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Benoît LE MAUX

University of Rennes 1, CREM-CNRS, Condorcet Center for Political Economy, France

Kristýna DOSTÁLOVÁ

University of Rennes 1, CREM-CNRS, France

Fabio PADOVANO

University of Rennes 1, CREM-CNRS, Condorcet Center for Political Economy, France

CONDORCET CENTER FOR POLITICAL ECONOMY
UNIVERSITY OF RENNES 1 – CREM-CNRS
www.condorcet-center.fr

Ideology and Public Policies: A Quasi-Experimental Test of the Hypothesis that Left-Wing Governments Spend More*

Benoît LE MAUX
benoit.le-maux@univ-rennes1.fr
University of Rennes 1, CREM-CNRS, Condorcet Center for Political Economy

Kristýna DOSTÁLOVÁ
kristyna.dostalova@univ-rennes1.fr
University of Rennes 1, CREM-CNRS

Fabio PADOVANO
fabio.padovano@univ-rennes1.fr
University of Rennes 1, CREM-CNRS, Condorcet Center for Political Economy

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Abstract

In the literature it is often argued that governments on the left tend to raise tax rates and public spending more than their right-wing counterparts. We demonstrate that this result must be interpreted with caution. Not only it may reveal partisan effects, due to the direct impact of parties' ideology on public spending, but also a selection bias, since the distribution of voters' preferences determines the ideology of the government in office. The present research overcomes this problem of observational equivalence by applying two identification strategies, namely *regression discontinuity design* and *propensity score matching*. Using data from the French local public sector, we show that governments facing the same economic situation do not spend more when they are left-wing, particularly in the case of social expenditures. This result rules out the partisan-politicians hypothesis and lends support to demand driven policy selection processes.

JEL-Classification: H72, H40, D72
Keywords: Public services, Party ideology, Redistribution, Partisan effects, Selection bias

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1. Introduction

Despite the production of several theoretical explanations and of a large empirical literature, the issue of why public sectors grow in representative democracies is far from being settled. The most commonly used theories to explain such a phenomenon stem from two alternative characterizations of the political process: an "opportunistic" vision, where politicians are unbounded to move along the entire policy space to satisfy voters' demands to get reelected; and a "partisan" vision, where politicians in office implement their electoral promises and are therefore bounded by an ideological space (Tridimas and Winer, 2005; Borcherding, 1997). The median voter model belongs to the first vision of politics, whilst the citizen candidate and probabilistic voting models adopt the second. Explanations based on the median voter relate government growth to his demand for more redistribution, which occurs whenever his income lies below the mean income (see Boustan *et al.*, 2013, for recent evidence at the US municipality level). In a median voter world, politics is competitive and politicians will always satisfy the median voter's demands, regardless of their personal convictions, for fear of losing the elections. Conversely, models of policy choices based on the citizen candidate or probabilistic voting models attribute a more active role to the supply side of politics, as they consider politicians' and parties' ideology an important driver of policy choices. In a partisan framework, credibility is the winning factor in competitive elections; once elected, politicians/parties have an incentive to implement their promises to remain in power. Politics is partisan, inasmuch as candidates who want to prevail over their opponents must present different political platforms.

Policy choices predicted by the partisan politicians models may not coincide with those that would emerge with the median voter model, especially because political platforms could diverge from one government to the other. Empirical tests have exploited this idea, trying to show that left-wing governments behave differently than their right-wing counterparts. Nowadays, it is a stylized and generally accepted fact that politics is partisan. The literature seems to support this view, more than the median voter one, since a considerable amount of studies finds – in a large array of samples and institutional contexts – that governments with a left-wing ideology tend to increase public spending and taxation, and therefore make government grow, or grow faster; whereas right-wing governments are expected to curb government expenditures, or at least to retard the expansion of the public sector (Tridimas and Winer, 2005; Hansen and Stuart, 2003; Borcherding, 1997).

The claim of this paper is that an evidence of policy divergence is insufficient to settle the explanation of the dynamics of public sector size in favor of the partisan models and against the demand driven ones, for two reasons. The first is that government ideology can itself be endogenous; a left-wing government may spend more than a right-wing one because a movement of the median voter towards the left results in the election of a left-wing government, which in turn expands the budget for the purpose of satisfying the median voter's preferences. In other words, what may appear as an ideology, or supply side driven process, is in fact a demand driven one. This "selection bias" amounts to a problem of observational equivalence in empirical testing. Secondly, testing for the impact of government ideology on policy choices and government size is more complex than usually assumed in the empirical

literature. These relationships are likely to change with the level of income (Pickering and Rockey, 2011), and therefore be nonlinear (Bénabou, 2000).

We propose to solve this problem by presenting first a model that combines the main features of the demand driven and of the partisan explanations into a single theoretical structure. From this structure we can formally derive predictions, while accounting for the abovementioned problems of selection bias and nonlinearity. Secondly, we bring this theoretical structure to the data, and test the model by means of quasi-experimental techniques such as regression discontinuity design (RDD) and propensity score matching (PSM). Both approaches consist in selecting a group of right-wing jurisdictions in order to make them resemble the left-wing ones in all features except for their ideology, i.e., the fact that these jurisdictions are right-wing rather than left-wing. In other words, our empirical strategy keeps constant the demand driven characteristics, i.e., all the proxies normally used to capture the preferences and the position of the median voter in the policy space. In this way we can single out the impact of government ideology on policy choices, actually holding all other conditioning factors constant. In the framework of our analysis, a statistically significant coefficient of the government ideology variables is conclusive evidence in favor of the partisan explanation, precisely because we control for changes in the median voter position and for the shape – linear or not – of the ideology-policy choices relationship. As a testing ground we select the French Departments (*Départements*), which, as it will be shown, are highly suitable for the research question at hand.

Overall, our empirical analysis leads to two main results. In a first step of the analysis, the estimation of a vote function and of a spending equation confirms the existence of a selection bias and suggests that the relationship between income inequalities and public expenditures is in fact nonlinear. In a second step, the resort to quasi-experimental techniques allows controlling for the socio-economic characteristics of the electorate; we can then show that left-wing governments facing the same economic situation as right-wing ones do not spend more, particularly for social expenditures, which is the spending item most liable to be affected by ideological concerns. This is evidence against the partisan politicians hypothesis, and consistent with the demand driven one.

The remainder of the paper is organized as follows. Section 2 briefly summarizes the theoretical and the empirical literature. Section 3 provides a unified microeconomic theoretical framework that leads to the specification of the testable hypotheses. Section 4 justifies the choice of the French Departments as a testing ground and describes the data. Section 5 provides the first step of our empirical analysis, which highlights the selection bias in our data, discusses the endogeneity of government ideology and tests for the nonlinear relationship between inequalities and public expenditures. Section 6 illustrates the second step of our empirical analysis, where the selection bias is solved through quasi-experimental techniques and the partisan effects are verified controlling for demand driven phenomena. Section 7 highlights the main finding of the analysis.

2. Literature review

2.1. Demand driven models

The median voter theorem establishes that, if all voters have single-peaked preferences over a unidimensional policy space – such as the level of public spending and/or of taxation – then the median preferred alternative is a Condorcet winner. Political candidates will always have an incentive to set their platforms closer to the median ideal point in order to capture a majority of votes. This policy convergence restriction has been intensively used in the public choice/political economy literature of government growth based both on redistributive policies (Meltzer and Richard, 1981) and on the provision of public goods (Borcherding and Deacon, 1972). Both streams of studies identify the political position of the voters with their personal situation, the so-called *pocketbook* or *egotropic* voter hypothesis (Lewis-Beck and Stegmaier, 2000).

A crucial corollary of the median voter model is that politicians are not constrained to move along the policy space by ideological concerns, since in the deterministic and symmetric setting of the model those concerns amount to losing the elections. Party control and ideology are therefore irrelevant (Besley and Case, 2003). Empirical evidence lends some support to this prediction, inasmuch as the median income, or equivalently the average income, has been frequently found to be a relevant variable for explaining governments' behavior in democracies both at the local (Aronson *et al.*, 2000; Ahmed and Greene, 2000; Guengant *et al.*, 2002) and at the central government level (Kolluri *et al.*, 2000; Wahab, 2004; Arpaia and Turrini, 2008; Pradhan and Bagchi, 2012). Likewise, the Meltzer-and-Richard hypothesis has recently found statistical support in Alesina *et al.* (2000), Borge and Rattsø (2004), Mattos and Rocha (2008), Mohl and Pamp (2009), and Boustan *et al.*, (2013). Yet, those findings seem insufficient to conclude in favor of the demand models for two reasons. First, the recent empirical literature on the congruency between voters' preferences and politicians' policy decisions has never found a strong correlation among the two (Matsusaka, 2010; Eichenberger *et al.*, 2013), thus casting doubts about the ability of the demand side of policy to constrain the supply side. Second, as we shall see, there is also considerable evidence of partisan behavior by incumbent governments, which the median voter model excludes.

2.2. Partisan models

Several theoretical arguments suggest that the ideology and the party affiliation of public officials also affect the size of the public sector. This second category of models views the politicians as citizen-candidates (Osborne and Slivinsky, 1996; Besley and Coate, 1997) or as partisan politicians (Persson and Tabellini, 2000), with specific characteristics and preference functions. Under this setting, candidates have an incentive to reveal their preferences during the electoral campaign and to implement them if elected, since credibility is a crucial factor to winning the elections. Under certain, fairly general conditions, a policy divergence can be observed between the competing political parties, thereby making the government ideology a relevant variable for explaining public policy choices (Padovano, 2013).

The question of the existence of partisan effects has been addressed extensively, as

exemplified by Jackson and Kingdon (1992), Bender and Lott (1996), and Imbeau *et al.* (2001). The hypothesis has been recently supported by empirical evidence in the US (Besley and Case, 2003; Bjørnskov and Potrafke, 2012; Pickering and Rockey, 2013), in Spain (Solé-Ollé, 2003), in Norway (Borge and Rattsø, 2004), in France (Foucault *et al.*, 2008; Le Maux *et al.*, 2011), in Italy (Santolini, 2008; Padovano and Petrarca, 2014) and in OECD countries (Pickering and Rockey, 2011). In most cases, the studies show that governments on the left tend to raise tax rates and public spending more than their right-wing counterparts.

2.3. An endogenous ideology?

One still unsolved issue is whether this empirical evidence depends on a true partisan effect, or whether it is the indirect result of changes in voters' preferences. So far, no empirical study has been able to tell whether the policy changes and outcomes depend on a truly ideologically driven, supply side process or on a demand side one that indirectly determines the policy outcomes by affecting the probability of an ideology constrained candidate to be elected. In the theoretical literature, there are numerous arguments suggesting that the parameters measuring the ideology space of each candidate can be endogenous. One of these endogenizing factors can be the distribution of voters. In Hinich (1978) and Lindbeck and Weibull (1987), for instance, political candidates have imperfect information about voter preferences. Under certain conditions (namely, two-party competition, symmetry and monotone probabilistic voting function) the political equilibrium outcome would be the "utilitarian point", i.e., a situation where the size of the ideological spaces reflects the distribution of voters' ideological preferences. This result can be generalized to a repeated-game setting where both the ruling and the opposition parties have their reputation to protect, which forces the incumbent to fulfill their electoral promises (see, e.g., Kreps and Wilson, 1982, as well as other developments in the literature on imperfect competition). Milesi-Ferretti *et al.* (2002) extend this logic to a setting where expenditures on public goods and services have a local nature. In this setting the incumbent government distributes expenditures geographically, to maximize the joint utility of the various jurisdictions and, by that, its probability of reelection. In such a case, the weights of the social welfare function depend also on the size and on the policy preferences of the population in each jurisdiction.

Voters' interests may also be propagated through pressure groups, either by influencing elections (via campaign contributions or indirect lobbying) or through pressures exerted on the politicians once in office (interviews, petitions, etc.). In these models, the candidates' policy space depends on the lobby's ability to map support to the elected politicians. The logic of collective action literature generally assumes that the size of the lobby groups negatively affects their influence. The direction of the effect is however unclear, since larger groups may also mobilize more resources and thus map more support to the targeted politician. For instance, using Swiss data, Eichenberger *et al.* (2013) find that special interest groups are able to make politicians diverge from policy positions that the median voter had already endorsed in a referendum.

Finally, numerous other factors could also endogenize the candidates' policy space, such as the number of candidates who choose to run, electoral campaigns, incumbency, the

multidimensionality of platforms, personal characteristics of the candidates – their personality, charm, reputation, racial characteristics, religion, family situation, etc. This may increase the margin of maneuver of politicians who have the opportunity to implement their favorite policy without electoral sanctions (see, e.g., Wittman, 1973; Hansson and Stuart, 1984; Calvert, 1985).

2.4. The issue of nonlinearity

Theory has also pointed out another still unsolved issue in the relationship between voters, ideology and policy decisions: nonlinearity. A new class of political economy models argues that the interactions among voters and politicians that affect the candidates' ideological or policy spaces may be quite complex. Persson (1995), Horstmann and Scharf (2000) and Bénabou (2000) suggest that cooperation among the rich and the poor may generate benefits such as economic growth, which increase the willingness of the rich to support redistributive policies. In such a case, the relationship between the distribution of voters and the candidates' endogenous ideological stance might well be nonlinear, depending on the degree of interclass cooperation.

This recent literature has roots in the models of "sociotropic voting" and of "altruistic voting", where voters base their decision not only on their personal degree of altruism, but also on the candidate's ability to improve the well-being of the whole community. In such a case, the candidates' policy spaces depend on the distribution of voters' preferences (Wright, 1986; Kinder and Kiewiet, 1979), and the weights of the government's social welfare function endogenously depend on the empathy/altruism of voters.

