Political fragmentation, Party ideology and Public expenditures

Benoît LE MAUX
University of Rennes 1 and CREM-CNRS

Yvon ROCABOY[*]
University of Rennes 1 and CREM-CNRS

Timothy GOODSPEED
Hunter College and Graduate Center of the City University of New York

Abstract

In this paper we propose an original model of competition for effective political power between majority and opposition coalitions. The model indicates that the electoral margin of the majority and the fragmentation of both coalitions are key variables that determine their effective political power. We estimate the model in the case of the French *départements*. Our econometric results support the model and show that the per capita social expenditures in the French *départements* depend on the effective political power of the majority.

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[*]Corresponding author: Yvon Rocaboy, University of Rennes I, 7 Place Hoche, 35065 Rennes Cedex, France; E-mail: yvon.rocaboy@univ-rennes1.fr

1. Introduction

Many papers have investigated the influence of political factors on public spending (see for instance Persson and Tabellini, 2003). Political fragmentation is one of these factors. The intuition relies mostly on the common pool resource hypothesis. A politician belonging to a coalition of n politicians is supposed to defend the interest of its own constituency, for instance expand a particular item of public spending. Since the cost of the expansion is divided among the voters of the n constituencies, a non cooperative politician sets an increase in public spending which is higher than the efficient one. This theory can be traced in Buchanan and Tullock (1962) and Olson (1965). Refinements are found in Weingast and al (1981) and more recently in Velasco (2000). According to this theory, the larger the size of the legislature, the higher the public expenditures. This result sometimes termed the "weak government hypothesis" (Roubini and Sachs, 1989) or "the law of $1=n$" (Bradbury and Crain, 2001) is the starting point of many empirical studies beginning with Gilligan and Matsusaka (1995). Political fragmentation is measured by the number of parties in a coalition, the number of spending ministers or the number of representatives (see Kuster and Botero, 2008 for a comparison of the different measure of political fragmentation). Most of the studies find a positive correlation between political fragmentation and the level of public expenditures as suggested by the theory (for instance Volkering and de Haan, 2001; Bradbury and Crain, 2001; Padovano and Venturi, 2001; Perotti and Kontopoulos, 2002).[1]

Yet, a different story can be told to illustrate why political fragmentation matters for policy outcomes. The story is based on the team production theory (Alchian and Demsetz, 1972). As discussed by Crain and Tollison (1982), the activity of a political coalition may be seen as a team process where the members of the coalition compose a team in which it is not feasible to allocate rewards as a function of the productivity of individual parties[2]. In that setting, the political power of a coalition would have the properties of a public good and the

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parties of the coalition may have incentives to free-ride and devote time and resources to other activites. We use this framework in our paper. We assume that the implemented policy is the result of a majority/opposition confrontation in Parliament. Each coalition compromises according to a *contest success function* (Tullock, 1980 and Skaperdas, 1996) that represents its effective political power. While its political power (with full participation from members of the coalition) depends on the number of seats in parliament, its effective political power depends on each member's participation decision as well, which in turn depends on the number of parties or fragmentation of the coalition. This result is due to strategic interactions among parties of the same coalition which leads to free-riding: the greater the fragmentation of the coalition, the less the participation of parties in the coalition. Moreover we show that the effective political power of the majority coalition also depends on the fragmentation of the opposition. We develop a measure of a coalition's effective political power based on these results and test our theory using data on French local governments.

Our theoretical approach is new and differs at least in two points from other studies. First, as far as we know, contests have not yet been used to analyse the provision of public goods. Second, contest success functions have been utilized for modeling conflicts between two or more agents but not between two coalitions subject to fragmentation. This novelty enables us to emphasize not only the importance of the opposition but also the way it is structured. Contrary to "the law of $1=n$" we do not state that public expenditures are an increasing function of government fragmentation but that public expenditures depend on the effective political power of competing political coalitions which itself depends on the fragmentation of the coalitions.

A few empirical papers deal with the effect of political fragmentation on budgetary outcomes at the local government level, for instance Pommerehne (1978) for the Swiss cantons, Poterba (1994) for US States, Borge and Rattsø (2002) for Norwegian municipalities, Rattsø and Tovmo (2002) for Danish municipalities or Ashworth and Heyndel (2005) for

Flemish municipalities. Our study is different in that it takes account of not only the majority but also the opposition fragmentation as suggested by our theoretical results. There is an abundant literature on the impact of party ideology on government spending (see Boyne, 1996 for a survey) which may be summarized as follows: parties on the right/left decrease/increase the size of the public sector when they are in power. Our empirical work also finds that party ideology matters, but adds to this literature by analyzing the effect of fragmentation. We find that both majority and opposition fragmentation has a significant impact on the amount of per head social expenditure of the French *départements*. The less fragmented the right-wing (left-wing) opposition, relative to the left-wing (right-wing) majority, the lower (higher) the social expenditure per head, ceteris paribus. Thus, we find that fragmentation of the opposition as well as the fragmentation of the majority is a significant determinant of social expenditures.

The remainder of the paper is organized as follows. Section 2 presents the theoretical framework. Section 3 is dedicated to the presentation of the econometric analysis. Section 4 provides the estimation results. Section 5 concludes.

2.   Theoretical model

Consider a parliament where two political coalitions, labeled coalition A and coalition B, compete for political power. The political power a coalition has depends on the number of its members actively participating in the debate. If a coalition has full participation, its political power is simply the ratio of its number of seats to the total number of seats in Parliament. We denote s^A and s^B the number of seats respectively held by coalition A and coalition B. Let $a \leq s^A$ and $b \leq s^B$ represent the number of coalition A's (respectively B's) members who are taking an active part in the debate. We will define the effective political power of each coalition to be:

$$\pi^A(a;b) = \frac{a}{a+b} \qquad \text{and} \qquad \pi^B(a;b) = 1 - \pi^A(a;b): \qquad (1)$$

$\pi^A(a;b)$ and $\pi^B(a;b)$ are *contest success functions* as in Tullock (1980) and Skaperdas (1996). They are used to translate each coalition's participation in the debate into how they influence the public policy. They may be seen as a measure of the effective political power of the two competing political coalitions.

We will allow participation to be endogenously determined and we next derive the participation of each coalition. The total participation of a coalition depends on the number of parties in that coalition. We assume that each coalition is respectively composed of n^A and n^B parties. The number of seats held by party p in coalition A, $p = 1 ::: n^A$, is denoted s_p^A. Similarly, the number of seats held by party p in coalition B, $p = 1 ::: n^B$, is denoted s_p^B. Let $a_p \leq s_p^A$ (respectively $b_p \leq s_p^B$) define the number of members of party p in coalition A (respectively in coalition B) that actively participate in the debate. The total amount of participation of each coalition is defined as $\sum_{p=1}^{n^A} a_p = a$ and $\sum_{p=1}^{n^B} b_p = b$. The effective political power, π^K, of coalition K increases as the participation of each member of the coalition increases.

The parties inside the same coalition are assumed to behave non-cooperatively. The utility of party p in coalition K depends on the effective political power of the entire coalition, π^K. The cost of participation of party p depends only on its own participation, however. Party p in coalition A chooses its participation a_p so as to maximize its net welfare, the difference between its benefit and its cost of participation:

$$U_p^A(a_p) = \frac{a}{a+b} - \left(\frac{a_p}{s_p^A}\right)^\lambda ; \qquad\qquad p = 1 ::: n^A; \qquad\qquad (2)$$

with $\lambda > 1$ (to ensure that second order conditions are met). Note that the effective political power of coalition A is a pure public good that benefits all parties in the coalition while the cost of participation is limited to party p. While λ does not play much of a role in our analysis, a higher λ lowers the cost of participation, and its value may depend on the constitutional

organization of the country.

The participation level of party p in coalition A must satisfy the following first-order condition:

$$\frac{\partial U_p^A}{\partial a_p} = \frac{b}{(a+b)^2} - \frac{\lambda}{s_p^A}\left(\frac{a_p}{s_p^A}\right)^{\lambda-1} = 0; \qquad p = 1 \ldots n^A. \qquad (3)$$

Equation 3 says that the marginal benefit of participation should be set equal to the marginal cost. The marginal benefit is a downward sloping function of party p's participation, while the marginal cost (with $\lambda > 1$) is an upward sloping function.

