

Electoral Mechanisms and Pressure Groups: The Mix of Direct and Indirect Taxation

Gianluca Fiorentini*

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*Dipartimento di Scienze Economiche
University of Bologna

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Address for correspondence:

Prof. Gianluca Fiorentini
Università degli Studi di Bologna
Dipartimento di Scienze Economiche
Piazza Scaravilli, 2
40126 Bologna
Italy
Phone: +51+258135
Fax: +51+258040
E-mail: fiorentini@ecn01.economia.unibo.it

Le opinioni espresse nel presente lavoro non rappresentano necessariamente
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SUMMARY

This paper describes the fiscal structure of a community as an equilibrium of a non-cooperative game where members of different pressure groups - characterised by conflicting interests - compete to get distributive gains. Their interaction is regulated by a constitution which sets the electoral rules and the institutional framework in which pressure groups' activities take place. We focus on how the equilibrium mix of direct and indirect taxation is determined in a community divided into two groups working in different sectors which we label regular and shadow sectors, respectively. Our main aim is to investigate the relations between the relative scale of the shadow sector, the fiscal equilibrium between direct and indirect taxation, and the constitutional setting. In this respect we show that the constitutional settings in which the main legislative body is chosen through a strictly proportional electoral rule tend to determine a fiscal equilibrium with a greater emphasis on direct taxation and this in turn gives greater incentives to enlarge the shadow sector. The paper provides empirical evidence on 21 OECD countries for the period 1970-90 on the relevance of the features of the electoral mechanisms on the fiscal mix between direct and indirect taxation.

NON TECHNICAL SUMMARY

In the analysis of collective decision making, welfare economists are generally reluctant to tackle the issue of the electoral and legislative equilibria which underlie the definition of policy rules. This is because they assume that such rules should be chosen following a metric for interpersonal comparisons of utility alternative to that given by the political process. By doing so they propose normative evaluations which cannot be usually implemented through the existing institutional setting. In this respect a conceptual shift is necessary in order to investigate the feasibility of fiscal rules with respect to a given constitutional setting and to discuss the consequences of changes in constitutional rules.

In this paper the fiscal mix between direct and indirect taxation is analysed as an equilibrium of a non-cooperative game where members of pressure groups compete at the legislative level to get distributive gains. Their choice of participation in the activity of pressure groups is constrained by a set of constitutional rules which are embodied in a reduced-form model of electoral competition. Focusing on the relations between different institutional settings of the political mechanism and the features of the fiscal equilibrium we move the analysis from the design of fiscal rules to that of constitutional rules.

Our major results are as follows. First, when constitutional rules are such as to enforce a ban on pressure groups' activity, fiscal rules are strictly determined by the features of the electoral rules for the legislative body. The higher is the comparative disadvantage for small groups to reach political representation in the legislative body, for instance because of highly disproportional electoral rules, the better off are the members of larger groups who are better represented in the collective decision mechanism. Second, when the transaction costs are low enough as to allow for pressure groups' activity, small groups have a comparative advantage in supplying contributions to pressure groups and can shift the fiscal equilibrium to their advantage. If the agents in the regular sector are the larger group this means that, when pressure groups are active, the fiscal equilibrium shifts in favour of the agents in the shadow sector. Third, such comparative advantage of smaller groups is reduced if there is the possibility to undertake binding agreements inside the groups in order to co-ordinate the supply of contributions.

Most of these results have been confirmed by an empirical test of our model. In this respect we have seen that, since the two groups under observation are encompassing ones, they are unlikely to reach cooperative agreements for the production of political pressure. It follows that agents in the shadow sector, which can minimise the effects of opportunistic behaviour in the political arena, are able to obtain fiscal equilibria which rely more heavily on income taxation than on expenditure taxation. Moreover, we have seen that the features of the electoral rules for the legislative body are indeed relevant variables in shaping the fiscal equilibrium. More specifically our results show that the index of disproportionality of the electoral rules is not a proper measure of the comparative disadvantage to reach direct political representation for agents in small groups. A much more effective measure is given by the index of concentration (an inverse measure of fractionalisation) of the legislative body.