To sum up, two problems appear to be still unsolved in the literature on the voters-ideology-policy choice nexus. First, the observed difference between two policy decisions appears to be the sum of two components: (1) the direct effect of the supply side's ideology and (2) the indirect effect created by the distribution of voters, that determines the supply side's ideology and thereby the policy choices. Secondly, the nature of this relationship might be nonlinear and thus involve non-constant marginal effects. These problems may explain why testing the Meltzer-and-Richard hypothesis has produced such mixed results.

While the issue of nonlinearity is fairly easy to address empirically, the problem of the selection bias requires more sophisticated empirical strategies. In this paper we employ two quasi-experimental techniques: regression discontinuity design (RDD) and propensity score matching (PSM). Several studies have applied RDD to explain the relationship between government policy choices and electoral processes, like Pettersson-Lidblom (2008) on Swedish local governments, Lee (2008) for US House elections, Gerber and Hopkins (2011) for US mayoral elections, Lee and Mas (2012) for US union elections, as well as Freier and Odendahl (2012) and Ade and Freier (2013) on German municipalities. On the other hand, to the best of our knowledge, PSM has never been used for this purpose.

3. The model

To address the previously mentioned problems, we first need to provide a unified theoretical structure able to generate equilibria characterized by either policy convergence or divergence, under alternative sets of parameters that relate voters' preferences to party ideology, policy choices and policy outcomes.

Consider N inhabitants living in a representative democracy and a government providing a public policy in quantity Z. For simplicity of exposition, Z is produced by a firm acting in a competitive market, with price equal to a constant marginal cost of production c. To capture the essential features of the demand side explanations, we exogenously divide the voting population in two income classes: n_1 low income and welfare-dependent individuals (class 1) and n_2 wealthier individuals (class 2). Every member of a given class has the same income y_i, with $y_2 > y_1$. All members of class i have a utility function given by $U_i(x_i, z)$, where x_i denotes the quantity of a composite private good consumed, the *numéraire* of the economy, and z denotes the true quantity of public service that is available to each individual voter. U_i is strictly concave, twice differentiable, increasing in both variables, and its cross partials are assumed to be nonnegative to rule out inferior goods. Possible congestion effects are included by a parameter α to account for the taxonomy of public policies:

$$z = \frac{Z}{N^{\alpha}}, \tag{1}$$

If the service is a subsidy, as in Meltzer and Richard (1981), $\alpha = 1$; if, instead, it is a pure public good, $\alpha = 0$.

An important difference between the two classes of individuals is that income y_2 is taxable, but y_1 is not. The individual budget constraint for a member of class 1 is therefore $y_1 = x_1$, while it is $(1-r)y_2 = x_2$ for a member of class 2, where r is a proportional tax rate assumed to be the same for all taxpayers in that class. The government is assumed to balance its budget, hence:

$$n_2(rY_2) = cZ. \tag{2}$$

By substituting Equations (1) and (2) into the budget constraint of class 2, we obtain $y_2 = x_2 + p_2 z$, where $p_2 = \frac{cN^{\alpha}}{n_2}$ denotes the tax price paid by the wealthier class. This tax price plays a determinant role, as it represents the share of the cost c that each voter of class 2 finances. The larger the size of class 2, the lower the tax burden on the members of this class. Substituting the budget constraints into the utility functions gives the following reduced forms of preference: $U_1(y_1, z)$ for class 1 and $U_2(y_2 - p_2 z, z)$ for class 2.

The electoral process is characterized as follows. There are two politicians (parties), $j = A, B$, who maximize their probability of being elected into office. They are assumed to be ideologically oriented, in the sense that candidate A is ideologically oriented toward class 1 while candidate B is ideologically oriented toward class 2. The timeline of the model has two steps: first, both candidates simultaneously announce their political platforms, respectively z^A and z^B. In the second step, elections are held. The voting game is solved by backward induction.

Voters' decisions are based on candidates' positions. An individual k from class 1 will vote for A if and only if:

$$(1+\delta)U_1(y_1,z^A)-(1-\delta)U_1(y_1,z^B)>\sigma_1^k. \tag{3}$$

Moreover, an individual k from class 2 will vote for A if and only if:

$$(1-\delta)U_2(y_2-p_2z^A,z^A)-(1+\delta)U_2(y_2-p_2z^B,z^B)>\sigma_2^k, \tag{4}$$

where σ_i^k is an individual-specific parameter which is uniformly distributed over $[-\frac{1}{2\phi},+\frac{1}{2\phi}]$ and has density ϕ. As in Persson and Tabelini (2000), page 52, those parameters represent voter's k ideological bias toward the political candidates. For simplicity of exposition, these distributions have the same density and are common knowledge. Coefficient δ is a positive parameter that represents the candidates' ability to influence the vote of each class. Candidate A (resp. candidate B), who is assumed to be ideologically oriented toward class 1 (resp. class 2), is more popular in that class.[1]

The voter of class 1 who is indifferent between both candidates has an ideology parameter equal to:

$$\sigma_1^*=(1+\delta)U_1(y_1,z^A)-(1-\delta)U_1(y_1,z^B). \tag{5}$$

Similarly, the swing voter for class 2 has an ideology parameter:

$$\sigma_2^*=(1-\delta)U_2(y_2-p_2z^A,z^A)-(1+\delta)U_2(y_2-p_2z^B,z^B). \tag{6}$$

The share of votes for candidate A coming from the voters in class i is:

$$\pi_i^A=\phi\left(\sigma_i^*+\frac{1}{2\phi}\right)\qquad(i=1,2). \tag{7}$$

The overall vote share for candidates A and B are therefore:

$$\pi^A=\frac{n_1}{N}\pi_1^A+\frac{n_2}{N}\pi_2^A\quad\text{and}\quad\pi^B=1-\pi^A. \tag{8}$$

Replacing π_i^A and σ_i^* by their expression, we have:

$$\begin{aligned}\pi^A &= \frac{n_1}{N}\phi\left[(1+\delta)U_1(y_1,z^A)-(1-\delta)U_1(y_1,z^B)+\frac{1}{2\phi}\right]\\ &\quad+\frac{n_2}{N}\phi\left[(1-\delta)U_2(y_2-p_2z^A,z^A)-(1+\delta)U_2(y_2-p_2z^B,z^B)+\frac{1}{2\phi}\right].\end{aligned} \tag{9}$$

[1]This so-called party identification, providing voters with a shortcut for making voting decisions, can be explained through citizens' social group identities and perceptions of the social groups that support each party (e.g., Green *et al.*, 2002; Campbell *et al.*, 2011), or through evaluation of the parties' policies and ideological orientation (e.g., Downs, 1957; Abramowitz and Saunders, 2006). The extend to which the elements of an election reflect the voters' summary judgment about parties should condition the strength and character of partisan voting (Campbell *et al.*, 2011).

Political candidates are assumed to maximize their expected number of votes. The platform announced by candidate A must satisfy the following first-order condition:

$$(1+\delta)\frac{n_1}{N}\frac{\partial U_1}{\partial z^A}+(1-\delta)\frac{n_2}{N}\left[\frac{\partial U_2}{\partial z^A}-p_2\frac{\partial U_2}{\partial x_2}\right]=0. \tag{10}$$

Similarly, candidate B chooses z^B so that:

$$(1-\delta)\frac{n_1}{N}\frac{\partial U_1}{\partial z^B}+(1+\delta)\frac{n_2}{N}\left[\frac{\partial U_2}{\partial z^B}-p_2\frac{\partial U_2}{\partial x_2}\right]=0. \tag{11}$$

When $\delta=0$, i.e., when candidates share the same ideology, both political platforms converge to the utilitarian optimum, a standard result in political economy.[2] Should $\delta>0$, i.e., political candidates do not share the same ideology, then the platforms would diverge. Candidate A would put more weights on the utility of class 1, while candidate B would favor class 2. In such a case one obtains $z^A>z^B$.

Overall, candidates' behavior can be characterized as a maximization of the following objective function whose control variable is z:

$$\max_z \quad \Omega=\theta_1^j U_1(y_1,z)+\theta_2^j U_2(y_2-p_2z,z) \qquad (j=A,B) \tag{12}$$

with

$$\theta_1^A=(1+\delta)\frac{n_1}{N};\theta_2^A=(1-\delta)\frac{n_2}{N};\theta_1^B=(1-\delta)\frac{n_1}{N};\theta_2^B=(1+\delta)\frac{n_2}{N}, \tag{13}$$

where θ_1^j and θ_2^j are two parameters that denote the ability of each class to aggregate the individual utilities of their members and thereby influence the policy-making process, either via voting or via lobbying.

To simplify the exposition, let us assume that the solution to (12) satisfies the (work) incentive compatibility constraint $U_1<U_2$. The first-order condition can be rewritten as:

$$\theta_1^j\frac{\partial U_1}{\partial z}+\theta_2^j\left[\frac{\partial U_2}{\partial z}-p_2\frac{\partial U_2}{\partial x_2}\right]=0 \qquad (j=A,B), \tag{14}$$

where $\partial U_1/\partial z$ and $\partial U_2/\partial z-p_2\partial U_2\partial x_2$ represent the net marginal benefit from the public service for class 1 and class 2, respectively. While class 1 always derives a positive marginal utility from the public service z, the members of class 2 must pay taxes; hence they suffer a utility loss when z is too high. More generally, let z^* denote the solution to Equation (14). We therefore have the following effects:

Proposition 1. *From the policy z^*, we obtain the following comparative static derivatives:*

$$\frac{\partial z^*}{\partial y_1}>0,\frac{\partial z^*}{\partial y_2}>0,\frac{\partial z^*}{\partial p_2}<0,\frac{\partial z^*}{\partial \frac{n_1}{N}}<0,\frac{\partial z^*}{\partial \alpha}<0,\frac{\partial z^*}{\partial c}<0,\frac{\partial z^*}{\partial \theta_1^j}<0,\frac{\partial z^*}{\partial \theta_2^j}<0.$$

[2]Note that while the utilitarian optimum obtained in a probabilistic setting is unlikely to correspond to the median voter's ideal point (an outcome that is instead usually obtained in a deterministic setting), both frameworks predict full policy convergence.

Proof. See Appendix A. □

Proposition 1 yields the following predictions:

- **P1** The value of z^* rises as y_1 and y_2 increase and p_2 (the tax price paid by the wealthier class) decreases. These results are consistent with the demand side model view that the demand for public services should react as that of any normal private good, even when redistribution issues are involved.

- **P2** z^* is also expected to decrease as n_1/N (the share of the poorer class in the total population) increases. In such a case, the tax price paid by the wealthier class p_2 rises, lowering the demand for z. Interestingly, however, in the case where z^* is a subsidy ($\alpha = 1$), a higher number n_1 of individuals in class 1 produces two effects:

  i. It raises automatically the total amount $n_1 z^*$ of subsidy granted to class 1;

  ii. It lowers the amount z^* per beneficiary, because the richer class faces a higher tax price.

  Because of these opposite effects, the sign of the relationship between income inequalities and the size of the public sector depends on whether we are focusing on expenditures per beneficiary or on total expenditures – an issue that has not received enough attention in the empirical literature.[3]

- **P3** Finally, the weights θ_i in the government objective function for aggregating the utilities of each class play a determinant role in setting z^*. In equilibrium, the higher the influence of the wealthier class (θ_2), the lower the support coming from the poorer class, and the lower will be the demand for z. Similarly, the higher the influence of the poorer class, the higher the demand for z. Importantly, since the weights θ_i depend on the candidates' ability to influence elections $\pm\delta$, the equilibrium results are not symmetric; rather they are conditional on which political candidate is elected.

Overall, Proposition 1 reveals that the number of voters in the poorer class n_1 can have an impact on z through three different channels: (1) an indirect effect through the price of z borne by the wealthier class; (2) a direct effect through the influence of this class; (3) an indirect effect through the ideology of the party in office. To illustrate each of them, consider the derivative of z with respect to n_1. Given that $\theta_1^j = \frac{n_1}{N}(1 \pm \delta)$ and assuming that the marginal influence of the poorer class $\frac{\partial z^*}{\partial \theta_1^j}$ is constant and equal to μ, we have:

$$\frac{\partial z^*}{\partial n_1} = \frac{\partial z^*}{\partial p_2}\frac{\partial p_2}{\partial n_1} + \frac{\partial z^*}{\partial \theta_1^j}\frac{\partial \theta_1}{\partial n_1} = \varepsilon \times \frac{z^*}{N - n_1} + \frac{\mu}{N}(1 \pm \delta), \tag{15}$$

[3] Note that as c (the marginal cost of z) and α (the degree of rivalry in consumption of z) increase, z^* will decrease, since these variables appear in the tax price equation $p_2 = \frac{cN^\alpha}{n_2}$. In particular, with respect to α, the demand will be higher for a pure public good ($\alpha = 0$) than for a subsidy ($\alpha = 1$), because p_2 tends to 0 as α approaches 0.