Rewriting the first-order condition gives $a_p = (s_p^A)^{\frac{\lambda}{\lambda-1}}\left(\frac{b}{\lambda(a+b)^2}\right)^{\frac{1}{\lambda-1}}$, $p = 1 \ldots n^A$. Since $a = \sum_{p=1}^{n^A} a_p$, we have

$$a = \sum_{p=1}^{n^A} (s_p^A)^{\frac{\lambda}{\lambda-1}}\left(\frac{b}{\lambda(a+b)^2}\right)^{\frac{1}{\lambda-1}}; \qquad (4)$$

which implicitly defines the optimal response $a = a(b)$ of coalition A to any strategy b chosen by coalition B. By symmetry, if the net welfare of party p in coalition B is given by $U_p^B(b_p) = \frac{b}{a+b} - \left(\frac{b_p}{s_p^A}\right)^{\lambda}$, we find that

$$b = \sum_{p=1}^{n^B} (s_p^B)^{\frac{\lambda}{\lambda-1}}\left(\frac{a}{\lambda(a+b)^2}\right)^{\frac{1}{\lambda-1}}; \qquad (5)$$

which implicitly defines the reaction function of coalition B, that is, $b = b(a)$. It follows from equations (4) and (5) that

$$\frac{a}{b} = \left(\frac{X^A}{X^B}\right)^{\frac{\lambda-1}{\lambda}}; \qquad (6)$$

where $X^A = \sum_{p=1}^{n^A}\left(s_p^A\right)^{\frac{\lambda}{\lambda-1}}$ and $X^B = \sum_{p=1}^{n^B}\left(s_p^B\right)^{\frac{\lambda}{\lambda-1}}$. Using equation (6) with equations (4) and

(5) yields the Nash equilibrium participation levels of coalition A and coalition B :

$$a^* = \left(X^A\right)^{\frac{\lambda-1}{\lambda}} \left(\frac{\left(X^A\right)^{\frac{\lambda-1}{\lambda}} \left(X^B\right)^{\frac{\lambda-1}{\lambda}}}{\lambda \left(\left(X^A\right)^{\frac{\lambda-1}{\lambda}} + \left(X^B\right)^{\frac{\lambda-1}{\lambda}} \right)^2} \right)^{\frac{1}{\lambda}} \tag{7}$$

$$b^* = \left(X^B\right)^{\frac{\lambda-1}{\lambda}} \left(\frac{\left(X^A\right)^{\frac{\lambda-1}{\lambda}} \left(X^B\right)^{\frac{\lambda-1}{\lambda}}}{\lambda \left(\left(X^A\right)^{\frac{\lambda-1}{\lambda}} + \left(X^B\right)^{\frac{\lambda-1}{\lambda}} \right)^2} \right)^{\frac{1}{\lambda}} \tag{8}$$

Notice that the functions X^K, $K = \{A;B\}$, may be re-written as $X^K = \left(s^K\right)^{\frac{\lambda}{\lambda-1}} \sum_{p=1}^{n^K} \left(\alpha_p^K\right)^{\frac{\lambda}{\lambda-1}}$, where $\alpha_p^K = \frac{s_p^K}{s^K}$ is the share of seats held by party p in coalition K. By using equations (7) and (8) with equation (1), we directly find the equilibrium values of the contest success functions:

$$\pi^A(a^*;b^*) = \frac{1}{1+\left(\frac{X^B}{X^A}\right)^{\frac{\lambda-1}{\lambda}}} = \frac{1}{1+\frac{s^B}{s^A}\left(\frac{\sum_{p=1}^{n^B}\left(\alpha_p^B\right)^{\frac{\lambda}{\lambda-1}}}{\sum_{p=1}^{n^A}\left(\alpha_p^A\right)^{\frac{\lambda}{\lambda-1}}}\right)^{\frac{\lambda-1}{\lambda}}} \tag{9}$$

and

$$\pi^B(a^*;b^*) = \frac{1}{1+\left(\frac{X^A}{X^B}\right)^{\frac{\lambda-1}{\lambda}}} = \frac{1}{1+\frac{s^A}{s^B}\left(\frac{\sum_{p=1}^{n^A}\left(\alpha_p^A\right)^{\frac{\lambda}{\lambda-1}}}{\sum_{p=1}^{n^B}\left(\alpha_p^B\right)^{\frac{\lambda}{\lambda-1}}}\right)^{\frac{\lambda-1}{\lambda}}}. \tag{10}$$

These two functions measure the equilibrium effective political power of coalitions A and B respectively. What is important for the empirical work is how equilibrium participation levels (equations (7) and (8)) and, more importantly, the equilibrium effective power of the coalitions (equations (9) and (10)) change with the fragmentation of the coalitions. To understand this, notice that the term $(\sum_{p=1}^{n^K} \left(\alpha_p^K\right)^{\frac{\lambda}{\lambda-1}})$ is a measure of the concentration (or fragmentation) of

coalition K. For a given s^K, the function X^K decreases when the fragmentation of coalition K increases (or increases when the concentration of coalition K goes up). Hence, the equilibrium total participation of a coalition is an increasing function of the number of seats obtained by the coalition and a decreasing function of the coalition political fragmentation. It also depends negatively on the number of seats and positively on the political fragmentation of the opposite coalition.

With respect to (9) and (10), it is easy to see that coalition A's effective political power, π^A, is an increasing function of its electoral margin measured by the relative number of seats $\frac{s^A}{s^B}$ and its relative concentration $\frac{\sum_{p=1}^{n^A}(\alpha_p^A)^{\frac{\lambda}{\lambda-1}}}{\sum_{p=1}^{n^B}(\alpha_p^B)^{\frac{\lambda}{\lambda-1}}}$. For illustrative purposes, it is useful to take the example of $\lambda = 2$. In that case, $X^K = (s^K)^2(H^K)$ where $H^K = \sum_{p=1}^{n^K}(\alpha_p^K)^2$ denotes the Herfindhal index of coalition K. This index is a familiar measure of the concentration degree of a variable. It is often used in the empirical public choice literature to measure the power of governments. The higher H^K, the more concentrated (less fragmented) a coalition will be, and the higher will be the total participation of coalition K.

The effective political power of a coalition may also be simplified to an expression involving the familiar Herfindahl index when $\lambda = 2$. For coalition A the simplified expression is:

$$\pi^A = \frac{1}{1 + \frac{1}{I^A}},$$ (11)

with

$$I^A = \frac{s^A}{s^B}\sqrt{\frac{H^A}{H^B}},$$ (12)

and similarly for coalition B. Given its familiarity and ease of measurement, we propose to take I^A and I^B as our empirical measures for the effective political power. Note that the higher I^A the more powerful coalition A is ($\frac{\partial \pi^A(a^*;b^*)}{\partial I^A} > 0$). It is easy to show that the influence of a

coalition increases with its concentration and its size and decreases with the other coalition's concentration and size ($\frac{\partial I^A}{\partial s^A} > 0$, $\frac{\partial I^A}{\partial s^B} < 0$, $\frac{\partial I^A}{\partial H^A} > 0$, and $\frac{\partial I^A}{\partial H^B} < 0$). The Herfindahl index H^K ranges from 0 (if the number of parties in coalition K tends toward infinity) to 1 (if there is only one party in the coalition). If there is an equal sharing of seats among the different parties of coalition K, then $H^K = \frac{1}{n^K}$. Consequently, I^A ranges from 0 (if there is an infinite number of parties in A and one party in B) to $+\infty$ (if there is only one party in A and an infinite number of parties in B). Our index is different from that which is generally used in the literature. Our measure takes into account the relative concentration and the relative size of a coalition in addition to the absolute levels of the generally used index.

