions	–	–	–	0.076* (1.99)
$\overline{R}^2$	0.08	0.15	0.09	0.15
SER	0.20	0.26	0.28	0.71
D.-W.	2.32	2.33	2.38	2.26
d.f.	168	168	168	168

The numbers in parentheses are the absolute values of the estimated t-statistics. '**', '*' or '(*)' show that the estimated parameter is significantly different from zero on the 1, 5, or 10 percent level, respectively. SER is the standard error of the regression. D.-W. is the Durbin-Watson test statistic on autocorrelation of the residuals and d.f. are the degrees of freedom of the t-statistics.