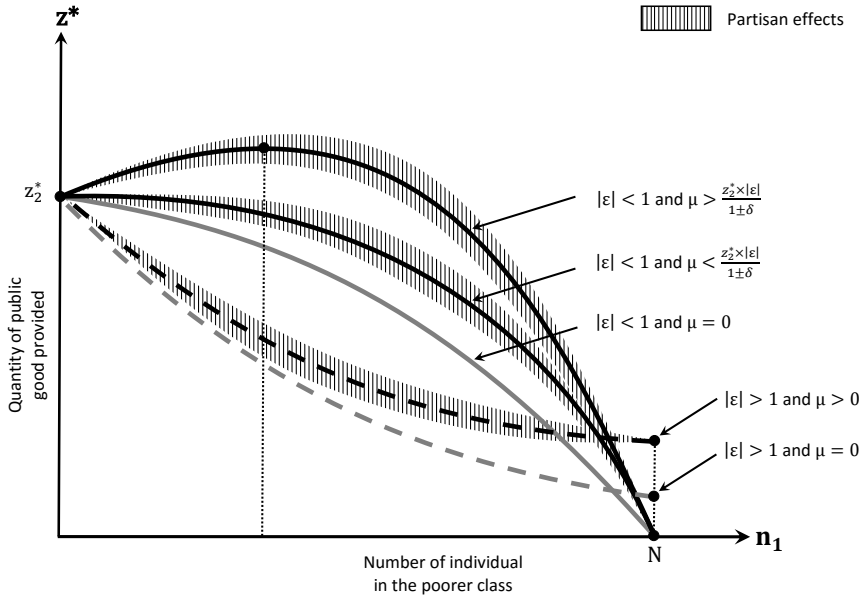

Figure 1. *Inequalities and public good provision.*

where $\varepsilon = \frac{\partial z^*}{\partial p_2} \frac{p_2}{z^*}$ denotes the (tax) price elasticity of demand ($\varepsilon < 0$). Furthermore, δ can be either added or subtracted depending on the ideology of the elected candidate. The second derivative is:

$$\frac{\partial^2 z^*}{\partial n_1^2} = \varepsilon(1+\varepsilon) \times \frac{z^*}{N-n_1} + \varepsilon \frac{\mu}{N}(1 \pm \delta). \tag{16}$$

Consider now the case where n_1 has an impact on z^* only through the tax price, i.e., $\mu = 0$ and just the utility of the richer class matters. If the price elasticity of demand is smaller than 1 in absolute value, the demand curve for z will be concave and always decreasing with n_1, as illustrated by the solid gray curve in Figure 1. In this case, the highest level of provision, hereafter denoted z_2^*, is obtained when $n_1 = 0$. Should μ instead be greater than 0, the demand curve would shift upwards, as indicated by the black solid curves; the direct influence of the poorer class raises the levels of provision of z with respect to the $\mu = 0$ case. In particular, if $\mu > \frac{z_2^* \times |\varepsilon|}{1 \pm \delta}$, the demand curve would first increase as inequality of income (effectively, the share of poor individuals within the population) rises. At some point, there are so many poor, and still a sufficient number of taxpayers, that there is a near-unanimous support for the policy. Beyond such level, the decrease in the relative number of taxpayers more than offsets the demand for more redistribution that comes from the poorer class. Last, if the price elasticity of demand is higher than 1 in absolute value, the demand curve will be convex (gray dashed line). At high levels of inequality, the government is more reluctant to reduce the provision of the public service z, especially when μ rises (black dashed line).

Finally, a partisan effect could affect the policy in one direction or another, depending on the value of δ. Depending on the distribution of voters, one candidate may prevail over the other, which in turn affects the way the voters influence public policy choices. This effect is

illustrated by the short vertical lines.

These three effects generate as many testable hypotheses:

- **H1** *The demand side hypothesis*. The distribution of voters affects the ideology of government. The higher the share of low-income people n_1, the stronger their influence on the policy-making process. This result is driven by the fact that the weights θ_i depend on the relative size of the two classes of voters n_1/n_2. This is the actual selection bias.
- **H2** *The tax price hypothesis*. Income inequalities decrease the demand for public goods and services. The tax price p_2 depends negatively on the number of taxpayers n_2. Therefore, the greater the share of welfare-dependent people n_1, the higher p_2, the lower the demand for public goods of the wealthier class.
- **H3** *The partisan hypothesis*. The weights θ_1^j and θ_2^j may not reflect exactly the demand of the voters, but rather the ideology of a left-wing or a right-wing political party, because θ_i depends also on the candidates' ability to influence elections $\pm\delta$.

This theoretical framework shows that the interactions between public spending, inequalities and ideology are quite complex, even starting from the conclusion that the value of n_1 eventually determines the final shape of the demand for redistribution. In particular, the mechanisms described in H1 and H2 offset each other. A greater share of welfare-dependent people leads to a stronger support for left-wing governments, more ideologically in favor of increasing the provision of public goods and services; this increases the tax burden levied on the wealthier class, which demands to reduce public spending. This is the effect emphasized by Bénabou (2000), who suggests that there is no monotonic relationship between income inequality and the likelihood and amount of redistribution.

4. Data description

French Departments are chosen as a testing ground for two reasons. First, welfare expenditures are the main responsibility and source of public outlays for the Department, which provides a close characterization of the endogenous variable of the theoretical model. Second, the social and political contexts of the Departments show considerable variability, both cross-sectionally and over time. These features allow a good representation of the exogenous factors of the model as well.

4.1. Institutional context

France is divided into 96 metropolitan and 5 overseas Departments (Guadeloupe, Guyane, Martinique, Mayotte and Réunion). Because of their unique characteristics, Paris, the two Corsican and the five overseas Departments have been excluded from the sample. This leaves us with 93 Departments, observed over the period of 11 years between 1998 and 2008. The

Departments are governed by a council elected in a so-called "cantonal elections", which are held approximately every three years.[4]

The total operating expenditures of the Departments can be divided into two categories:

A) **Social expenditures** include social aid to the unemployed (through specific health care program and, since 2004, through an unemployment benefit too), social assistance to mothers with infants in charge (through prevention, protection, aid to family, etc.), the disabled (through housing subsidies, direct payments, housing modifications for accessibility, etc.) and, lastly, to pensioners and the elderly (through direct payments and home subsidies). Departments do not hold responsibility for immigration programs. These redistributive programs fit into the taxonomy of z for the case where $\alpha = 1$.

B) **Non-social expenditures** cover principally the provision of bus services for all students in the Department and the maintenance of the roadway and waterway network, the management of ports, airports and public buildings. Moreover, since 1986, French Departments are responsible for building and maintaining the schools for students aged between 11 and 15 years (*collèges*). As these schools are attended by the great majority of French children, this responsibility grants to the Departments an important role in the French education system. Non-social expenditures resemble public goods and can be proxied by the theoretical variable z for the case where $\alpha = 0$.

The number of social beneficiaries in each Department depends on eligibility criteria defined by the national government; as such they remain constant across France. Conversely, except for unemployment benefits, the *amount* of individual social aid and of non-social expenditures is a discretionary choice of the Department. Inasmuch as the Departments' expenditure choices reflect voters' preferences, greater inequalities within the population should increase the chances of success of left-wing parties in departmental elections. This in turn should positively affect the size of the public sector of the Department; and vice versa for the case of smaller inequalities and right-wing governments winning the elections.

4.2. Stylized facts

Figure 2 illustrates the situation of the French Departments in 2008. In the top-left panel of Figure 2, we can observe an unequal distribution of beneficiaries of social expenditures. Difficult social situations are especially evident in the South and in the North of France. At the same time, these regions are usually governed by left-wing coalitions (top-right panel),

[4]Voters directly elect the departmental counselors for a six-year term through a two-ballot, uninominal majority voting procedure. An important feature of these elections is that only half of the councilors are renewed at each election, with one councilor per constituency. A constituency is a grouping of municipalities referred to as canton – in fact a subset of the Department. A candidate securing the votes of at least 25% registered voters within the canton and more than 50% of the total number of votes is elected. If no political candidate satisfies these conditions, a second round of voting is held one week later. The two candidates who received the largest number of votes in the first round are entitled to present themselves in the second round, plus any other candidate who received the votes of at least 10% of those registered to vote in the constituency. In the second round, the candidate who receives the highest number of votes is elected.