3. Data and specification

In the following econometric analysis, we want to show that our proposed effective political power index is relevant to partially explain public expenditure disparities among local governments. Our empirical results will show that left-wing governments are more willing to expand social public expenditures than right-wing governments and that this willingness depends partially on the effective political power of the majority. According to the previous discussion, we specify a per capita public expenditure equation as follows:

$$ln(e) = w'\Phi + \Omega_1(LEFT)(I^L) + \Omega_2(1 - LEFT)(I^R) + \varepsilon; \tag{13}$$

where w' is a vector of control variables, Φ a vector of parameters to be estimated, $LEFT$ a dummy variable that takes the value of 1 when the majority is on the left and 0 for a right wing majority, I^L (respectively I^R) is the effective political power of the left wing (respectively right wing) coalition as defined by equation (12) above, Ω_1 and Ω_2 are two parameters to be estimated. As suggested by the party ideology hypothesis Ω_1 should be positive while Ω_2 should be negative.

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The study uses balanced panel data consisting of the French *départements* for years 1992 to 1999. By decreasing size, the three levels of local government in France are the *régions* (approx. states or provinces), the *départements* (approx. counties) and the *communes* (approx. townships or municipalities). France is divided in 96 metropolitan *départements* regrouped in 22 regions and 4 overseas *départements*, the DOM (Guadeloupe, Guyane, Martinique and Réunion). They can cover a single municipality (Paris) up to several hundreds, the average being around 360. They were created on geographical basis at the time of the Revolution. Most of them have a surface area comprised between 4,000 and 8,000 km2 and a population of 250,000 to 1,000,000 inhabitants. Each *département* is administered by a General Council. For each constituency a General Councillor is directly elected for a term of six years. A constituency is a grouping of municipalities known as a *canton*. The elections (referred to as *Elections Cantonales*) are held every three years. Consequently, only half the councillors are renewed at each election. The following structure was applied the last 20 years:

Election year	Round	Length of the mandate
1985	First half	7 years: 1985-1992
1988	Second half	6 years: 1988-1994
1992	First half	6 years: 1992-1998
1994	Second half	7 years: 1994-2001
1998	First half	6 years: 1998-2004
2001	Second half	7 years: 2001-2008
2004	First half	7 years: 2004-2011

Since 1982, the General Council is headed by a president elected by the councillors for a term of six years. The latter prepares the council's debates and implements its decisions, heads the *département*'s staff and services, exercises certain police powers in the areas of conservation and *département* highways and represents the *département* at the legal level.

If there is a certain uniformity between *départements*, some exceptions deserve mentioning. Since 1995, Paris and the two Corsican *départements* no longer have any

business tax. Moreover, the four overseas *départements*, Guadeloupe, Guyane, Martinique and Réunion, have various autonomy degrees. Lastly, three of the French *départements* (Bas-Rhin, Haut-Rhin and Moselle) due to their history have institutional specificities which make them somewhat different from the others. For these 10 *départements*, the data were not always available. Consequently, they have been excluded from the sample, leaving us with 90 *départements*.

We discuss below the variables used in our econometric analysis: first the dependent variable, second the vector of control variables w', third the party ideology variable and fourth the political power variables. The description and summary statistics of these variables are given respectively in Tables 1 and 2.

3.1. The dependent variable e

Social expenditure per head is the dependent variable. We have chosen this variable because it fits well in our theoretical framework. First, social assistance represents the main element of *département*'s operating expenditures (61% of total operating expenditures in 1999). It is partly defined by national law and partly by regulations voted by the General Council. Social expenditure is composed of protection of the mother and infants (prevention, protection, aids to family, etc.), social assistance for handicapped persons (subsidies to homes, direct payments, modifications of their house to provide them better access, etc.), assistance for pensioners and elderly people (direct payments and subsidies to homes) and for unemployed persons (health protection, etc.). Second, social assistance is a redistribution policy which lends itself well to testing the party ideology hypothesis that left-wing governments spend more than right-wing governments. A quick glance at figure 1 confirms this intuition. It depicts the per head social expenditures of the French *Départements*. The horizontal axis represents the *départements* ranked by increasing level of public expenditures over 8 years (each of the 90 *départements* is represented 8 times). The vertical axis plots per capita social

expenditures of the *départements* (in current franc price). The average per head expenditure amounts to 1309 francs for right-wing *départements* (shown in grey on the figure), while it reaches 1542 francs for left-wing *départements* (shown in black on the figure).
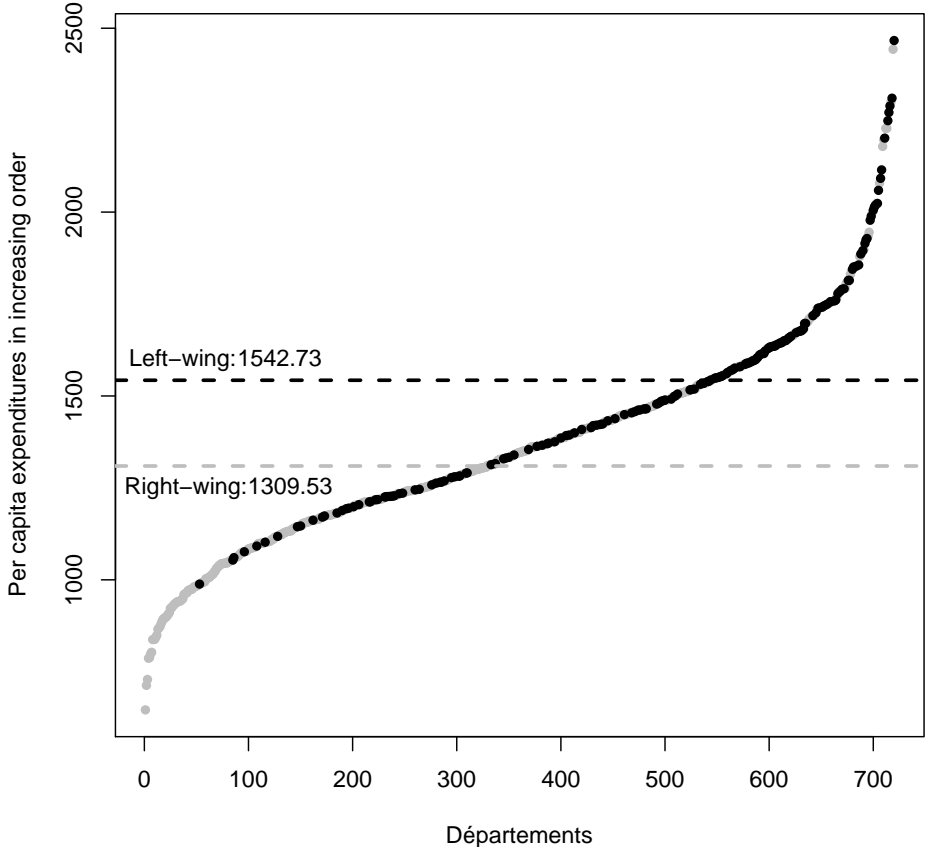

Figure 1. *Per capita social expenditures in Francs (SOCIAL).*

3.2. The vector of control variables w'

Vector w' is used to control for different aspects of the public decision-making process. The variable *TAX* represents the household tax share, which is defined as the share of household taxes (tax on housing and property taxes) in the total taxes of the *département* (tax on housing, property taxes and local business tax). It is a measure of tax exporting of the *département*.