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1 Introduction

This paper describes the fiscal structure of a community as an equilibrium of a non-cooperative game where members of different pressure groups - characterised by conflicting interests - compete to get distributive gains. Their interaction is regulated by a constitution which sets the electoral rules and the institutional framework in which pressure groups' activities take place. More specifically, we focus on how the equilibrium mix of direct and indirect taxation is determined in a community divided into two groups working in different sectors which we label *regular* and *shadow* sectors, respectively. In the regular sector agents are subjected both to income and to expenditure taxation while the agents in the shadow sector are subjected only to expenditure taxation.¹ However, we are not interested in the analysis of fiscal evasion in the shadow sector, and we ignore the analysis of agents' behaviour in violation of fiscal rules - taking it as given for technological reasons (e.g. excessively high costs of enforcement) - in order to concentrate on their behaviour in the legislative competition from which the fiscal rules emerge.

Our main aim is to investigate the relations between the relative scale of the shadow sector, the fiscal equilibrium between direct and indirect taxation, and the constitutional setting through which any legislation - including the fiscal one - goes. Our main result in this respect is that those constitutional settings in which the main legislative body is chosen through a strictly proportional electoral rule tend to determine a fiscal equilibrium with a greater emphasis on direct taxation and this in turn gives greater incentives to enlarge the shadow sector. As we shall see such result seems to be supported from the empirical evidence that we have collected.

In the analysis of collective decision making, welfare economists are generally reluctant to tackle the issue of the electoral and legislative equilibria which underlie the definition of policy rules. This is because they assume that such rules should be chosen following a metric for interpersonal comparisons of utility which is wholly alternative to the one generated by the political process². By doing so they propose normative evaluations which cannot be usually implemented through the existing institutional setting. The latter, in fact, embodies a metric

¹ We will see in section 6 that in order to test the main implications of the model, and only with reference to fiscal issues, we will approximate the regular sector with the employees and the shadow sector with the self employed.

² See Coleman (1990) ch. 16.

described in the constitutional rules which set a given distribution of rights and defines inter-personal comparisons of utility which must take these rights into account. To investigate how the above distribution of rights occurs in the electoral-legislative mechanisms one needs a shift towards a positive approach to constitutional economics. Such a shift is necessary in order to investigate the feasibility of fiscal rules with respect to a given constitutional setting and to discuss the consequences of changes in constitutional rules³.

In section 2 the basic elements of the model are shown, and the main features of the fiscal equilibria are analysed in a general setting. In order to introduce the reader to the analysis of the model for specific functional forms, section 3 investigates the working of the electoral model in absence of pressure groups' activity. Section 4 then introduces such activity in the case in which decentralised agents are unable to undertake binding commitments in contributing to pressure groups. Such section allows to determine the extent of the comparative advantage enjoyed by agents in the shadow sector in the competition between pressure groups. A more closer analysis of the sources of such comparative advantage is attempted in section 5 which investigates the alternative framework in which cooperative agreements are assumed possible as it is the case when well-established political organisations are at work. Section 6 shows the main findings of an empirical test of the model on the fiscal structure of 21 OECD countries. Section 7 summarises the main results.

2 The basic model

We consider a community made up of a finite number (N) of agents exogenously distributed into two groups. Agents in sector b work in the shadow (*black*) sector of the economy where they pay no income taxes, whereas agents in group r work in the *regular* sector where such taxation is enforced. There is no mobility across sectors. Both types of agents are subjected to the same expenditure taxation. To rationalise this situation one can think that in the labour market the contractual agreements undertaken in sector r allow for fiscal inspections at zero cost while

³ Moreover, this approach gives the opportunity to investigate the economic implications of the convertibility between economic resources and political rights which has been a central issue in the normative analysis of collective decision making. Coleman (1990) and Wittman (1989) strongly support vote trading schemes.

monitoring costs are infinite in sector b .

In both private sectors the same homogeneous commodity - whose price is normalised to one - is produced. Such commodity is produced using the following linear technology:

$$Q = n_r l_r + n_b l_b \quad (1)$$

where n_i is the number of agents active in each sector, l_i is their exogenous labour supply ($i=r,b$), Q is the total output. The net equilibrium wage in the regular sector is equal to the value of the labour's marginal productivity $w_r = (1 - t_l)$ where t_l is the tax rate on labour income. The output can be either consumed or invested in contributions to pressure groups.