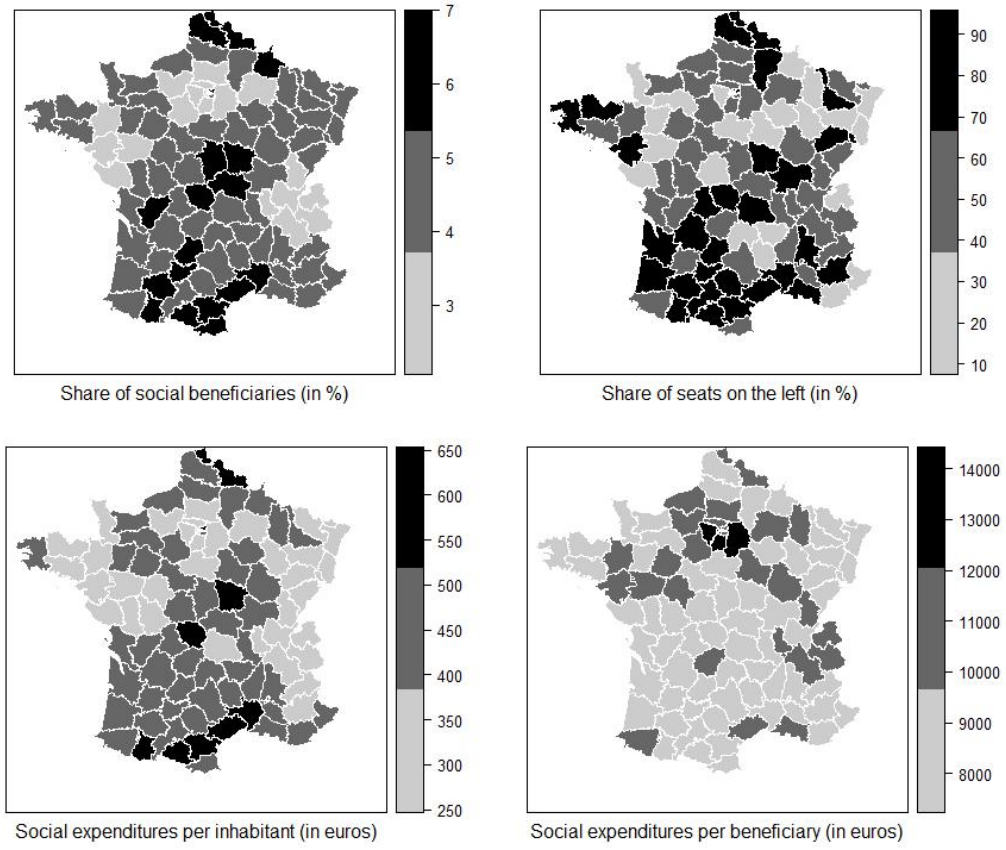

Figure 2. *Cross-sectional comparison – 2008.*

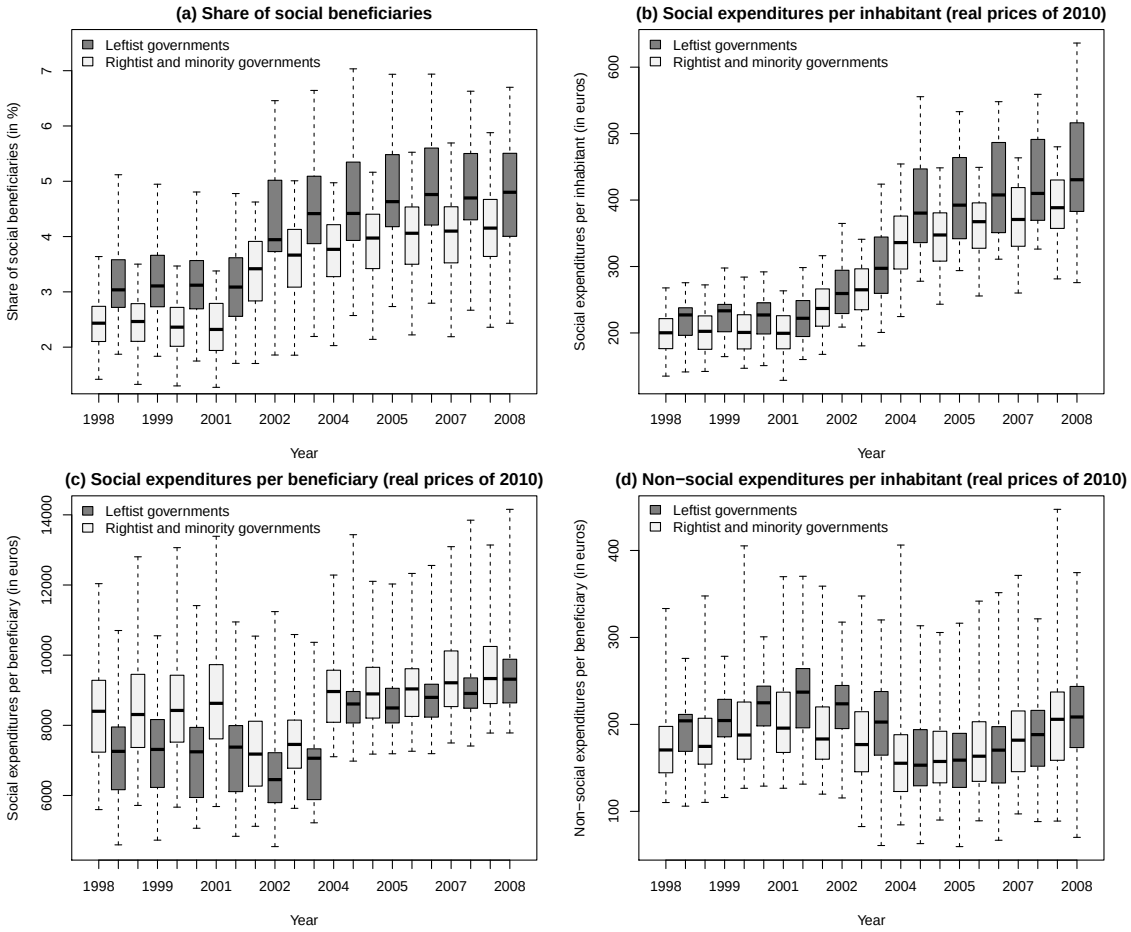

Figure 3. *Evolution over time between 1998 and 2008.*

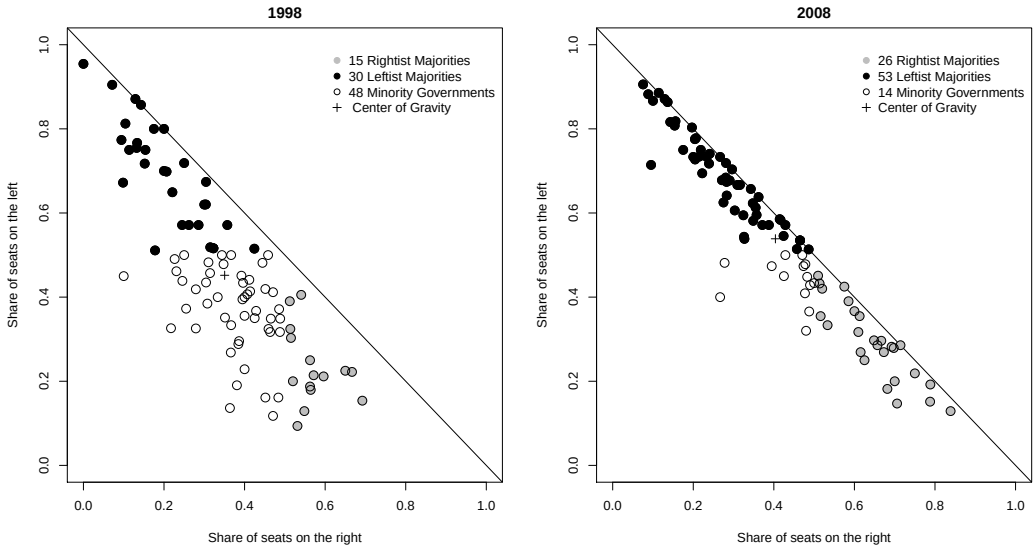

Figure 4. *Distribution of seats in 1998 and 2008.*

which is in principle consistent with H1. These Departments also show a high amount of social expenditures per inhabitant (bottom-left panel), but a lower amount of social aid per beneficiary (bottom-right panel – which lends support to H2).

Figure 3 describes the evolution of the situation over time. The temporal dimension too provides interesting hints for our empirical analysis. Between 1998 and 2008, the French Departments, like the rest of the world, were hit by the economic crises of 2001 and 2007, which raised the number of people depending on social welfare. These crises prompted the central government to add two more competences to the Departments. In 2002, a new welfare program targeting the elderly was created, called APA (*Allocation Personnalisée d'Autonomie*); then, with the *Decentralization Act* of 2004, the Departments were endowed with the responsibility to implement the social aid for the unemployed, the RMI (*Revenu Minimum d'Insertion*), replaced in 2009 by the RSA (*Revenu de Solidarité Active*). These innovations have significantly affected the financial situation of the Departments. First, between 1998 and 2008 one can notice a significant increase in the number of beneficiaries of welfare programs. This is illustrated in panel (a) of Figure 3, where each box-plot depicts the distribution of the French Departments over time. Each year is displayed twice, one for the Departments where left-wing parties are in the majority, the other for Departments with other types of government (either right-wing or minority ones).[5] The bottom and top of each box define the first and third income quartiles, and the band inside the box represents the median. The impact of this increased share of welfare-dependent individuals on social expenditures per inhabitant, social expenditures per beneficiary and on non-social expenditures per inhabitant after 2002 can be seen in panels (b), (c) and (d), respectively. This evidence is consistent with H2.

Finally, the scatter plots of Figure 4 show that the distribution of seats among political parties has changed considerably, in line with H1. Between 1998 and 2008, the center of gravity of the scatter plot, denoted by a cross, has moved from the center of the triangle, where each of the three political groups (left-wing, right-wing and minority governments) holds roughly one third of the seats, to the top side, suggesting that the majority of seats shifted to left-wing parties. Although relating political events to economic ones is always complicated, one can legitimately suppose that the political success of left-wing parties is connected with the increase of welfare-dependent people.

4.3. Measures of redistribution and inequalities

In order to measure redistribution carried out by the French Departments, we consider both social expenditures and non-social ones. By that we fit into the category of papers that measure redistribution carried out by the government by means of expenditure indicators.[6] This choice

[5] In what follows, we will group the right-wing and the minority governments together for two reasons. First, since the empirical analysis aims at uncovering whether parties with a left-wing ideology tend to spend more, the other two types of governing coalitions provide the counterfactual to being on the left. Second, minority left-wing governments find it harder to pass "leftist" policies; in terms of policy outcomes they tend to look more like right-wing ones.

[6] There are two types of indicators generally used in the literature. The first includes expenditures that are redistributive in nature, such as the average share of government expenditures on social security and welfare in

Table 1. Summary statistics

Variable	Description	Data source	N	Mean	St. Dev.	Min	Max
$leftshare$	Share of seats on the left. L equals 1 when $leftshare > 0.5$.	Le Monde	372	0.475	0.201	0.088	0.955
social	Per capita social expenditures (in euros, real prices of 2010), excluding mandatory expenditures under RSA.	DREES	1,023	263.031	63.791	128.709	462.535
nonsocial	Per capita non-social expenditures (in euros, real prices of 2010).	DREES	1,023	191.010	57.113	59.479	447.318
children	Share of beneficiaries receiving social assistance for children (in percent).	DREES	1,023	0.188	0.059	0.060	0.384
unemp	Share of beneficiaries receiving unemployment benefit (in percent).	DREES	1,023	1.519	0.620	0.552	3.824
elder	Share of beneficiaries receiving social assistance for the elderly (in percent).	DREES	1,023	1.556	0.876	0.196	4.134
disabled	Share of disabled people receiving social assistance (in percent).	DREES	1,023	0.388	0.094	0.184	0.919
I	Inequalities measure, as a sum of *children*, *unemp*, *elder* and *disabled* (in percent).	DREES	1,023	3.652	1.159	1.273	7.033
$population$	Number of inhabitants (in thousands).	DGCL	1,023	620.439	450.579	73.507	2,565.257
density	Number of inhabitants per km^2.	DGCL	1,023	330	1,178	14	8,825
Y	Taxable income per capita (in euros, real prices of 2010).	DGCL	1,023	8,868	1,855	6,075	20,036
grants	Grants per capita received by the Department (in euros, real prices of 2010).	DGCL	1,023	180.740	78.775	30.403	644.996

Note: DEC represents a time-dummy variable indicating the transfer of competences after 2002. Variables *social* and *nonsocial* are used as averages calculated over each period in office (*social_average*, *nonsocial_average*) when indicated.

is sometimes criticized because it does not accurately distinguish taxpayers from beneficiaries; for instance, in a society where both taxes and transfers are high, contributors and beneficiaries may largely overlap (Milanovic, 2000). We do not have such a problem, however, because in France social assistance is largely means-tested; only eligible people may benefit from social services. Moreover, as redistribution is not only a matter of taxes and monetary transfers, but also of in kind services, using both measures of social and of non-social expenditures seems a convenient approach. Pensions are excluded from the study because they do not belong to the competences of the French Departments. Nor do we consider unemployment benefits, since their amount is defined nationally and Departments have no discretionary power there. Table 1 offers the summary statistics of all variables; the GDP deflator ($2010 = 100$) has been used to deflate all the financial variables.

There is also a debate about the appropriate indicator for baseline income inequality. Focusing solely on disposable income involves a time-sequencing and an endogeneity problem at the same time. Taxpayers receive their factor income first, then vote on the

GDP (Meltzer and Richard, 1983; Persson and Tabellini, 1994; Perotti, 1996; Rodriguez, 1999; Bassett *et al.*, 1999; Gouveia and Masia, 1998); the average share of government expenditures on health and housing in GDP (Meltzer and Richard, 1983; Perotti, 1996; Rodriguez, 1999); the average share of government expenditures on education in GDP (Perotti, 1996), or city employment (Alesina *et al.*, 2000). A second category of papers considers measures of taxation, such as the average marginal tax rate, the average share of labor taxation in GDP, the average share of income taxes in personal income (Perotti, 1996), the degree of progressivity of the state tax burdens (Chernick and Reschovsky, 1982), the distribution of gross and disposable income (Milanovic, 2000), the Gini difference (Padovano and Turati, 2012; Feld and Schnellenbach, 2014), the poll tax per standard house, the property tax per standard house, and property tax share (Borge and Rattsø, 2004).

redistributive scheme, which generates their disposable income. The correct methodology would be to focus on individual choices before they receive the transfers and pay the taxes (Milanovic, 2000). We follow this idea by directly considering the share of welfare-dependent people:

$$I = unemp + elder + children + disabled, \tag{17}$$

where *unemp* represents the number of unemployed people per inhabitant, who benefit from the minimum guaranteed income scheme. Similarly, the variables *elder*, *children*, and *disabled* represent the shares of the elderly, children, and disabled people, respectively, who benefit from departmental welfare programs. As the number of social beneficiaries in a Department depends on eligibility criteria defined by national law, these variables are not functions of the Department's public policies and can therefore be considered as truly exogenous in the model.

5. Step 1: Evidence of a selection bias

The previous section has shown some descriptive evidence of a correlation between the proportion of welfare-dependent people, the number of votes to the left and the level and structure of public expenditures. In this section we verify this relationship more rigorously.

5.1. The endogeneity of government ideology

We begin by estimating a vote function model to assess the impact of the various socioeconomic characteristics of a Department on the probability of an election of a left-wing party to the departmental government (or, more precisely, the probability that left-wing representatives hold more than 50% of the seats in the departmental council). The vote function model is specified as follows:

$$L_{i,t} = \alpha_0 + \alpha_1 \ln I_{i,t} + \alpha_2 \ln Y_{i,t} + \mathbf{X}_{i,t}\lambda + \varepsilon_{i,t}, \tag{18}$$

where i and t stand for Department i and year t, respectively. Four electoral years are examined: 1998, 2001, 2004 and 2008. The endogenous variable is the ideology of the government, $L_{i,t}$, a dummy equal to one if the ruling party or coalition is on the left (or far-left), and zero otherwise. To simplify, we will refer to these coalitions as only "left" and "right" hereafter. Appendix B provides and explains the partition used to construct this variable. $I_{i,t}$ represents a measure of inequality, as defined in Section 4.3. The variable $Y_{i,t}$ denotes the mean taxable income. $X_{i,t}$ are the observable characteristics of jurisdiction i in year t, namely, the size and the density of the population.

We resort to a logistic regression to estimate the coefficients for the binary dependent variable L, in order to circumvent the well-known shortcomings of the linear probability model applied to binary outcomes. The choice between a logit or a probit model is not crucial here, since both tend to give very similar results, in terms of significance levels and direction of effects, and the Akaike criterion values are nearly identical. In practice, the

Table 2. Geographical dummies

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

logistic specification tends to be used to estimate propensity scores when performing matching (Austin, 2011), which constitutes the second step of our empirical strategy (see Section 6.2); hence our choice.

The ideology of the governments may exhibit a low degree of variation over time: among the 93 Departments under scrutiny, 65 have kept the same partisan affiliation during the whole sample period. To some extent, this is also the case for other variables, including the share of social beneficiaries or the average income. As such, adding fixed individual effects could remove much of the time variation necessary for obtaining good estimates, especially on those coefficients (Beck, 2001). To avoid potential bias, we include random effects and use a pooled model with geographical dummies. These dummies regroup the Departments into five areas (Table 2), which provides a good compromise between the pooled estimator and the fixed-effects estimator; they also allow to take into account the potential impact of regional specificities.

The results of the estimates are presented in Table 3. Overall, they prove consistent with what we expect. A higher value of I increases the chances that a Department has a left-wing government, which lends empirical support to H1 (see Section 3). In contrast, wealthier jurisdictions are less likely to vote for the left. The simulated probability of a left-wing party victory, depending on the share of social beneficiaries and on the average income, has been computed using the pooled logit model with geographical dummies. The results for each determinant are plotted in Figure 5. Moreover, columns 4, 5 and 6 of Table 3 provide estimates that examine in greater detail different groups of beneficiaries of welfare programs. The coefficients of $children$, $unemp$, and $elder$ appear with a positive and significant sign, with the highest impact found for $unemp$.

This set of results confirms the existence of a relationship between the share of seats won by left-wing parties on the one hand, and inequalities and, to an extent, per capita income on the other hand, observed around the time of the election. Population density also positively affects the share of seats won by left-wing parties, probably because social inequalities are more likely found in densely populated Departments, such as the ones with large suburban areas.