Table 1. *Description of the Variables.*

Variable	Content
SOCIAL	Per capita social expenditures. Source: *Direction Genérale des collectivités locales* (DGCL).
TAX	Household tax share, which is defined as the household share (tax on housing and property taxes) of *département* taxes (property taxes, local business tax, tax on housing). Source: *Direction Genérale des collectivités locales* (DGCL).
INCOME	Mean household taxable income. Source: *Direction Genérale des collectivités locales* (DGCL).
GRANTS	Grants received by the *département* (mainly from the central government) per inhabitant. Source: *Direction Genérale des collectivités locales* (DGCL).
POP	Local population. Source: *Institut National des la Statistique et des Etudes economiques* (INSEE).
OLD	Share of population beeing more than 60. Source: *Direction Genérale des collectivités locales* (DGCL).
DENS	Population density of the *département*. Source: *Direction Genérale des collectivités locales* (DGCL).
TREND	Trend. It takes the value 0 for year 1992, 1 for year 1993, ...
LEFT	Ideology of the majority coalition. It is a dummy equal to one if the majority coalition in the *département* council is on the left and zero if on the right. Source: Newspaper *Le Monde*.
$I^R = \frac{s^R}{s^L}\sqrt{\frac{H^R}{H^L}}$	Right-wing coalition effective political power index: s^R: Number of seats held by the right-wing coalition. Source: Newspaper *Le Monde*. s^L: Number of seats held by the Left-wing coalition. Source: Newspaper *Le Monde*. $H^R = \sum_{p=1}^{n^R}\left(\alpha_p^R\right)^2$:Herfindahl index of the right-wing coalition where n^R is the number of right-wing parties and α_p^R is the share of seats of party p in the right wing group. $H^L = \sum_{p=1}^{n^L}\left(\alpha_p^L\right)^2$:Herfindahl index of the left-wing coalition.
$I^L = \frac{s^L}{s^R}\sqrt{\frac{H^L}{H^R}}$	Left-wing coalition effective political power index.

This variable should have a negative impact on local public spendings. Variable *INCOME* represents the average household income. It is calculated by dividing the total income of the *département* by population. Variable *GRANTS* stands for the grants received by the *département* per inhabitant. Since they are lump-sump, we should rather expect a positive impact of *GRANTS* on the dependent variables. Variable *POP* represents the local population. The empirical literature usually views population as having a significant impact on *per capita* spendings (see Breunig and Rocaboy, 2008). We also use three other control variables: the share of population older than 60 (*OLD*), the population density of the *départements* (*DENS*) and a trend (*TREND*). Variable *OLD* takes account of the demand for social services and variable *DENS* controls for the cost of providing these services.

Table 2. *Summary Statistics.*[a]

Variables	Mean	Min	Max	SD
SOCIAL	1370	646	2467	283
TAX	0.521	0.067	0.884	0.076
INCOME	42353	29460	80474	6332
GRANTS	914	383	2991	308
POP	585984	72390	2555471	435502
OLD	0.2219	0.1231	0.3362	0.0430
DENS	320	14	8113	1140
LEFT	0.261	0	1	0.440
I^A	2.722	0.5689	21	2.287

[a] Number of observations: 720. *SOCIAL*, *GRANTS* and *INCOME* are in current Francs.

3.3. *Party ideology variable LEFT*

Variable *LEFT* represents the ideology of the majority. It is a dummy equal to 1 if more than 50% of General Councillors are on the left and zero else. Left-wing governments should advocate a general increase in public expenditure compared to right-wing governments. This applies particularly to expenditures in the areas of social assistance. This is the so-called Partisan hypothesis.

Table 3 provides a description of the 18 political parties present in the General Councils over the period 1992-1999. The partition left-wing/right-wing presented in this table is the one used to construct *LEFT*. The main voting bloks are the *Party Communiste Français* also referred to as PCF (6%-7% of whole seats), the *Parti Socialiste* referred to as PS (22%-30%), the *Union pour la Démocratie Française* or UDF (18%-25%) and the *Rassemblement Pour la République* or RPR (17%-22%). The PCF is a far left-wing party founded in 1920 by those in the SFIO (French section of the Workers' International) who supported in 1917 the Bolshevik Revolution and opposed the First World War. The SFIO was a socialist political party founded in 1905. It was replaced in 1969 by the PS, which is now the main opposition party in France. In addition, the UDF is a French right-centrist party. It was established as a union among several smaller parties: the *Parti radical (valoisien)*, the *Parti républicain* and

the *Centre des démocrates sociaux*. It was founded in 1978 as an electoral organization to support President Valéry Giscard d'Estaing during the presidential election of 1981. Lastly, the RPR was founded by Jacques Chirac in 1976 as the heir of the UDR, the successor to Charles de Gaulle's former party. It was replaced in 2002 by the UMP (Union for a Popular Movement).

Before the nineties, the PCF and the PS usually composed the left-wing coalition in General Councils while the UDF and the RPR formed the right-wing coalition. The appearance of new political tendancies like The Greens, the MDC, the MDR, the GE, the MPF has nonetheless created divisions within both the left-wing and the right-wing, making these coalitions fragile. The pluralism has also been reinforced by the emergence of parties, like the MEI or the ADD, that emphasize specific issues. In addition, more than 15% of the whole seats are held by independent right-wing candidates who do not belong to the parties of Table 3, which accentuates even more the fragmentation of the *départements*' political landscape. Likewise, more than 2% of seats are held by left-wing independent candidates. The presence of the right-wing in General Councils is consequently more important that we could think with Table 3. The right-wing actually held in 1992 more than 63% of seats in the 90 considered *départements*, 64% in 1994 and 52% in 1998. The summary statistics of Table 2 are even more explicit as regards the political ideology of the French *départements*. According to the statistics of *LEFT*, only 26.01% of the 90 *départements* were actually on the left over the period 1992-1999. The difference between these numbers may actually be explained by the fact that in left-wing governments, most of the seats are held by left-wing politicians while in right-wing governments the opposition is always well present. In other words, the left-wing electorate is less geographically dispersed than the right-wing electorate.

Table 3. *Political Parties at the département Level.*

Name	Acronym	English name	Political ideology	Remarks	1992[a]	1994[a]	1998[a]
Left-wing political parties							
Convention pour une Alternative Progressiste	CAP	Convention for a Progressive Alternative	Far left-wing, Environmentalism	Founded in 1994 mainly by former members of the PCF, the ADS, the PS and The Greens. Dissolved in 1998	0%	0%	0.38%
Parti Communiste Français	PCF	French Communist Party	Far left-wing, Left-wing, Communism	Major voting block. Founded in 1920	6.90%	6.47%	7.31%
Alternative, Démocratie, Socialisme	ADS	Alternative, Democracy, Socialism	Left, Far Left-Wing, Alliances on the left, Communism	Founded in 1994 mainly by past members of the PCF	0.33%	0.36%	0%
Mouvement des Citoyens, Mouvement Républicain et Citoyen	MDC, MRC	Citizens' Movement, Republican and Citizen Movement	Left-wing, Social democracy, Democratic socialism	Founded by Jean-Pierre Chevènement in 1993	0%	0.25%	0.49%
Association pour la Démocratie et le Développement	ADD	Association for Democracy and Development	Left-wing, Defense of democracy and human rights, Humanitarian assistance	Founded by Hassan Mokbel in 1991, it has merged as a result of student movements	0.03%	0.05%	0.05%
Génération Écologie	GE	Ecology Generation	Left-Wing, Cross-party alliances of green-minded politicians	Founded by Brice Lalonde in 1990	0.19%	0.16%	0.03%
Majorité plurielle		Plural Majority	Alliances between the MRC, the PS, the PCF, the PRG, and The Greens	Founded in 1997	0.19%	0%	0%
Les Verts		The Greens	Left-wing, Environmentalism	Founded in 1982	0.02%	0.05%	0.14%
Parti socialiste	PS	Socialist Party	Left-wing, Center left, Social democracy, Democratic socialism	Major voting block. Replaced the SFIO in 1969	23.89%	22.44%	30.28%
Parti radical de gauche, Mouvement des Radicaux de Gauche	PRG, MRG	Left Radical Party, Left Radical Movement	Center left, Social democracy, Democratic socialism	Founded in 1971. Heir of the *Parti républicain, radical et radical-socialiste*	1.83%	1.59%	1.70%
Mouvement Écologiste Indépendant	MEI	Independent Ecological Movement	Center, Center Left, Environmentalism	Founded by Antoine Waechter in 1994	0%	0%	0.03%
Right-wing political parties							
Mouvement Des Réformateurs	MDR	Reformists Movement	Center, Center right, Ambiguous	Founded by Jean-Pierre Soisson in 1992	0.27%	0.08%	0%
Union Démocratique Internationale	UDI	International Democrat Union	Center, Center right, Conservatism, Christian democracy, Liberalism	International oganization founded in 1983	0%	0.03%	0%
Union pour la Démocratie Française	UDF	Union for French Democracy	Center right, Christian democracy minority factions, Social liberalism	Major voting block. Founded by Valéry Giscard d'Estaing in 1978	25.45%	25.16%	18.91%
Rassemblement pour la République	RPR	Rally for the Republic	Right-wing, Conservatism, Gaullism	Major voting block. Founded by Jacques Chirac in 1976	22.11%	22.39%	17.99%
Centre National des Indépendants et Paysans	CNI, CNIP	National Center of Independents and Peasants	Alliances mainly between the UDF, the RPR, the MPF, and the FN	Founded by Roger Duchetin in 1948 as the National Centre of Independents	0.57%	0.33%	0.11%
Mouvement pour la France	MPF	Movement for France	Right-wing, Far right-wing	Founded by Philippe de Villiers in 1994	0%	0%	0.14%
Front National	FN	National Front	Far right-wing, Nationalism	Founded by Jean-Marie Le Pen in 1972	0.08%	0.11%	0.19%