Assuming that the investment in contributions to pressure groups, as well as the direct consumption, is subjected to expenditure taxation, the fiscal constraint can be written as:

$$T = t_l l_r n_r + t_y [l_b n_b + (1 - t_l) n_r l_r]$$

where t_y is the tax rate on expenditures and T is the exogenously given level of fiscal revenue to be collected. Since T is exogenous, the above expression for the fiscal constraint can be written as:

$$(1 - t_y) = \frac{Y}{L_r(1 - t_l) + L_b}$$

where $Y=Q-T$ is the disposable aggregate income gross of the contributions to pressure groups, and $L_i = l_i n_i$.

At this stage, the prevalent procedure to determine the fiscal equilibrium is to assume that a collective objective function is maximised under different constraints. To underline the fact that the community has no goals of its own we prefer to reverse such procedure. The approach to the analysis of the political equilibrium shown in Fiorentini (1993) is centred on the behaviour of pressure groups' members in the competition between pressure groups where such groups' activities are constrained by a given constitutional setting⁴. Under the assumptions introduced in Fiorentini (1993) in such a model of political equilibrium the candidates for the executive

⁴ See Fiorentini (1993) for a more detailed description of such approach.

office choose their policy proposals as if a policy-maker were maximising the following fictitious (Nash bargaining) function:

$$t_l = \operatorname{argmax} \sum_{i=1}^m a_i \sum_{j=1}^{n_i} \log(U_{ij}(t_l)) \quad (2)$$

with

$$a_i = \frac{1}{n_i} \frac{n_i^\gamma \sum_{j=1}^{n_i} s_{ij}}{\sum_{i=r,b} \sum_{j=1}^{n_i} n_i^\gamma s_{ij}} \quad \text{and} \quad \sum_{i=r,b} n_i a_i = 1$$

where, at the threat point, agents are characterised by zero utility⁵, s_{ij} is the investment in pressure groups' activities of agent j in group i and $1 > \gamma > 0$ is the degree of disproportionality of the legislative system.⁶ In what follows we assume that the candidates in the electoral competition ignore the individual contributions made by individual agents, and treat them as if they all make the same average contribution (\bar{s}_i). Accordingly, the problem faced by a representative agent j of group i in the game between members of different pressure groups, can be written as follows⁷:

$$\operatorname{Max}_{s_{ij} \in S_{ij}} U_{ij} = U((1 - t_l)(1 - t_y)L_r - c(s_{ij})) \quad \forall j \quad (3)$$

$$\text{s.t.} \quad t_l = \operatorname{argmax} C = \frac{n_r^{\gamma+1} \bar{s}_r \log U((1 - t_l)(1 - t_y)L_r - c(\bar{s}_r))}{n_r^{\gamma+1} \bar{s}_r + n_b^{\gamma+1} \bar{s}_b} + \frac{n_b^{\gamma+1} \bar{s}_b \log U((1 - t_l)(1 - t_y)L_b - c(\bar{s}_b))}{n_r^{\gamma+1} \bar{s}_r + n_b^{\gamma+1} \bar{s}_b} \quad (3a)$$

$$t_y = \frac{T - t_l L_r}{L_r(1 - t_l) + L_b} \quad (3b)$$

In (3) U_{ij} are assumed to be defined, continuous, and bounded for $\forall s_{ij} \in S_{ij}$, where $S_{ij} \subseteq R$ is a compact and convex set for $\forall i, j$. Moreover, $c(s_i)$, with $c' > 0$, and $c'' > 0$, indicates the transaction

⁵ This can be justified by assuming that agents face very high costs in exiting the community.

⁶ See Appendix 2 for clarifications on the use of such index.

⁷ A generic agent j in sector b is faced by a slightly different objective function (3) in which $t_l = 0$.

costs for unit of contributions to a pressure group⁸. The features of the above cost function become then the second constitutional element - other than the features of the electoral rules for the legislative body - on which the normative analysis can focus upon.