5.2. The nonlinear influence of inequalities

Next we examine how the main socio-economic characteristics of Departments, chiefly the inequalities observed among the population, affect the level of public spending. The empirical

Table 3. Vote function – estimation results[a]

	Dependent variable:					
	L					
	Logit Pooled	Logit RE	Logit Geogr. dummies	Logit Pooled	Logit RE	Logit Geogr. dummies
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	27.477***	−5.310	23.042***	20.280**	18.632	23.846**
	(7.824)	(22.324)	(7.873)	(10.140)	(27.912)	(10.305)
log(I)	3.721***	9.377***	3.582***			
	(0.423)	(1.870)	(0.463)			
log(children)				0.852*	3.859**	2.022***
				(0.439)	(1.663)	(0.557)
log(unemp)				2.592***	8.146***	1.976***
				(0.418)	(2.496)	(0.483)
log(elder)				1.218***	2.541***	1.205***
				(0.273)	(0.788)	(0.308)
log(disabled)				−0.887	−1.074	−0.885
				(0.677)	(2.113)	(0.736)
log(density)	0.459**	−1.561	0.240	0.294	0.628	0.317
	(0.200)	(1.129)	(0.366)	(0.220)	(0.676)	(0.363)
log(population)	0.131	1.965*	0.461	−0.142	−0.740	0.113
	(0.292)	(1.033)	(0.427)	(0.300)	(1.000)	(0.417)
log(Y)	−2.090***	1.963	−1.951***	−0.347	5.712*	−0.571
	(0.735)	(2.146)	(0.746)	(0.984)	(3.035)	(1.059)
NORTHWEST			−1.353			−1.084
			(1.046)			(0.954)
NORTHEAST			−0.914			−0.971
			(1.036)			(0.925)
SOUTHWEST			0.180			0.747
			(1.062)			(1.004)
SOUTHEAST			−0.666			0.102
			(1.011)			(0.959)
Observations	372	372	372	372	372	372
Log-Likelihood	-206.236	-137.747	-196.451	-199.474	-134.780	-186.883

[a] Arellano's method (1987) was used to compute a robust covariance matrix, allowing a fully general structure with respect to heteroskedasticity and serial correlation in panel data. In the context of a logistic regression, the approach was not possible for the logit RE model.
***, ** and * indicate a significance level of 1%, 5% and 10%, respectively.

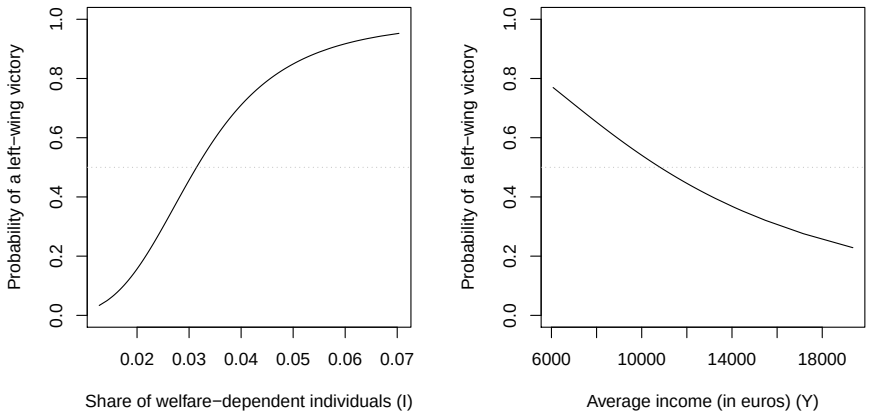

Figure 5. *Vote function: simulating the probability of being on the left.*

specification of the spending equation is as follows:

$$\ln E_{i,t+1} = \beta_0 + \beta_1 \ln I_{i,t} + \beta_2 I_{i,t} + \beta_3 \ln Y_{i,t} + \mathbf{X}_{i,t}\mu + \eta_{i,t}, \tag{19}$$

where again i and t stand for Department i and year t, respectively. The endogenous variable $E_{i,t+1}$ denotes the level of public expenditures per inhabitant; it is the empirical equivalent of variable cZ in the theoretical framework. $E_{i,t+1}$ represents either the per capita social expenditures of the Departments (hereafter *social*) or the per capita non-social expenditures (*nonsocial*). Expenditures are lagged one year to take into account the budget process: the budget of year $t+1$ is proposed and approved between September t and January $t+1$, i.e., by the government of year t.

Equation (19) also takes into account a vector $X_{i,t}$ of control variables. The impact of population density and population depends on the magnitude of the congestion effects and of economies of scale. The variable *grants* denotes the transfers that the Departments receive from the central government. Following the standard literature on the demand for public goods (see, e.g., Guengant *et al.*, 2002), we relax the assumption that income and grants produce identical marginal effects. The variable *DEC* is a time-dummy variable indicating the transfers of competences that occurred after 2002.

As discussed in the second prediction of Proposition 1, depending on the margin of maneuver of the departmental government, the endogenous variable may increase automatically with the number of recipients of welfare transfers. If this is the case, in Equation (19) β_1 is expected to be positive and equal to 1. Yet, a higher I could be synonymous of a higher tax price for the members of the wealthier classes (H2, the tax price hypothesis). The value of β_1 in this case depends also on the price elasticity of demand; if so, we should obtain a parameter value lower than 1.

In addition, a more complex relationship can be expected to link expenditures and inequalities, namely a quadratic rather than a linear one. In such a case, the significant positive coefficient should be β_2 instead. In line with the theoretical model, the amount of public good demanded increases with the share of welfare recipients; yet, at the same time, the resulting higher tax price motivates the wealthier voters to lower their demand, hence the nonlinearity.

The estimation results for the spending equation (Table 4) are consistent with what we expected. The inequality coefficient β_2 indeed indicates a significant nonlinear relationship between I and E, positive in the case of social expenditures, negative in the case of the non-social ones. This suggests that these two types of expenditures (chiefly monetary transfers the former, in kind the latter) are potentially substitutes, which implicitly gives support to the tax price effect (H2). To explore this possibility, we have calculated an "average Department" within the sample and we have used it to simulate the form of the nonlinear function, illustrated in Figure 6. In panel (a), as we move from the minimum to the maximum share of welfare recipients in the electorate, average social expenditures per inhabitant double, from less than 200 euros to almost 400 euros. The convexity of the simulated relationships becomes more evident once we consider spending per recipient (panel (b)): the larger is the share of welfare-dependent people, the lower will be the marginal decrease in social expenditures per beneficiary. Lastly, in panel (c), non-social expenditures show first a diminishing marginal increase in per capita spending, then they start to decrease once the share of welfare recipients

Table 4. Spending equation – estimation results[a]

	Dependent variable:					
	log(social)			log(nonsocial)		
	Pooled-OLS	Random effects	Geographical dummies	Pooled-OLS	Random effects	Geographical dummies
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	4.010***	4.131***	4.237***	3.623*	3.106***	4.753***
	(0.730)	(0.533)	(0.612)	(1.864)	(1.121)	(1.512)
log(I)	0.140	0.161***	0.167*	0.191	0.253	0.427*
	(0.097)	(0.062)	(0.093)	(0.291)	(0.180)	(0.221)
I	7.934***	6.588***	7.589***	−8.409	−17.884***	−16.415***
	(2.691)	(1.697)	(2.646)	(7.874)	(5.548)	(6.021)
log(Y)	0.152***	0.236***	0.136***	0.608***	0.779***	0.556***
	(0.041)	(0.019)	(0.038)	(0.104)	(0.059)	(0.089)
log(density)	0.001	−0.015	−0.023	0.129***	0.110***	0.098**
	(0.018)	(0.020)	(0.021)	(0.031)	(0.039)	(0.042)
log(population)	−0.020	−0.034	−0.001	−0.307***	−0.332***	−0.270***
	(0.032)	(0.033)	(0.030)	(0.053)	(0.056)	(0.044)
log(grants)	0.111***	0.001	0.108***	0.124*	0.099***	0.159***
	(0.035)	(0.013)	(0.032)	(0.073)	(0.031)	(0.061)
DEC	0.098***	0.168***	0.097***	−0.218***	−0.130***	−0.220***
	(0.019)	(0.010)	(0.0178)	(0.036)	(0.020)	(0.032)
NORTHWEST			−0.083			−0.199
			(0.057)			(0.128)
NORTHEAST			−0.119**			−0.162
			(0.055)			(0.122)
SOUTHWEST			−0.073			−0.136
			(0.059)			(0.142)
SOUTHEAST			−0.147***			0.085
			(0.052)			(0.132)
Observations	1,023	1,023	1,023	1,023	1,023	1,023
R^2	0.772	0.909	0.793	0.312	0.291	0.428
Adjusted R^2	0.766	0.902	0.784	0.309	0.289	0.423

[a] Arellano's method (1987) was used to compute a robust covariance matrix, correcting for heteroskedasticity and serial correlation in panel data. ***, ** and * indicate a significance level of 1%, 5% and 10%, respectively.

exceeds some 3% of the population. This inversed shape may indeed be due to the fact that social and non-social expenditures appear to be substitutes.

The income elasticities and the grants elasticities of the demand for public goods and services are always positive and highly significant. Their estimated coefficients range from 0.1 to 0.24 for social expenditures and from 0.1 to 0.8 for non-social ones. Departments that are both richer and receive more financial support via grants tend to spend relatively more of their allotted resources. This suggests that the demand for public spending increases with voters' income, although less than proportionally. Finally, Departments with a larger population and a lower population density require lower non-social spending per inhabitant, which surmises a significant effect of economies of scale. Yet, also congestion effects may explain the negative coefficient, since in more densely populated Departments congestion may force people to demand fewer public services, and resort more to privately provided ones. Some of the estimated variations of public spending are also related to the mechanical effects of the new transfer of competences in 2002 and 2004: the *DEC* dummy has a significant positive impact on social expenditures, but a negative impact on non-social ones.