[a] Share of seats held in the 90 considered *départements* for the 1992, 1994 and 1998 cantonal elections. It should be stressed that some of the candidates were independent, i.e. did not belong to a political party. This is why the sum of the statistics is no totally equal to 100%. As regards the estimations of Section 4, we knew the ideology of these independent candidates, i.e., Far left-wing, Left-wing or Right-wing. To compute the Herfindahl indexes, we did as if these candidates belonged to the same political party, i.e. "Far left independent candidates", "Left-wing independent candidates" and "Right-wing independent candidates".

3.4. Political power variables I^R and I^L

Contrary to previous empirical studies (an exception is Padovano and Venturi, 2001), we use an effective political power index based on the fragmentation of both majority and opposition coalitions. As suggested by equation (12), our index is measured by $I^A = \frac{s^A}{s^B} \sqrt{\frac{H^A}{H^B}}$, where A is the ideology of the majority coalition ($A = L$ for Left-wing coalition and R for Right-wing coalition), B is the ideology of the opposition coalition. Variable s^A (respectively s^B) represents the number of seats held by the majority (respectively the opposition). Variable H^A (respectively H^B) is the Herfindahl index of the majority (respectively the opposition): $H^K = \sum_{p=1}^{n^K} (SHARE_p^K)^2$ where $SHARE_p^K$ is the share of representatives of party p of coalition K in the *département* council ($K = A; B$).

4. Estimations

The empirical model tested in this paper is as follows:

$$
\begin{aligned}
\ln SOCIAL_{i,t} = {} & \Phi_0 + \Phi_1 \ln(TAX_{i,t}) + \Phi_2 \ln(INCOME_{i,t}) + \Phi_3 \ln(GRANTS_{i,t}) + \\
& \Phi_4 \ln(POP_{i,t}) + \Phi_5(OLD_{i,t}) + \Phi_6 \ln(DENS_{i,t}) + \Phi_7 \ln(TREND_t) + \\
& \Omega_1(LEFT_{i,t})(I_{i,t}^L) + \Omega_2(1 - LEFT_{i,t})(I_{i,t}^R) + u_{i,t}: \qquad (14)
\end{aligned}
$$

where i stands for *département* i and t for year t.

4.1. Estimation strategy and preliminary tests

Equation 14 describes the relationship between the public expenditures and the exogenous variables, allowing the coefficient of I^A (the effective political power of the majority) to be different depending on the ideology of the majority ($A = R$ or L). It should be stressed that including both $(LEFT) I^L$ and $(1 - LEFT) I^R$ in the same equation does not lead to multicollinearity problems since these variables are not computed from other variables in the

Table 4. *Geographical dummies.*

Area	Regions
West	Bretagne, Basse-Normandie, Pays de la Loire, Poitou-Charentes.
North	Nord-Pas-de-Calais, Haute Normandie, Picardie, Ile-de-France, Picardie.
East	Champagne-Ardenne, Lorraine, Franche-Comté.
Centre	Centre, Bourgogne, Auvergne.
South-West	Limousin, Aquitaine, Midi-Pyrénées.
South-East	Rhône-Alpes, Provence-Alpes-Côte d'Azur, Languedoc-Roussillon.

equation (it is also possible to use I^A and $(LEFT) I^A$ instead of $(LEFT) I^A$ and $(1 - LEFT) I^A$). This kind of functional form is used in the framework of exogenous switching regression models where the two regimes (here Left-wing and Right-wing) are given a priori. The method is somewhat equivalent to implementing a Chow test (Goldfeld and Quandt, 1973).

In order to estimate equation (14), our study has made use of balanced panel data for the period 1992 to 1999. Some inequalities exist regarding the geographical resources from one French department to the next. In our panel data estimations, these sources of disparity could be taken into account thanks to individual fixed effects. In order to check whether the fixed effects estimator was really necessary, the joint significance of the individual fixed effects was tested using an F-test which was significant indicating that use of the individual fixed effects was appropriate (F statistic equal to 50.80 with a high level of significance). However, some of our variables exhibit low variation over time and adding fixed effects could remove much of the time variation necessary for obtaining good coefficient estimates (Beck, 2001). This is why we have decided to focus on the Pooled-OLS estimator.

Since the Pooled-OLS estimator may lead us to omitted-variable bias (biased and

Table 5. *Serial correlation and cross-sectional dependence tests.*

Estimator	Test for serial correlation	Test for cross-sectional dependence
Pooled-OLS	435.6963***	48.4422***
Geographical dummies	435.2672***	48.2871***
Plümper and Troeger procedure	143.4256***	29.0321***

*** indicates significance at the 0.1% level.

breaks down the unit effects into a part explained by the time-invariant variables and an error term, and the third stage reestimates the first stage by Pooled-OLS. Based on Monte Carlo simulations, the authors demonstrate that this technique has better finite sample properties in estimating models that include either time invariant or almost time-invariant variables than competing estimators (Pooled-OLS, random effects or Hausman-Taylor).[3]

Finally, when dealing with panel data, it is necessary to test for serial correlation and crosssectional dependence. The tests developed by Breusch (1978), Godfrey (1978), Wooldridge (2002) and Pesaran (2004) were implemented on the three alternative models. The statistics are presented in table 5. For each estimator, both tests are positive which suggests the need to construct a robust covariance matrix estimator. The general White method devised by Arellano (1987) was used to deal with these heteroskedasticity and serial correlation problems.

4.2. Estimation results

We first focus on the results obtained with the Pooled-OLS estimator (table 6). The estimation of equation (14) is depicted in the first column of table 6, labeled Specification 1. As we can see, the adjusted R^2 is relatively high reaching 60%. The estimates concerning tax share, income, grants and population are significant and consistent with what is generally found in the literature. The tax coefficient is significant at the 1% level and equal to -0.086. The income coefficient is highly significant, positive and equal to 0.453. The grant coefficient is significant and appears with the expected positive sign. Its value accounts for 0.446. The population coefficient is positive, significant and equal to 0.029, suggesting that the magnitude

of the congestion effects is relatively important. The coefficients of the variables OLD, $DENS$ and $TREND$ are positive and significant. Both effective political power variables are significant determinants of per head social expenditures and their sign is consistent with what we expected. The coefficient of variable I^L is positive showing that the stronger a left-wing coalition, the higher are per head social expenditures. On the contrary, the coefficient of variable I^R is negative suggesting that the more powerful a right-wing coalition, the lower are per head social expenditures.

Columns labeled Specification 2 and Specification 3 of table 6 display the results we obtain from estimating equation (14) with majority coalitions sharing the same ideology. There are 188 left-wing *départements* and 532 right-wing *départements* in our sample. The econometric approach here is slightly different from Specification 1. On the one hand, Specification 1 only allows the coefficient of I^A to vary in each regime. On the other hand, Specifications 2 and 3 are more flexible since each estimated coefficient can be different from one regime to the other. In other words, the purpose of estimating Specifications 2 and 3 is to check whether Specification 1 is not too restrictive. Moreover, Specifications 2 and 3 simplify the estimated model since it does not depend on $LEFT$ and $(1 - LEFT)$ anymore. According to the estimates there are no significant changes compared with Specification 1. More specifically, the coefficients of variables I^L and I^R are still significant with the expected signs.