The constraint (3a) shows how the individual maximisation problem is linked with the constitutional and legislative rules for collective decision making. In adopting it, we want to stress that electors (members of pressure groups), and not politicians or benevolent dictators are the ultimate principals in the collective decision mechanism, though they are subjected to the constitutional constraints embodied in (3a). In the welfare economics approach to public decision making, (3a) represents the collective objective function and (3) represents the incentive compatibility constraint. Indeed, such format could also be adopted here, where the possibility for decentralised agents to act through contributions to pressure groups results in an additional constraint for the public decision maker. However, such a format would obscure the strategic elements introduced by (3a) in the decentralised agents' choice of contributing to their pressure groups. In our model the constitutional constraint in (3a) dictates the institutional constraint of the distributive game where major elements in shaping the equilibrium outcomes are also the notion of equilibrium adopted and the possibility of coordination within each sector.

Our approach, therefore, allows one to characterise the fiscal rules with respect to changes in the following exogenous variables: 1) the individual labour supplies of the decentralised agents, 2) the distribution of such agents across sectors, 3) the features of the electoral rules for the legislative body, and 4) the constitutional rules which regulate the investment in contribution to pressure groups, imposing higher or lower transaction costs on participating to pressure groups' activities. On the other hand, the model determines endogenously the level of contributions to each pressure group, the fiscal rules, and the relative after-tax allocations.

We first deal with a generic form of the utility function in (3) trying to determine a few general features of the equilibrium in the contributions to pressure groups. In the following

⁸ The larger $c''(s_i)$, the more costly for the individual agent to increase his investment in political pressure and this reflects the presence of stricter rules which makes it incrementally more difficult to transform economic resources into political rights.

sections we will adopt a more specific form of the utility function in order to derive further results. The necessary condition for an equilibrium in the electoral competition is:

$$n_r^{\gamma+1} \bar{s}_r \left(\frac{\partial U_r}{\partial t_l} U_b \right) - n_b^{\gamma+1} \bar{s}_b \left(\frac{\partial U_b}{\partial t_l} U_r \right) = 0 \quad (4)$$

Expression (4) allows us to characterise the relation between the fiscal policy chosen at the electoral equilibrium and the fundamentals of the model. Implicitly differentiating (4) we can get the following comparative statics results:

$$\begin{aligned} \frac{dt_l}{dn_r} < 0 \quad , \quad \frac{dt_l}{dn_b} > 0 \quad , \quad \frac{dt_l}{dl_r} > 0 \quad , \quad \frac{dt_l}{dl_b} < 0 \quad , \\ n_r \gtrless n_b \quad \Rightarrow \quad \frac{dt_l}{d\gamma} \lessgtr 0 \quad , \quad n_r \gtrless n_b \quad \Rightarrow \quad \frac{dt_v}{d\gamma} \gtrless 0 \quad , \\ \frac{dt_l}{d\bar{s}_r} < 0 \quad , \quad \frac{d^2 t_l}{d\bar{s}_r^2} > 0 \quad , \quad \frac{dt_l}{d\bar{s}_b} > 0 \quad , \quad \frac{d^2 t_l}{d\bar{s}_b^2} < 0 \end{aligned}$$

First, an increase in the number of agents active in a given group decreases the fiscal burden for agents in that group. Second, an increase in the exogenous labour supply of members of a given group worsens the fiscal equilibrium for agents in that group. Third, an increase in the individual contribution to a given pressure group's activity leads to a more favourable fiscal equilibrium for agents in that group. Fourth, an increase in γ makes, *coeteris paribus*, heavier (lighter) the fiscal burden for agents in the smaller (larger) group.

Let us now go back to the analysis of how the chosen policy affects the utility function of individual members of the pressure groups. We pursue this analysis at a general level mainly to show how the organisational and institutional effects examined in Fiorentini (1993) can be isolated in this case. In order to understand the incentives for agents in different groups to invest in pressure groups we observe that:

$$\frac{\partial U_r}{\partial t_l} = U'_r(.) \left(\frac{-L_b l_r Y}{D} \right) < 0 \quad \frac{\partial U_b}{\partial t_l} = U'_b(.) \left(\frac{L_r l_b Y}{D} \right) > 0 \quad (5)$$

where $D = L_r(1 - t_l) + L_b$. From the two expressions in (5) one can notice that, if the utility functions are the same across sectors, workers in the larger sector are characterised by a lower marginal utility from a variation of t_l because - irrespective of the sign of such variation - the