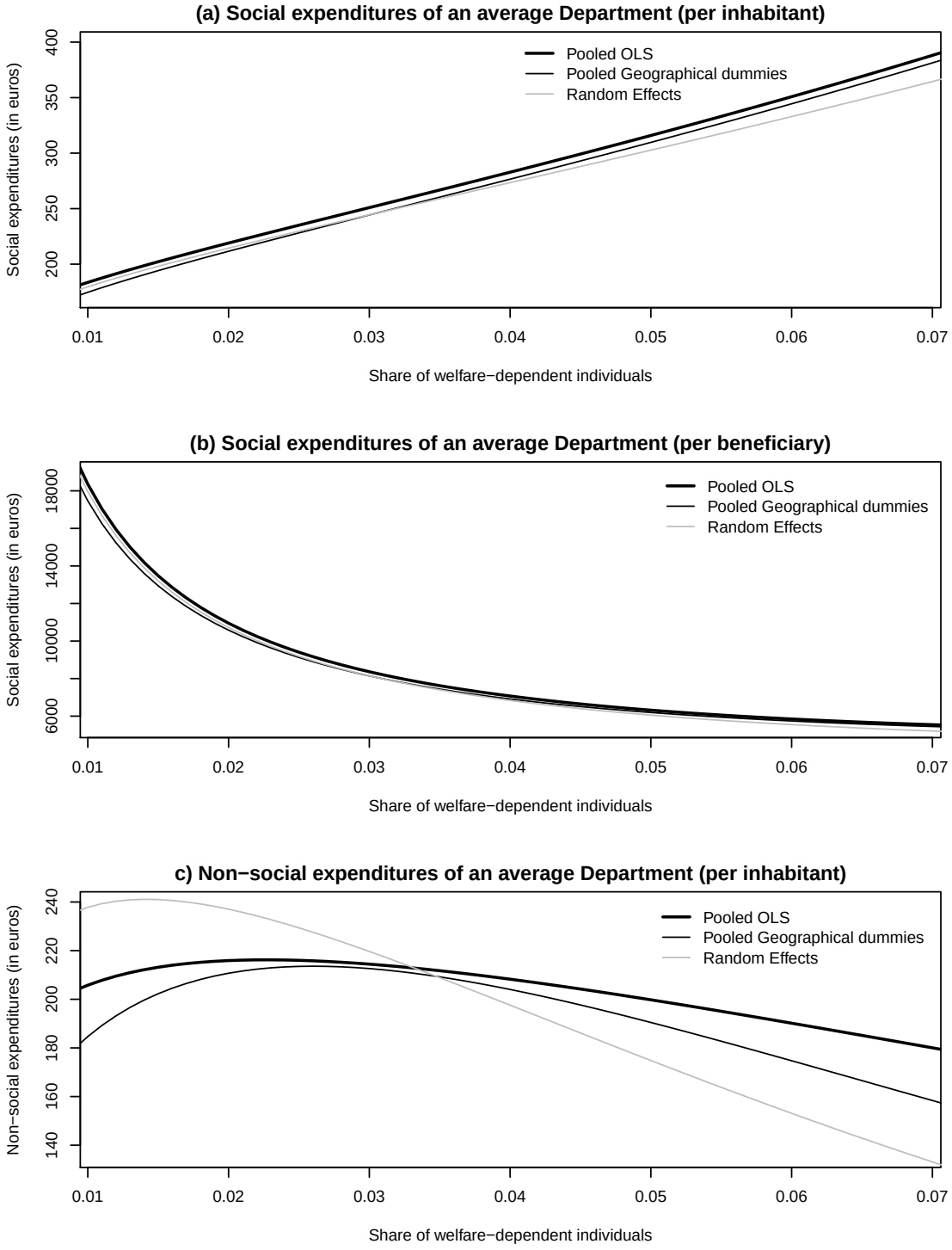

Figure 6. *Spending and inequalities: simulations at the average Department.*

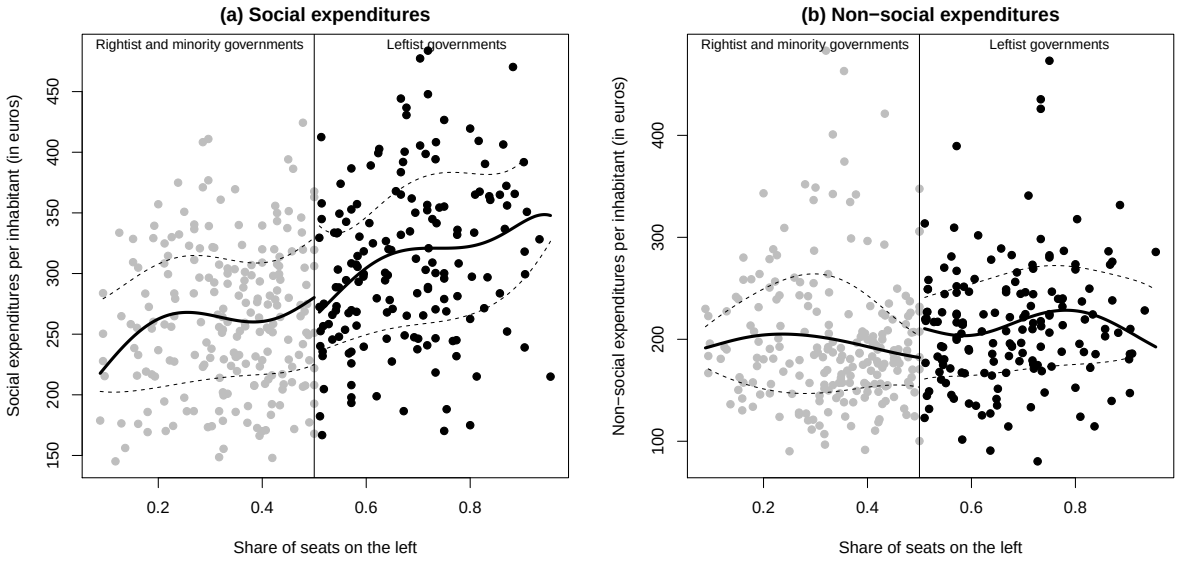

Figure 7. *Comparison around the threshold.*

6. Step 2: Test for partisan effects

Combining the interpretation of the vote function and of the spending equation is not sufficient to conclude that data lend support to H1, the demand side hypothesis. The simple regression analysis actually highlights only the fact that left-wing parties are elected in more unequal areas and, therefore, do not face the same demand for public goods. It remains to be seen, however, whether partisan effects explain differences in policy choices and public spending levels, as stated in H3, or if such differences are wholly absorbed by demand driven processes. To deal with this potential selection bias and observational equivalency problem, generated by the voting process itself, we apply two different approaches: (1) the regression discontinuity design (RDD) and (2) the propensity score matching (PSM). These methodologies compare left-wing jurisdictions with their right-wing counterparts while eliminating other systematic differences between Departments.

6.1. Regression discontinuity design (RDD)

The RDD approach allows overcoming the misinterpretation that higher spending is determined by the left-wing ideology of departmental governments, rather than by the higher income inequality within the Department, by taking advantage of the discontinuity in the share of seats held by the political coalitions in power. The Departments with a share of left-wing seats just below 50%, which are then governed by a right-wing government, are compared with the Departments where left-wing parties obtained a number of seats just above the majority and were therefore able to form the government themselves. These two groups of Departments are likely to be very similar in their exogenous characteristics, thereby easing the concerns of selection bias. Hence, differences in policy choices found around the 50% threshold are likely to be generated by ideological differences. If this is indeed the case, the

Table 5. RDD equation – estimation results: Imbens-Kalyanaraman (2012) optimal bandwidth[a]

	Dependent variable:					
	log(social_average)			log(nonsocial_average)		
	Double BW	Optimal BW	Half BW	Double BW	Optimal BW	Half BW
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	5.564***	5.600***	5.528***	5.188***	5.191***	5.201***
	(0.031)	(0.045)	(0.072)	(0.037)	(0.043)	(0.061)
L	0.020	−0.041	0.021	0.110**	0.139**	0.135*
	(0.042)	(0.057)	(0.084)	(0.051)	(0.057)	(0.075)
leftshare	0.105	0.669	−1.847	−0.275	−0.242	−0.029
	(0.257)	(0.657)	(2.111)	(0.227)	(0.429)	(1.118)
leftshare:L	0.864***	1.330**	1.200	0.200	−0.359	−0.393
	(0.243)	(0.646)	(1.574)	(0.223)	(0.427)	(1.022)
F-statistic	10.260	2.592	0.796	4.260	3.037	2.689
R^2	0.088	0.042	0.025	0.034	0.033	0.055
Adjusted R^2	0.080	0.026	0	0.026	0.022	0.034

[a] Arellano's method (1987) was used to compute a robust covariance matrix, correcting for heteroskedasticity and serial correlation in panel data.
***, ** and * indicate a significance level of 1%, 5% and 10%, respectively.

H3 partisan hypothesis is validated.

As a preliminary test, the regression discontinuity regression can be examined graphically. Panel (a) of Figure 7 plots the average per capita social expenditure against the share of council seats held by left-wing parties. The bold curves represent the average value of the endogenous variable, estimated through local regressions (as in Wand and Jones, 1995). The dashed curves mark the locally estimated 50% interquartile range, which means that 50% of the dots lie beyond these curves. As can be seen, a policy divergence between left-wing and right-wing governments cannot be easily perceived around the threshold. A break is more apparent in panel (b), where average non-social expenditures are represented.

The RDD equation itself estimates the following relationship:

$$\ln E_{i,t+1} = (\gamma_0 + \gamma_1 L_{i,t}) + (\gamma_2 + \gamma_3 L_{i,t})(leftshare_{i,t} - 0.5) + \delta_{i,t}, \tag{20}$$

where $leftshare_{i,t} - 0.5$ denotes the share of seats on the left, centered at 50%, i.e., 0 indicates a 50% share of left-wing parties. The focus is on the election years (1998, 2001, 2004, 2008) and the average spending of governments while in office, labeled *social_average* and *nonsocial_average*.

The parameter of interest is γ_1, which aims at measuring policy divergence. Obtaining consistent estimates of γ_1 is, however, complicated by the fact that the relationship between the outcome variable (*social_average* and *nonsocial_average*) and the running variable $leftshare$ could be unstable with respect to extreme observations. For this reason, a bandwidth around the threshold is usually selected.

In principle, the smaller the bandwidth, the lower will be the selection bias. There is, however, a trade-off between the size of the bandwidth and the number of observations. In this paper we have selected the bandwidths according to the method of Imbens and Kalyanaraman (2012, henceforth IK), which ensures an asymptotically optimal bandwidth under squared error loss:

Table 6. McCrary (2008) density test

year	1998	2001	2004	2008
p-value	0.142	0.770	0.861	0.559

- for *social_average*: 34.4% < $leftshare$ < 65.6%, or equivalently 50% $\pm$ 15.6%,
- for *nonsocial_average*: 26.2% < $leftshare$ < 73.8%, or equivalently 50% $\pm$ 23.8%.

These bandwidths treat respectively 183 and 273 observations out of 372. Since the focus of RDD lies entirely on the change in the value of the regression function at the threshold, the choice of the appropriate bandwidth is crucial. Equally important is establishing that the forcing variable ($leftshare$) is not subject to manipulation around this threshold, which the McCrary (2008) density test refutes (Table 6).

The results of the IK optimal bandwidths, along with twice and half the bandwidth, are reported in Table 5. For *social_average*, all estimations point out a non-significant difference between left-wing and right-wing jurisdictions. In *nonsocial_average* instead, RDD reveals a change in intercept at the threshold (i.e., the main effect of ideology L) that accounts for an increase of about 28.5 euros on average (0.139$\times$mean *nonsocial_average*). In other words, RDD finds significant partisan effects only for per capita non-social expenditures, and only when very similar left-wing and right-wing Departments are being compared. The rest of the variations in policy choices appear to be demand driven.

6.2. Propensity score matching (PSM)

A shortcoming of the previous approach is that the degree of competition is likely to increase as the electoral margin decreases, as shown empirically in Lee *et al.* (2004) and Le Maux *et al.* (2011, 2016) among others. The previous result could therefore be misinterpreted, since a stronger competition may also induce a quicker policy convergence. To deal with this concern, we implement a propensity score matching (PSM) methodology as well. The principle of PSM is to select a group of right-wing jurisdictions so as to make them resemble the left-wing jurisdictions in everything except for the fact that they are on the left. Once the matched groups are formed, the average treatment effect (ATE) is estimated for each outcome, by simply computing the difference in means between the two groups. In performing the matching, one would ideally find for each left-wing jurisdiction a right-wing jurisdiction that is identical in all respects. Since the list of possible variables is too large to allow an exact match to be achieved, the focus shifts onto propensity scores, as the probabilities estimated on all the observed exogenous characteristics. In our case, the propensity scores correspond to the fitted values of our vote function (Equation 18), the pooled logit model using geographical dummies with the greatest log likelihood (column 6 of Table 3, since RE models cannot be used in this case by construction).

To counterbalance their advantages and weaknesses, different matching algorithms are used. First, nearest neighbor matching (NNM) links any two left-wing and right-wing Departments based on the most similar propensity scores, until all jurisdictions have been

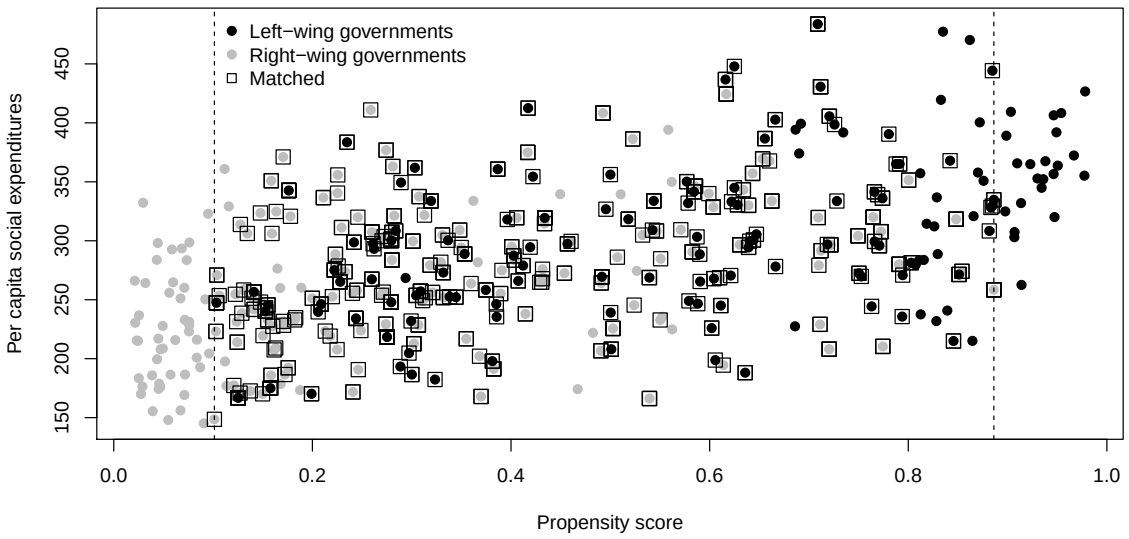

Figure 8. *Graphical representation of matching algorithms: 0.025 caliper matching.*

matched. Replacement, i.e., a repeated use of the same controls, is allowed, which should lead to a higher average quality of matching and easily avoid problems of dependence on the order in which the matches are made (Caliendo and Kopeinig, 2008). NNM may, however, associate Departments with very different propensity scores, and hence characteristics, if no closer match is available. For that reason, a maximum permitted distance is determined next, through a caliper matching algorithm. A tighter caliper reduces the association bias, but some subjects may not be matched, as all observations outside of the caliper are dropped. A smaller number of pairs is therefore assigned when the width of the caliper is gradually reduced to 0.1, 0.05 and 0.025 standard deviations of the propensity score.

Figure 8 illustrates the matching process in the case of social expenditures, using the tightest caliper of 0.025. Treated (left-wing) Departments are displayed in black, while right-wing (not treated) ones are in gray. The black boxes identify the matched left-wing/right-wing pairs, i.e., those observations that are characterized by a very similar propensity score, shown by their position on the horizontal axis. Given the period of 4 elections, a Department can be both in the control group and in the treatment group if there has been an alternation of ideological coalitions in government. This has indeed been the case for 28 Departments in the sample. Before matching the Departments, a check for common support, i.e., an overlap between the two groups, must be performed. Typically, the observations above/below the other group's maximum/minimum propensity score are excluded (Caliendo and Kopeinig, 2008, pp. 45–46), as is the case for the dots beyond the dashed vertical lines.

Before performing the matching, we could conclude that a significant difference exists between both social and non-social expenditures implemented by either left-wing or right-wing departmental governments. Per capita social expenditures averaged 308.5 euros in leftist

Table 7. Propensity score matching – results of matching algorithms: ATE

				social_average		*nonsocial_average*	
	Observations	Treated	Controls	mean dif.	*t*-stat	mean dif.	*t*-stat
Before matching	1,023	419	604	46.085***	6.859	16.972**	2.576
				social_average		*nonsocial_average*	
Matching algorithm	Matched pairs	Controls (unweighted)	Loss in %	ATE	*t*-stat	ATE	*t*-stat
Nearest neighbor	372	394	0	14.219	1.211	18.169	1.445
Caliper = 0.1	322	344	13.44	8.748	1.107	18.383**	2.206
Caliper = 0.05	293	315	21.24	6.638	0.948	15.056**	2.051
Caliper = 0.025	257	279	30.91	5.248	0.877	17.929***	2.815

***, ** and * indicate a significance level of 1%, 5% and 10%, respectively.

Departments, compared to 262.4 euros for their right-wing counterparts, i.e., a difference of 46.1 euros; non-social expenditures stood at 214.8 euros and 197.9 euros, respectively, i.e., a difference of 16.9 euros. After the matching, however, the test for the difference between means leads to a quite different conclusion, namely, that left-wing governments do not spend more on social expenditures than right-wing governments (see Table 7). None of the matching algorithms report a statistically significant ATE for *social_average* (column 5 in Table 7), i.e., no partisan effects are observed for social expenditures. In contrast, for *nonsocial_average* (column 7) only the least accurate NNM matching algorithm fails to concur that leftist governments tend to spend more on non-social expenditures, by about 18 euros per capita. This result holds even when we consider near-identical Departments.