The results obtained with equation 14 suggest that the higher the effective political power of the majority, the higher the expenditures of a left-wing government and the lower the expenditures of a right-wing government. A problem with specifications 1 to 3, however, is that the political power of a majority, i.e. I^A, depends on its electoral margin and its relative fragmentation. Consequently, it could well be that the estimated partisan effects are driven by variations in electoral margin rather than variation in fragmentation. To disentangle these two effects, and to provide a more accurate test of the theoretical model, we have replaced

I^A with the electoral margin of the majority measured by $(s^A = s^B)$, the Herfindhal index of the majority H^A and the Herfindhal index of the opposition H^B. The results are given in column labeled Specification 4 for left-wing majority coalitions and in column labeled specification 5 for right-wing majorities. For leftist majorities, the effects which determine their effective political power are all significant and in the right direction: the coefficients of variables $(s^A = s^B)$, H^A and H^B are respectively equal to 0.044, 0.142 and -0.274. It means that a high electoral margin and a low fragmentation of leftist majorities are two significant factors which raise per head social expenditures, while a low fragmentation of the right-wing opposition reduces social expenditures per capita. For rightist majorities, the electoral margin and the concentration of the coalition have the expected negative effects on per capita social expenditures: the coefficients of $(s^A = s^B)$ and H^A are respectively equal to -0.027 and -0.144. However the fragmentation of the left-wing opposition has no significant effect.

Table 7 presents the results for the 5 specifications using geographical dummies. The only notable changes are that some exogenous variables are no longer significant for the left-wing governments. For instance the effective political power index is not significant anymore when the government is on the left (see Specification 2). This might be explained by the lower number of observations in the left-wing sample. Most of the results for the right-wing *départements* remain unchanged. As for the Plümper and Troeger procedure, the results are broadly the same as those obtained for the Pooled-OLS estimation method (see table 8). The only major difference lies in the value of the adjusted R^2 which is much higher in the Plümper and Troeger procedure than in the Pooled-OLS method.

5.   Discussion and conclusion

In this paper we put forward an original model of competition for effective political power between majority and opposition coalitions. The political power a coalition has depends on the number of its members actively participating in the debate. Each coalition is composed of

parties that would like the highest possible political power for their coalition, but participating in the debate is costly, and this can lead the parties to free-ride on the participation of others in the coalition. More specifically, the model indicates that the electoral margin of the majority and the fragmentation of both coalitions are key variables that determine their effective political power.

Our econometric tests support these implications of the theory. Our results indicate that the per capita social expenditures in the French *départments* depend on the effective political power of the majority. In particular, a high electoral margin and a low fragmentation of leftist majorities are two significant factors which raise per head social expenditures, while for rightist majorities, the electoral margin and the concentration of the coalition have negative effects on per capita social expenditures.

Surprisingly, while a lower fragmentation of a right-wing opposition is synonymous with a lower level of social expenditures per capita, the fragmentation of leftist oppositions has no impact. To understand this result, we may have a look at figures 2 to 5. They depict respectively the effective political power index, the electoral margin and the Herfindahl index of the majority, and the Herfindahl index of the opposition for the 90 départements over the 8 years of our study. As depicted by figure 2, the average effective political power indexes of the left-wing (in black on the figure) and right-wing majorities (in grey on the figure), I^A, are pretty close, reaching respectively 2.99 and 2.63. However the average electoral margin of the right-wing *départements* is much higher than that of the left-wing *départements*, respectively 3.6 and 2.54 (see figure 3) and the left-wing coalitions are more concentrated than the right-wing coalitions, whatever their status, majority or opposition (see figure 4 and 5). Hence, it seems that the opposition's fragmentation might play a role only in the case of a relatively small electoral margin of the majority. Having a large electoral margin on average, the right-wing *départements* have the possibility to be more fragmented and the concentration of the left-wing opposition does not matter.

More generally, according to figures 2 to 5, it looks like there may be a kind of substituability between electoral margin and fragmentation. The larger the electoral margin of the majority, the more fragmented it is. Politicians would derive utility from leading their own party but they also know that fragmentation affects the effective political power of their coalition. As a result there could be a trade-off between fragmentation and the effective political power of a coalition, the nature of this trade-off being conditioned by the fragmentation of the opposition coalition.

To conclude, our model begins to analyze the relationship between parties, coalitions, and fragmentation, though it also raises many questions. Is there some kind of competition in concentration among competitive coalitions? Does the fragmentation of the majority and the opposition decrease volatility of expenditures? Does fragmentation consequently lead to inefficient public spending? These and other questions provide a formidable agenda for future research.

Notes

[1]Primo and Snyder (2008) show that this result might be reversed under certain conditions. We do not discuss this theory in our paper.

[2]For instance Rogers (2002) applies this theory to the production of legislation in the American states.

[3]It should be stressed that the Random effects estimator also permits estimation of coefficients of time-invariant regressors, but this estimator is inconsistent if the fixed effects model is the correct model (see for instance Cameron and Trivedi, 2005). In order to check whether random effects regressions were more appropriate, the specification test devised by Hausman (1978) was also applied on equation (14). The Hausman statistic was equal to 57.07 with a high level of significance. We consequently have no reason to believe that random effects regressions would be better than fixed effects regressions. Moreover, to be able to use the Random effects estimator, Hausman and Taylor (1981) propose the use of instruments for the variables that are likely to be correlated with the random effects. Unfortunately, this correlation is unobservable and it is difficult to correctly specify the Hausman-Taylor model (Plümper and Troeger, 2007).

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Table 6. *Estimation results (Pooled-OLS with panel robust standard errors).*[a]

	Specification 1: All the *départements*	Specification 2: Left-wing *départements*	Specification 3: Right-wing *départements*	Specification 4: Left-wing *départements*	Specification 5: Right-wing *départements*
Intercept	-9.203***	-8.663***	-9.199***	-7.862***	-9.728***
	(-17.900)	(-8.8255)	(-12.194)	(-8.886)	(-12.626)
Taxe share: $\ln(TAX_{it})$	-0.086**	-0.119	-0.087·	-0.118·	-0.110*
	(-2.615)	(-1.593)	(-1.660)	(-1.956)	(-2.098)
Income: $\ln(y_{it})$	0.453***	0.287**	0.470***	0.240**	0.513***
	(8.206)	(3.043)	(6.104)	(2.606)	(6.612)
Grants: $\ln(s_{it})$	0.446***	0.354***	0.466***	0.359***	0.468***
	(20.329)	(7.964)	(17.730)	(7.768)	(17.533)
Population: $\ln(N_{it})$	0.029**	0.040*	0.028*	0.008	0.027·
	(2.773)	(2.148)	(2.077)	(0.551)	(1.944)
Share of elderly: OLD_{it}	0.660***	1.904***	0.467*	1.792***	0.569**
	(3.659)	(3.453)	(2.292)	(3.508)	(2.638)
Population density: $\ln(DENS_{it})$	0.063***	0.090***	0.062***	0.102***	0.061***
	(8.880)	(7.697)	(5.748)	(8.165)	(5.490)
Trend: $TREND_t$	0.012***	0.013**	0.012***	0.021***	0.012***
	(4.247)	(2.819)	(3.460)	(4.399)	(3.469)
Left-wing effective political power: $\ln(I_{it}^L)$	0.047***	0.035*			
	(4.326)	(2.328)			
Right-wing effective political power: $\ln(I_{it}^R)$	-0.029***		-0.026**		
	(-3.451)		(-2.823)		
Electoral margin of coalition A: $\ln((s^A = s^B)_{it})$				0.044**	-0.027**
				(2.740)	(-2.849)
Herfindahl index of coalition A: $\ln(H_{it}^A)$				0.142*	-0.144**
				(2.314)	(-3.120)
Herfindahl index of coaltion B: $\ln(H_{it}^B)$				-0.274***	-0.033
				(-4.775)	(-0.963)
Adjusted R^2	0.6067	0.6354	0.5266	0.6645	0.5316
Number of observations	720	188	532	188	532

[a] t value in parentheses.
***, **, *, and · indicate significance at 0.1%, 1%, 5% and 10% level, respectively.