change in the fiscal mix ($T = \bar{T}$ brings about effects which are shared by a greater number of agents). In what follows (see comments on proposition 2.4(N)) we investigate the effects of this phenomenon on the difference between individual contributions to pressure groups across sectors of different size. From (5) we can derive further features of the relation between t_i and the utility functions:

$$\frac{\partial^2 U_r}{\partial t_i^2} = U''_{rr}(\cdot) \left(\frac{-L_h l_r Y}{D^2} \right) + U'_{rr}(\cdot) \left(\frac{-2L_h L_r l_r Y}{D^3} \right) \quad \frac{\partial^2 U_h}{\partial t_i^2} = U''_{hh}(\cdot) \left(\frac{L_r l_h Y}{D^2} \right) + U'_{hh}(\cdot) \left(\frac{2L_r L_h l_h Y}{D^3} \right) \quad (6)$$

Two cases must be distinguished. First, when $U''=0$, that is agents are interested in maximising their net consumption, the utility of the agents in the regular (black) sector is concave (convex) in t_i . Second, if $U''<0$ the utility of agents in both sectors can be either concave or convex in t_i depending on the on degree of concavity of the utility functions.

We are now in the position to analyse the equilibrium in the competition between pressure groups to get favourable legislation. The necessary conditions for an equilibrium for agents in the two groups are as follows⁹:

$$F_r = U'_{rr}(\cdot) \left(\frac{-\partial t_i}{\partial s_r} \frac{1}{n_r} \frac{l_r L_h Y}{D^2} - c'(s_{rj}) \right) = 0 \quad F_h = U'_{hh}(\cdot) \left(\frac{\partial t_i}{\partial s_h} \frac{1}{n_h} \frac{l_h L_r Y}{D^2} - c'(s_{hj}) \right) = 0 \quad (7)$$

In order to define the features of the equilibrium we need to derive the sufficient conditions for a maximum:

$$F_{rr} = U''_{rr}(\cdot) + U'_{rr}(\cdot) \left(\left(\frac{-\partial^2 t_i}{\partial s_r^2} - \frac{2L_r}{D} \left(\frac{\partial t_i}{\partial s_r} \right)^2 \right) \frac{Y l_r L_h}{n_r^2 D^2} - c''(s_{rj}) \right) \quad (8)$$

$$F_{hh} = U''_{hh}(\cdot) + U'_{hh}(\cdot) \left(\left(\frac{\partial^2 t_i}{\partial s_h^2} - \frac{2L_r}{D} \left(\frac{\partial t_i}{\partial s_h} \right)^2 \right) \frac{Y l_h L_r}{n_h^2 D^2} - c''(s_{hj}) \right)$$

⁹ In this section we do not analyse the possibility of corner solutions. For a justification of our choice, see the discussion in Fiorentini (1993).

different role of income and expenditure taxation can be better seen when no distributive concerns ($l_r=l_b$) are at work. In such a case only expenditure taxation is used in order to collect T ($t_l=0$ and $t_y=(T/Q)$).

Proposition 3.1. The electoral equilibrium in the regulated setting is such that:

$$\begin{aligned} \gamma > 0 \quad , \quad n_r \geq n_b \quad &\Rightarrow \quad U_r \geq U_b \\ \gamma = 0 \quad , \quad &U_r = U_b \quad \forall n_r, n_b \end{aligned} \quad (14)$$

Proof. Substituting (13) into (12) we get:

$$U_i = \frac{Y n_i^\gamma}{n_i^{\gamma+1} + n_k^{\gamma+1}} \quad i \neq k = r, b \quad (15)$$

from which the proposition follows. #

Differences in the equilibrium consumption levels depend only on how agents are distributed across sectors and on the features of the electoral rule for the legislative body¹¹. Notice that when agents are divided equally among groups ($n_r=n_b$), for all values of γ , incomes are equated.

When the convertibility between economic resources and political pressure is closely regulated as in the present setting, and for given n_r and n_b , the equilibrium allocation is uniquely determined by the features of the electoral rules of the legislative body. Hence, the analogy of this regulated political setting with a non-fungible voting system (where no pressure groups activity is allowed) becomes closer. The results obtained in this section in which decentralised agents cannot express the intensity of their preferences through the competition between pressure groups, are now compared with the different settings under which such competition can take place.