6.3. Robustness of the results

An important feature of RDD and PSM is the possibility to verify whether the question of selection bias has been resolved, i.e., whether the treatment group and the control group compared are balanced.

To formally assess the quality of the comparison, two-sample *t*-tests of exogenous variables are recommended (see Tables 8 and 9). Before applying the methods, we can observe highly significant differences in the control variables between the left-wing and the right-wing group (columns 1–2), with the exception of the average income and population density. With a decreasing RDD bandwidth, Table 8 indicates an increasing quality of the comparison at the threshold, showing the diminishing statistical difference in the key socio-economic variables. With PSM (Table 9), any difference between the compared groups of Departments is reduced to merely the share of preschool children in the population.

PSM also offers additional popular approaches to assessing the quality of the match, e.g., a calculation of the average standardized bias (SB), defined by Rosenbaum and Rubin (1985, p. 36) as the difference of sample means for each covariate in the treated group and a matched control group, divided by a square root of the average of sample variances in both groups. While there are no formal rules, SB between 3 and 5% is usually seen as sufficient (Caliendo and Kopeinig, 2008), while SB of 20% after matching is considered large (Rosenbaum and Rubin, 1985). The tighter the caliper, the higher the quality of the match,

Table 8. RDD quality indicators – difference in exogenous variables: two-sample t-tests

			Bandwidth:			
	Whole sample		0.238		0.156	
Variable	Right	Left	Right	Left	Right	Left
I	0.031	0.041***	0.031	0.040***	0.031	0.037***
children	0.002	0.002***	0.002	0.002***	0.002	0.002*
unemp	0.013	0.018***	0.013	0.017***	0.013	0.016***
elder	0.012	0.017***	0.012	0.017***	0.012	0.014**
disabled	0.004	0.004**	0.004	0.004**	0.004	0.004
Y	8,815	9,015	8,836	9,091	8,769	9,179
density	277	398	327	311	277	426
population	569,951	685,241**	577,648	707,200**	604,466	763,042**

***, ** and * indicate a significant difference at a 1%, 5% and 10% level, respectively.

Table 9. Matching quality indicators – difference in exogenous variables: two-sample t-tests

			Matching algorithm:							
	Before matching		Nearest neighbor		Caliper 0.1		Caliper 0.05		Caliper 0.025	
Variable	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left
I	0.031	0.041***	0.034	0.036*	0.036	0.036	0.035	0.035	0.035	0.035
children	0.002	0.002***	0.002	0.002	0.002	0.002**	0.002	0.002**	0.002	0.002**
unemp	0.013	0.018***	0.014	0.015***	0.014	0.015*	0.014	0.015	0.014	0.014
elder	0.012	0.017***	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
disabled	0.004	0.004**	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
Y	8,815	9,015	8,891	8,748	9,007	8,855	9,060	8,839	9,024	8,874
density	277	398	254	261	276	248	295	223	317	234
population	569,951	685,241**	539,793	596,279**	548,814	578,341	553,390	561,799	555,568	553,333

***, ** and * indicate a significant difference at a 1%, 5% and 10% level, respectively.

Table 10. Matching quality indicators – standardized bias (SB) in percentage

		Matching algorithm:			
Variable	Before matching	Nearest neighbor	Caliper 0.1	Caliper 0.05	Caliper 0.025
I	98.58	12.38	3.58	0.71	-0.50
children	33.54	-5.73	-18.99	-17.18	-21.74
unemp	93.67	21.25	14.01	7.56	2.81
elder	55.43	2.05	-2.22	-1.52	-0.21
disabled	24.28	9.82	-0.07	-3.31	-2.81
Y	10.45	-7.68	-7.87	-11.26	-7.67
density	10.29	0.74	-2.78	-6.99	-7.53
population	25.11	15.00	7.98	2.28	-0.63

as demonstrated by the fewer significant differences in the control variables between the left- and the right-wing group (Table 9) and also by the reduced value of the SB in Table 10 (e.g., by 99 percentage points for the key variable *I*).

To further validate our findings, we have performed two robustness checks in the form of variations of the original PSM quasi-experimental approach. First, we have addressed the fact that the calipers are exogenously defined, showing only four possible outcomes of the analysis. To avoid this limitation, we have plotted in Figure 9 the estimate of the average treatment effect (ATE) provided by PSM as a function of a decreasing caliper width for both (a) *social_average* and (b) *nonsocial_average* expenditures, enveloped by a 95% confidence interval. The evolution of the corresponding *p*-value on the abscissa emphasizes the boundary of statistical significance for the ATE, which for *social_average* is never above 10%. Both the size and the significance of the effect continue to decrease steadily. In contrast, the treatment effect for *nonsocial_average* grows statistically significant with a tightening caliper, surpassing the 5% and 1% level once the caliper size drops below 0.2 and 0.03, respectively. The difference in non-social expenditures remains stable at around 18 euro per capita, corroborating the partisan effects found in this type of departmental outlays and discussed in Section 6.2.

Second, we have performed a cross-sectional analysis (Table 11). This modification is especially important for PSM, since it does not automatically distinguish between the time series of each Department when the observations get matched. Before matching (columns 2 and 5 of Table 11), a series of *t*-tests reveals a statistically significant impact of ideology on social expenditures, in the sense that left-wing governments tend to spend more, but rarely on non-social expenditures. Like before, no significant difference is found with regard to social expenditures in matched Departments (columns 3–4), with the exception of the years 1998–1999 where the ATE is negative, implying that left-wing governments then in fact spent less.

For non-social expenditures the cross-sectional PSM again corroborates the result that left-wing governments spend slightly more (columns 6–7), although only until the 2004–2007 legislature. Overall, the range of results is quite similar to what has been observed with the whole sample in Section 6.2. The discontinuity in results after 2004 may be due to the transfer of competences introducing new mandatory social expenditures (i.e., welfare program for the elderly APA in 2002; social help regime for the unemployed RMI, now RSA, in 2004), which in turn reduced the discretionary power of departmental councils. Figure 3 in Section 4 clearly shows the surges in the number of social beneficiaries and in social spending per inhabitant after 2004 in both left- and right-wing Departments (panels (a) and (b)) and a corresponding marked decrease in non-social spending per inhabitant, particularly in left-wing Departments (panel (d)).

6.4. Comparison of RDD and PSM

Although both regression discontinuity design and propensity score matching are quasi-experimental methods designed to control for the selection bias, they approach the same problem from very different angles. In particular, neither treats the same subsample, nor

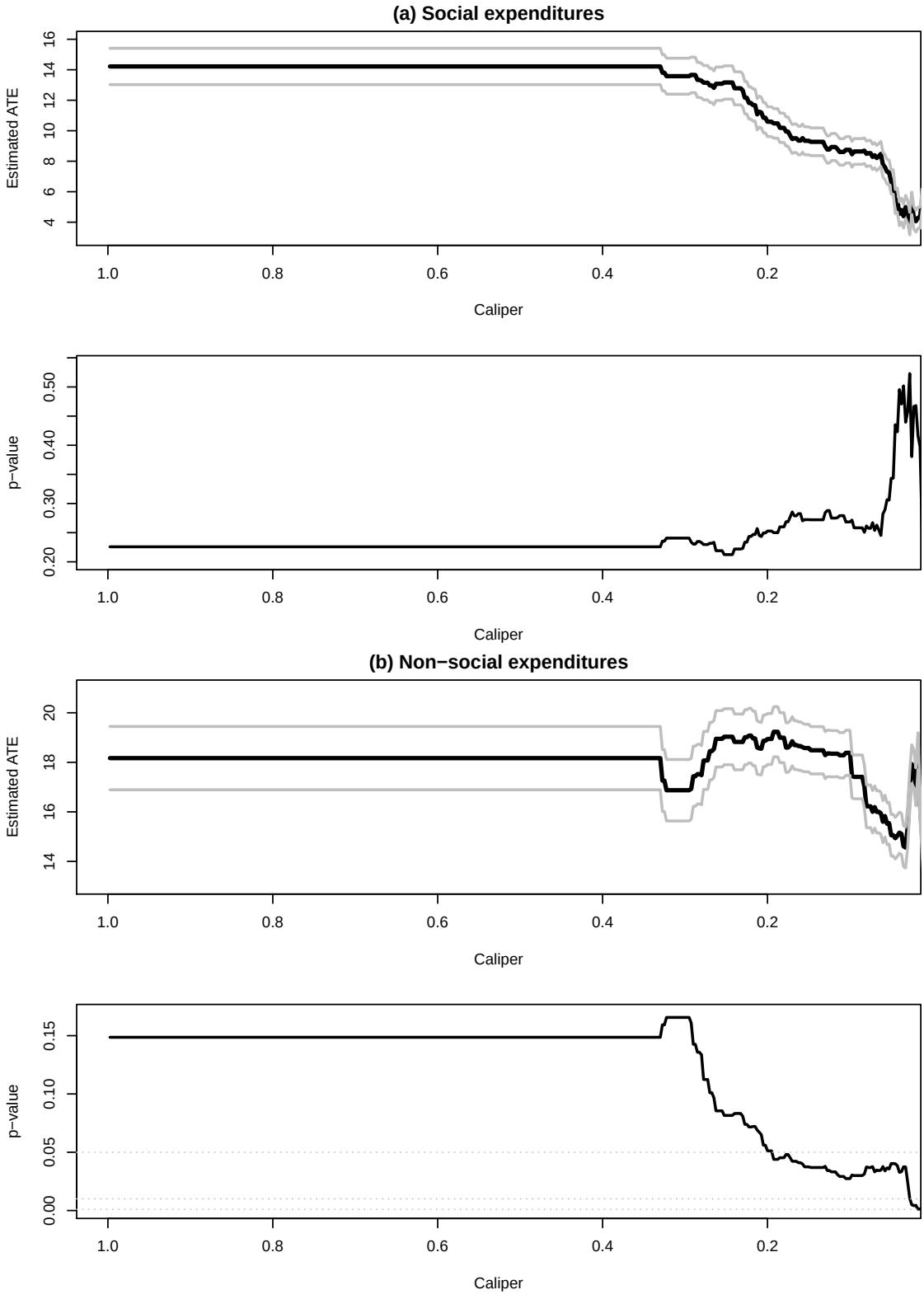

Figure 9. *Propensity score matching: ATE for social and non-social expenditures as a function of caliper size.*

Table 11. PSM – cross-sectional analysis and robustness of the results with respect to electoral years

	social			*nonsocial*		
	Before matching	Caliper 0.1	Caliper 0.05	Before matching	Caliper 0.1	Caliper 0.05
1998	22.972***	-13.514**	-12.631**	17.360*	21.350**	19.870***
1999	21.241***	-19.837***	-17.502***	21.902**	27.233***	25.061***
2000	25.475***	-9.719	-6.954	19.575*	15.816*	15.529**
2001	26.002***	2.105	-1.934	21.409**	31.514***	22.651***
2002	37.152***	5.558	1.807	15.015	25.152**	16.977*
2003	41.125***	5.841	-2.641	14.713	34.910***	25.759***
2004	30.746***	6.751	12.021	0.288	5.883	-2.778
2005	33.887***	9.618	16.206*	0.265	8.244	-0.478
2006	31.593***	9.778	14.100	4.010	2.408	-4.820
2007	30.019***	7.968	13.115	0.031	12.359	5.148
2008	26.379**	3.878	0.069	11.662	6.428	15.595

***, ** and * indicate a significance level of 1%, 5% and 10%, respectively.
Caliper 0.025 was disregarded due to a small remaining sample size ($N = 23$).

do they provide exactly the same results. RDD plots gradually decreasing bandwidths around a threshold at a 50% share of seats, measured by the results of actual elections. PSM instead treats the entire sample, excluding *a priori* only the extreme observations on both sides, i.e., those that exceed the common support area based on a probability of winning the elections, estimated through a logistical regression.

Despite these differences, preceding RDD and PSM analyses yield the conclusion that partisan effects are not apparent in social expenditures, while they amount to around 28.5 and 18 euros, respectively, in non-social expenditures. Figure 10 reiterates our results from Sections 6.1 and 6.2 to show that while within the smallest bandwidth (IK bandwidth of 15.6%; vertical bold lines) RDD deals with only 183 observations, under the tightest caliper (equal to 0.025; gray area) PSM concentrates on 257 matched pairs (squares). Of course, there is a positive relationship between propensity scores and the share of the seats on the left, as depicted by the dashed regression line, but only the observations in the gray field between the thick vertical lines (black points) are always taken into account by both methods. The obvious advantage of PSM is that it does not focus only on the close elections, which allows comparing additional Departments. Furthermore, by controlling the matching directly, we are able to more accurately reduce the observed differences in exogenous variables between the left-wing and right-wing Departments. The assessment of the quality of the RDD and PSM analysis in Section 6.3 shows that the comparison of the groups is better balanced for PSM (Tables 9 and 10), particularly with regard to the key variable I and its components, which is not the case for RDD (Table 8). Because of these results, PSM seems to be the more reliable method in our context of analysis.