Table 7. *Estimation results (Geographical dummies with panel robust standard errors).[a]*

	Specification 1: All the *départements*	Specification 2: Left-wing *départements*	Specification 3: Right-wing *départements*	Specification 4: Left-wing *départements*	Specification 5: Right-wing *départements*
Taxe share: $\ln(TAX_{it})$	-0.081*	-0.044	-0.137*	-0.062	-0.158**
	(-2.407)	(-1.338)	(-2.488)	(-1.568)	(-2.870)
Income: $\ln(y_{it})$	0.397***	0.137	0.516***	0.120	0.563***
	(5.960)	(1.438)	(5.076)	(1.147)	(5.350)
Grants: $\ln(s_{it})$	0.431***	0.321***	0.462***	0.329***	0.467***
	(19.365)	(7.499)	(17.874)	(7.682)	(17.916)
Population: $\ln(N_{it})$	0.017	-0.017	0.018	-0.023	0.011
	(1.613)	(-0.773)	(1.203)	(-1.055)	(0.742)
Share of elderly: OLD_{it}	0.505*	0.535	0.686*	1.108·	0.604·
	(2.043)	(0.883)	(2.114)	(1.738)	(1.915)
Population density: $\ln(DENS_{it})$	0.060***	0.093***	0.052***	0.111***	0.054***
	(7.818)	(6.605)	(3.815)	(6.889)	(3.918)
Trend: $TREND_t$	0.014***	0.022***	0.010*	0.027***	0.010*
	(4.686)	(6.172)	(2.390)	(7.688)	(2.474)
Left-wing effective political power: $\ln(I_{it}^L)$	0.043***	0.007			
	(3.699)	(0.450)			
Right-wing effective political power: $\ln(I_{it}^R)$	-0.025*		-0.025*		
	(-2.543)		(-2.297)		
Electoral margin of the majority: $\ln((S^A = S^B)_{it})$				0.0190	-0.026*
				(0.982)	(-2.324)
Herfindahl index of the majority: $\ln(H_{it}^A)$				0.156***	-0.169***
				(2.674)	(-3.830)
Herfindahl index of the opposition: $\ln(H_{it}^B)$				-0.239***	-0.043
				(-3.614)	(-1.137)
Adjusted R^2	0.621	0.7599	0.548	0.7809	0.5550
Number of observations	720	188	532	188	532

[a] t value in parentheses.
***, **, *, and · indicate significance at 0.1%,1%, 5% and 10% level, respectively.

Table 8. *Estimation results (Plümper and Troeger procedure with panel robust standard errors).[a]*

	Specification 1: All the départements	Specification 2: Left-wing départements	Specification 3: Right-wing départements	Specification 4: Left-wing départements	Specification 5: Right-wing départements
Intercept	-6.351***	-8.116***	-4.395***	-8.470***	-4.483***
	(-26.904)	(-15.231)	(-14.981)	(-18.428)	(-15.866)
Taxe share: $\ln(TAX_{it})$	-0.083**	-0.116	-0.132***	-0.010	-0.115***
	(-6.975)	(-0.893)	(-9.912)	(-0.507)	(-8.611)
Income: $\ln(y_{it})$	0.154***	0.364***	0.002	0.393***	0.009
	(6.951)	(7.112)	(0.109)	(7.895)	(0.349)
Grants: $\ln(s_{it})$	0.410***	0.472***	0.434***	0.436***	0.402***
	(54.139)	(26.209)	(56.200)	(19.978)	(51.858)
Population: $\ln(N_{it})$	0.025**	0.030**	0.002	0.002	-0.013*
	(4.572)	(3.066)	(0.421)	(0.287)	(-2.552)
Share of elderly: OLD_{it}	0.735***	0.835***	0.483***	1.007***	0.411***
	(10.723)	(3.921)	(6.929)	(4.964)	(6.389)
Population density: $\ln(DENS_{it})$	0.085***	0.072***	0.118***	0.085***	0.119***
	(22.992)	(11.579)	(26.642)	(13.704)	(26.393)
Trend: $TREND_t$	0.014***	0.012***	0.016***	0.016***	0.015***
	(12.012)	(4.858)	(13.251)	(7.522)	(12.482)
Left-wing effective political power: $\ln(I^L_{it})$	0.042***	0.031***			
	(7.650)	(3.487)			
Right-wing effective political power: $\ln(I^R_{it})$	-0.029***		-0.029***		
	(-8.670)		(-9.418)		
Electoral margin of the majority: $\ln((S^A=S^B)_{it})$				0.034***	-0.025***
				(4.931)	(-7.537)
Herfindahl index of the majority: $\ln(H^A_{it})$				0.184***	-0.079***
				(6.379)	(-4.049)
Herfindahl index of the opposition: $\ln(H^B_{it})$				-0.245***	-0.005
				(-8.963)	(-0.409)
Adjusted R^2	0.9491	0.9293	0.9586	0.9323	0.9596
Number of observations	720	188	532	188	532

[a] t value in parentheses.
*** , ** , * , and · indicate significance at 0.1%,1%, 5% and 10% level, respectively.
The following variables were considered as time-invariant or rarely changing variables : *POP*, *OLD*, *DENS*, I^A, s^A, H^A and H^B.
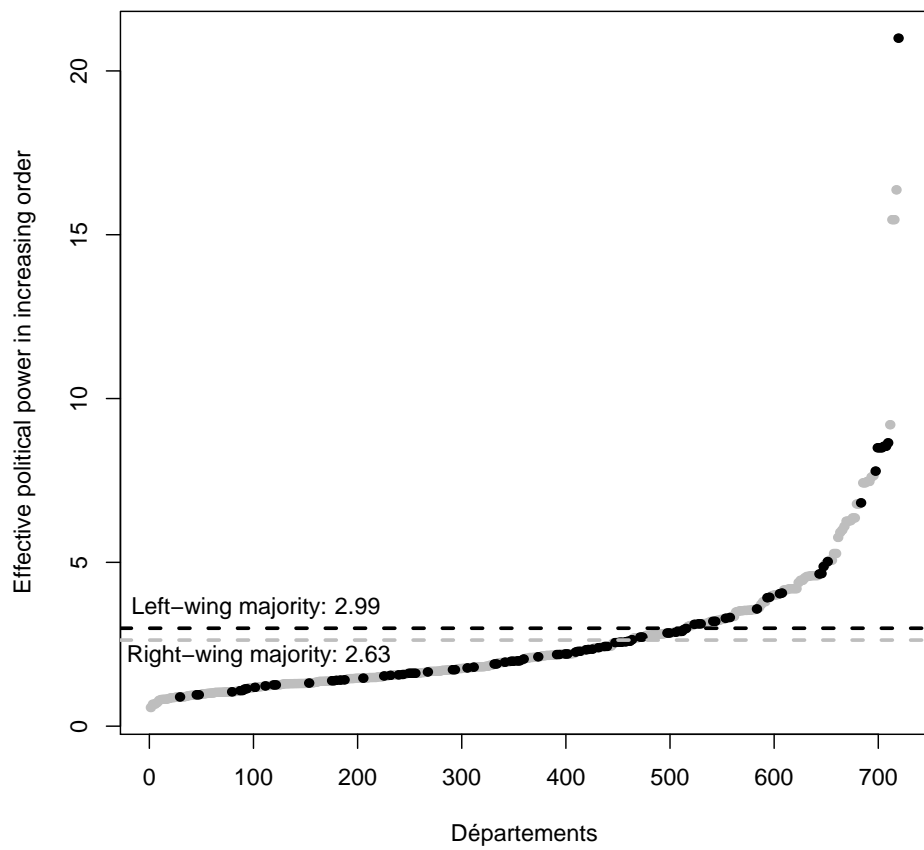
Figure 2. *Effective political power of the majority (I^A).*
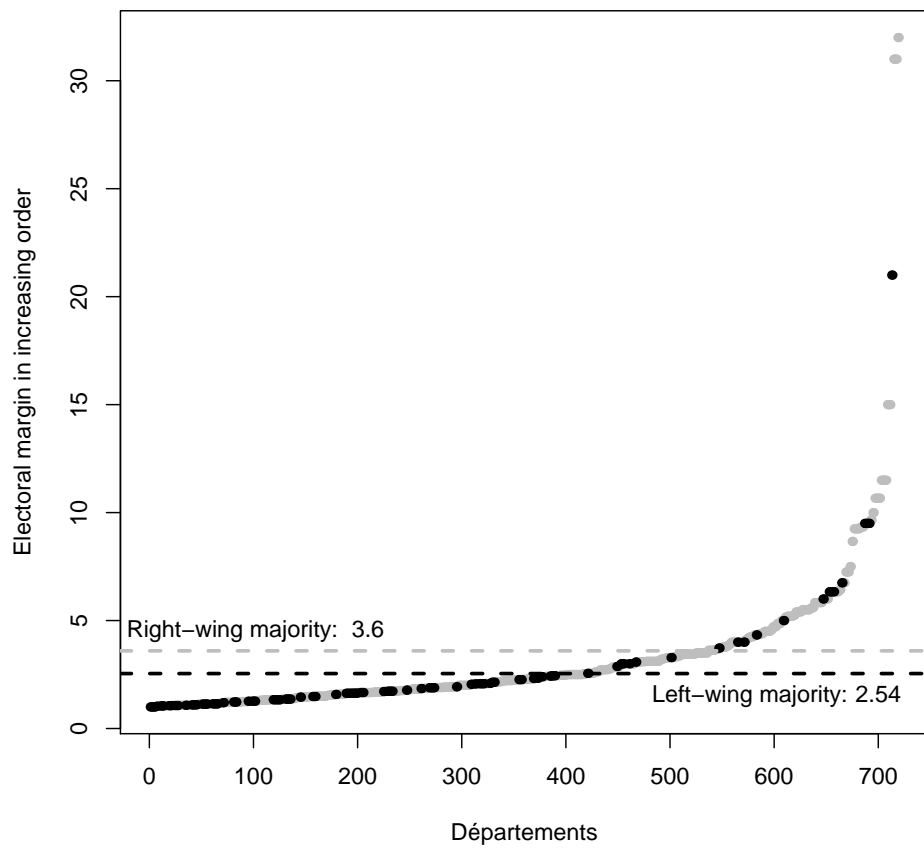
Figure 3. *Electoral margin of the majority ($s^A = s^B$).*
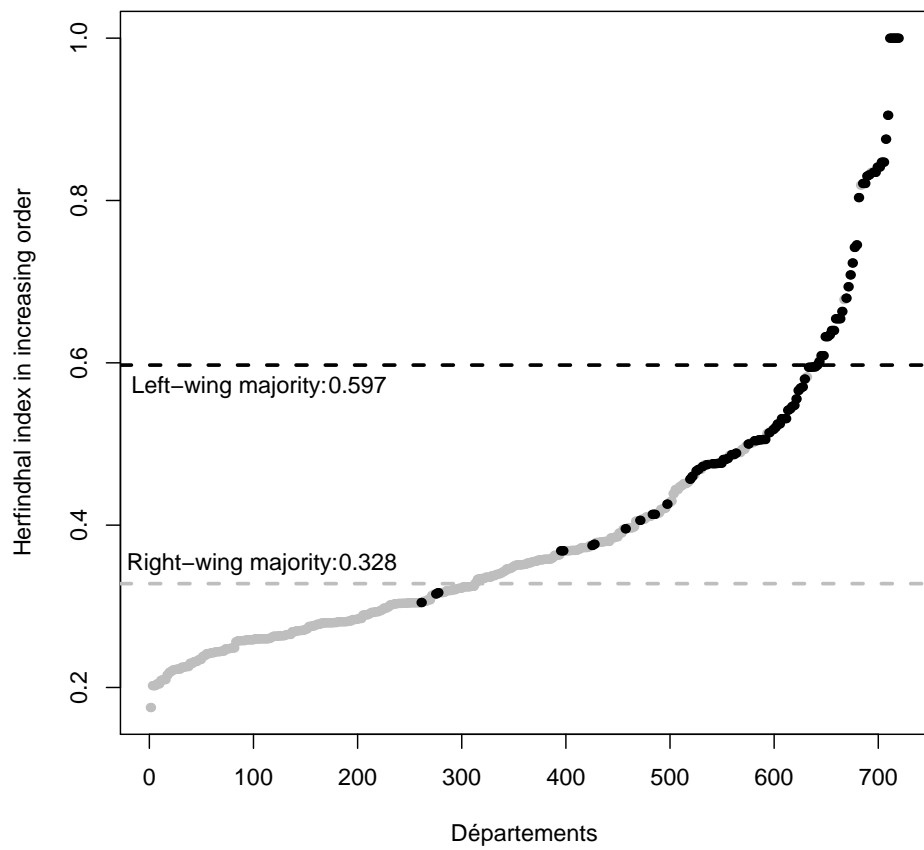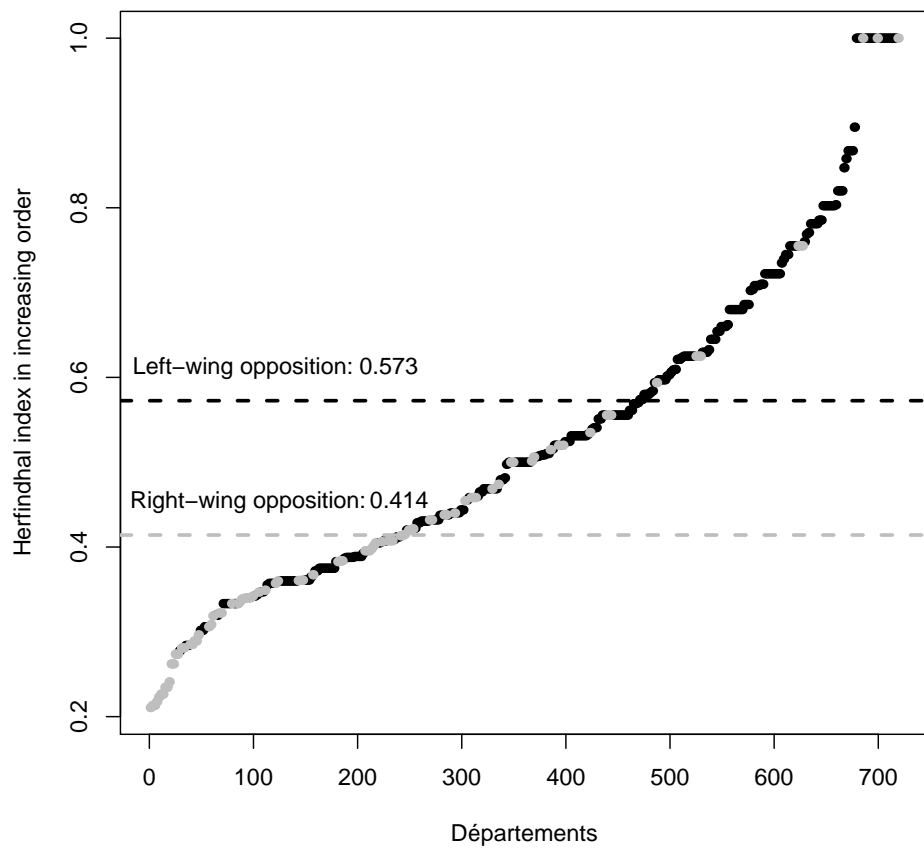
Figure 4. *Herfindhal index of the majority (H^A).*

Figure 5. *Herfindhal index of the opposition (H^B).*