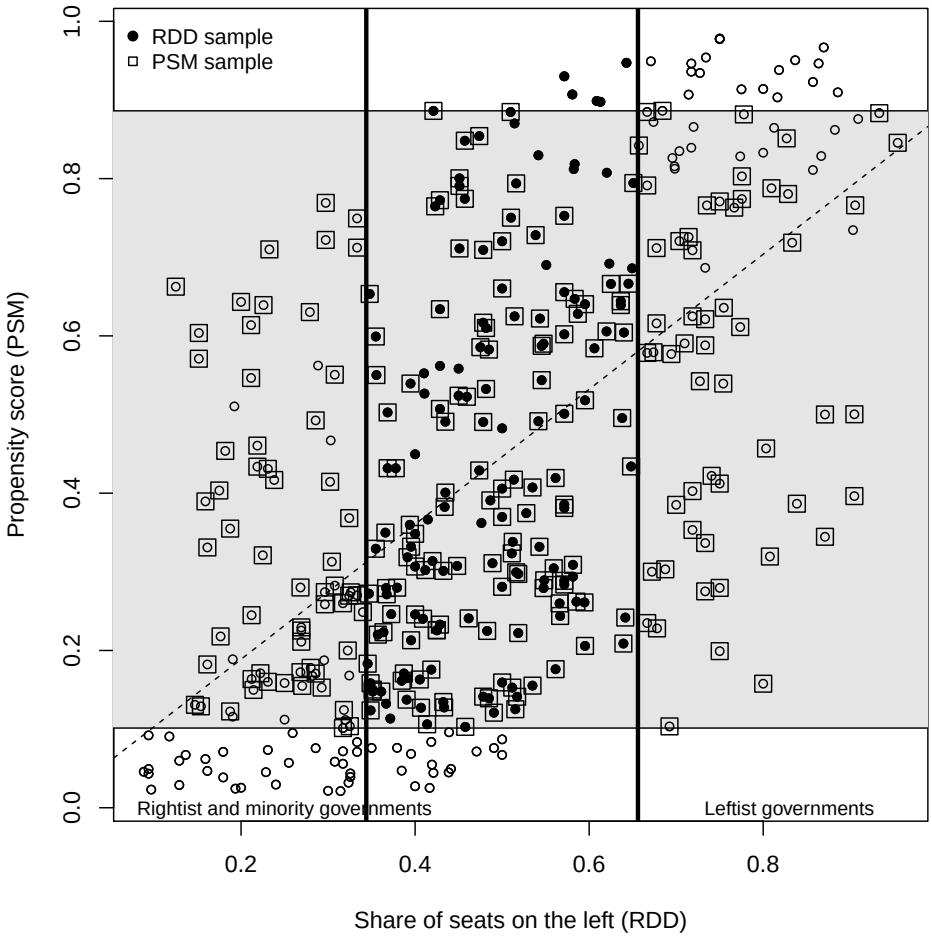

Figure 10. *Comparison of observations taken into account by RDD and PSM.*

7. Conclusion

As Borge and Rattsø (2004) and many others note, it is difficult to ignore the fact that countries characterized by a more equal distribution of income feature greater government spending, notably the Scandinavians countries, while many countries with unequal distributions of income tend to have smaller public sectors, as is the case of many developing countries. This finding squarely contradicts the traditional demand driven explanations, such as the Meltzer-and-Richard hypothesis. The phenomenon is also observed at the local government level in France, where poorer Departments cannot afford to redistribute more despite their higher number of welfare-dependent individuals.

A possible explanation for this counterintuitive result is that individuals in wealthier jurisdictions have a higher demand for redistribution. This would be explained, for instance, by altruism, risk aversion and by the fact that cooperation between the rich and the poor generates other types of benefits to both groups. In such a case, redistribution, and the size of the public sector, would rise with GDP, as any normal good (Wagner's law). But a second alternative explanation might be that inequalities and redistribution should not always be positively correlated, provided that the wealthier class has sufficient political influence. An increase in the number of welfare-dependent people may affect the tax price of the wealthier agents and, to some extent, reduce the demand for public spending. Thus, as suggested in Bénabou (2000), a nonlinear relationship between inequalities and redistribution could be observed.

The problem is all the more complex given that partisan effects may play a significant role as well. In most attempts to test the inequalities-redistributive policies relationship, ideology concerns are excluded from the analysis. The main focus is on a reduced form of the model, i.e., a direct relationship between inequalities and redistribution, without following the other specific channels that the theory nonetheless identifies. In this study we have innovated on this literature by considering both the demand and the supply side of the policy-making process and by distinguishing between social and non-social expenditures. To start, we have provided a theoretical model that generates all the possible interactions between social inequalities, political ideology and policy choices that the literature has identified. Next, the empirical analysis has led to results in line with our theoretical framework.

Our empirical results are threefold. First, inequalities (and partly also per capita income) significantly increase the probability of an electoral victory of a left-wing party. In particular, we have uncovered a positive relationship between government ideology and the share of recipients of social assistance (families with children, unemployed, disabled or elderly people). As an aside, this result reveals the importance of including redistribution aspects when estimating a vote function.

Second, the levels of both social and non-social expenditures per capita have been found to increase with the mean income, but they show a more complex nonlinear relationship when income inequalities are considered. For instance, we find that the higher is the level of inequality, the lower the marginal decrease in social assistance per beneficiary will be. These results may be connected with the fact that the ideology of government changes with the size of income inequalities. In line with Bénabou (2000), at high enough levels of inequality,

recipients of social expenditure programs appear to have a stronger political influence.

Finally, using quasi-experimental techniques, immune to the selection bias problem that plagues empirical analysis in the literature, we have shown that partisan effects disappear in the case of social expenditures once the socio-economic characteristics of each Department are controlled for. Hence a demand side process seems to entirely determine the policy decisions in this expenditure domain. In the case of non-social expenditures, the situation appears more complex: left-wing governments are still observed to spend more on average than their right-wing counterparts and socio-economic variables do not seem to represent a sufficient explanatory factor, as the relatively lower quality of the spending equation model suggests.

Of course, the results were obtained for the particular case of the French Departments and cannot be easily generalized to other types of government levels. Yet, our findings do provide support to the idea that the distribution of voters is a strong determinant of both government ideology and redistribution, and that party control matters mainly because there is a demand for it. Investigating whether the results hold in other countries and at other levels of government offers an interesting agenda for future research.

A. Proof of Proposition 1

The first order-condition is given by $\frac{d\Omega}{dz} = 0$:

$$\Omega' = \theta_1^j \frac{\partial U_1(y_1, z)}{\partial z} - \theta_2^j p_2 \frac{\partial U_2(y_2 - p_2 z, z)}{\partial x} + \theta_2^j \frac{\partial U_2(y_2 - p_2 z, z)}{\partial z} = 0$$

We can figure out the derivatives of z^* with respect to any other exogenous variable, say k, using the implicit function theorem: $\frac{dz^*}{dk} = -\frac{\partial \Omega'/\partial k}{\partial \Omega'/\partial z}$. We have:

$$\frac{\partial \Omega'}{\partial z} = \theta_1^j \frac{\partial^2 U_1}{\partial z^2} - \theta_2^j p_2 \frac{\partial^2 U_2}{\partial x \partial z} + \theta_2^j \frac{\partial^2 U_2}{\partial z^2},$$

which is negative since U_1 and U_2 are concave and their cross partials are assumed to be non-negative.

The partial derivative of Ω' with respect to y_1 is given by:

$$\frac{\partial \Omega'}{\partial y_1} = \theta_1^j \frac{\partial^2 U_1}{\partial z \partial x},$$

which is positive. Hence, we get $dz^*/dy_1 > 0$.

The derivative of Ω' with respect to y_2 is:

$$\frac{\partial \Omega'}{\partial y_2} = -\theta_2^j p_2 \frac{\partial^2 U_2}{\partial x^2} + \theta_2^j \frac{\partial^2 U_2}{\partial z \partial x},$$

which is positive. We have $dz^*/dy > 0$.

The derivative of Ω' with respect to p_2 is:

$$\frac{\partial \Omega'}{\partial p_2} = -\theta_2^j \frac{\partial U_2}{\partial x} + \theta_2^j (p_2)^2 \frac{\partial^2 U_2}{\partial x^2} - \theta_2^j p_2 \frac{\partial^2 U_2}{\partial z \partial x},$$

which is negative. We get $dz^*/dp_2 > 0$.

The derivative of Ω' with respect to θ_1 is:

$$\frac{\partial \Omega'}{\partial \theta_1^j} = \frac{\partial U_1(y_1, z)}{\partial z},$$

which is always positive. We have $dz^*/d\theta_1 > 0$.

The derivative of Ω' with respect to θ_2^j is:

$$\frac{\partial \Omega'}{\partial \theta_2^j} = -p_2 \frac{\partial U_2}{\partial x} + \frac{\partial U_2}{\partial z},$$

i.e., we have $dz^*/d\theta_2 < 0$ iff $\frac{\partial U_2}{\partial z} < p_2 \frac{\partial U_2}{\partial x}$, which is true given the first-order condition.

Last, since $p_2 = \frac{cN^\alpha}{n_2}$, the sign of the derivative with respect to n_1/N, α and c is directly given by the sign of dz^*/dp_2.

B. Principal component analysis of the French political spectrum

Principal Component Analysis (PCA) has been implemented to identify the link between inequalities, the share of seats held by extreme parties, and those held by mainstream center-left, center-right and centrist coalitions (see Table B3).

The advantage of implementing PCA is that it reduces the multidimensionality of the problem to a two-axis dimension. Figure B1 shows the relationship between the shares of seats and the inequality variables (*unemp*, *children*, *disabled*, *elder*). The first two dimensions sum up almost 50% of the total inertia. Consequently, the PCA illustration can be readily interpreted. The first component (horizontal axis) represents most information and is in line with our analysis. It opposes the far-right, the center-right and centrist parties with both the center-left and far-left parties. The construction of the variable $L_{i,t}$ is based on this opposition. This dimension is linked to the inequality variables in particular, as illustrated by the correlation of each variable with the first dimension:

Table B1. Correlation with the first axis

far.left	center.left	center	center.right	far.right	children	unemp	elder	disabled
0.409	0.776	-0.618	-0.658	-0.064	0.339	0.590	0.576	0.446

The second component (vertical axis) reveals that the political converse spectrum is even more complex. There is an opposition between (1) Departments with a high unemployment rate (south quadrant), urban jurisdictions for the most part, and (2) Departments with a high share of elderly and disabled people who benefit from social assistance (north quadrant), mainly rural:

Table B2. Correlation with the second axis

far.left	center.left	center	center.right	far.right	children	unemp	elder	disabled
-0.302	-0.197	-0.355	0.582	-0.320	0.069	-0.463	0.654	0.659

Table B3. Political parties on the left, center, and right[a]

$L_{i,t} = 1$	*Far.left* – share of seats in the council held by far-left parties PRG, CAP, Les Alternatifs, PC/PCF, Parti de gauche, PT. *Centre.left* – share of seats in the council held by center-left parties ADS, MDC, MRC, Majorité Présidentielle, PS, ADD, MDR, GE, MEI, Les verts, Ecologie, Europe-écologie les verts, CAP21.
$L_{i,t} = 0$	*Centre* – share of seats in the council held by centrist parties UDF - PSD, UDF radical, PRV, UDF-CDS, UDF-PR, UDFP et R, UDF, MODEM, Alliance centriste, NC. *Centre.right* – share of seats in the council held by center-right parties RPR, UDI, MPF, DL, RPF, UMP, PCD. *Far.right* – share of seats in the council held by far-right parties CNPT, CNI, CNIP, FN, Alsace d'abord, DLR, LDS, Unser Land.

[a] Some of the candidates were independent, i.e., did not belong to a political party. However, we knew the ideology of these independent candidates, i.e., far left-wing, left-wing, right-wing or far right-wing.

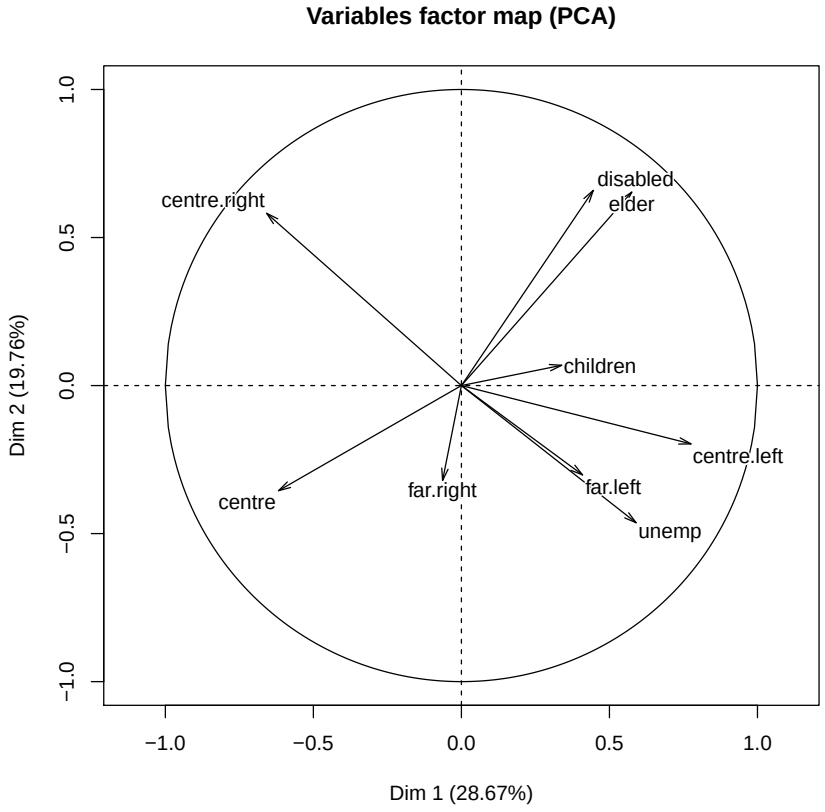

Figure B1. *Correlation between inequalities and the share of seats of centrist and extreme parties.*

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