4 Non-cooperative political activity

Let us now assume that the ban on the decentralised investment in contributions to pressure groups cannot be enforced effectively. Therefore, agents in both sectors solve the maximisation

¹¹ Notice that for $\gamma=0$, (14) describes the equilibrium utilities even for $n_r \neq n_b$ because the constitutional constraints becomes equivalent to a standard Benthamite social welfare function.

problem in (3) knowing that the institutional setting is as described in (2). Assuming that the cost function is quadratic ($c(s_{ij}) = c s_{ij}^2$), and proceeding as in the previous section, we get the tax rates determined by the working of the electoral mechanism for given levels of contributions to the activity of pressure groups:

$$(1 - t_i) = \frac{l_b \bar{s}_r (Y n_r^\gamma - c n_b \bar{s}_b A)}{l_r \bar{s}_b (Y n_b^\gamma + c n_r \bar{s}_r A)} \quad (16)$$

$$(1 - t_j) = \frac{\bar{s}_b (Y n_b^\gamma + c n_r \bar{s}_r A)}{l_b (n_b^{\gamma+1} \bar{s}_b + n_r^{\gamma+1} \bar{s}_r)}$$

where $A = n_r \bar{s}_b - n_b \bar{s}_r$, and where the tax rates are now functions of the average supply of contributions to pressure groups (\bar{s}_i). If the average contribution is the same across sectors, the fiscal equilibrium in (16) does not differ from that in (13). More generally, the introduction of decentralised supply of contributions to pressure groups shifts the fiscal equilibrium to the advantage of the group which is characterised by a larger average supply.

Plugging (16) into the utility functions allows one to write the net incomes of agents in both sectors as functions of their average contributions to pressure groups:

$$U_{ij} = \frac{n_i \bar{s}_i (Y - c(n_i \bar{s}_i^2 + n_k \bar{s}_k^2)) + n_k \bar{s}_k c(\bar{s}_i^2 - \bar{s}_j^2)}{n_i^{\gamma+1} \bar{s}_i + n_k^{\gamma+1} \bar{s}_k} \quad i \neq k = r, b \quad (17)$$

The role that the pressure groups' contributions play through the fiscal mechanism should now be clearer. Let us assume that $s_{ij} = \bar{s}_i$ and that $\gamma = 0$. In such a symmetric case with a purely proportional electoral mechanism, the individual utilities become the proportion of the overall income Y equal to the average share of each group's overall contributions. If such contributions are equal across agents in different groups, each agent gets an equal proportion of the aggregate net income¹². On the other hand if γ increases, the agents working in the larger sector, *coeteris paribus*, get larger utilities through the working of the fiscal mechanism. More generally, the latter term in (17) measures the gains from the opportunistic behaviour inside the pressure groups which is larger the greater the difference between the individual and the average contribution.

¹² In this respect one can interpret the investment in contributions to pressure groups as an investment in shares of the social capital, whose ownership allows to increase the control over the collective decisions. Compare this notion with that of social capital used in Coleman (1990).

Under the assumption of Nash conjectures with respect to the decisions of both the n_i-1 agents in the same sector and the agents in the other sector, from (17) the following necessary condition (for agents in sector i) are derived¹³:

$$\frac{n_i^{\gamma-1} n_k^{\gamma+1} \bar{s}_k (Y - c(n_k \bar{s}_k^2 + n_i \bar{s}_i^2))}{(n_k \bar{s}_k^{\gamma+1} + n_i \bar{s}_i^{\gamma+1})^2} - 2c s_{ij} = 0 \quad i \neq k = r, b \quad (18)$$

In (18) the marginal cost of contributing to the activities of pressure groups is equated to its marginal revenue¹⁴. Imposing symmetry within each sector after this point, the individual contribution to pressure groups:

$$s_i^N = \left(\frac{Y n_i^{\gamma-2} n_k^\gamma}{c B} \right)^{1/2} \quad i \neq k = r, b \quad (19)$$

where $B = (n_i^{\gamma-1} n_k^{\gamma-1} N + 2(n_k^\gamma + n_i^\gamma)^2)$ and the subscript j is no longer needed. From (19) it is easy to check that, for any γ :

$$s_i^N = s_k^N (n_k/n_i) \quad i \neq k = r, b \quad (20)$$

In (20) the asymmetry in the contributions to pressure groups across groups is due to the co-existence of the organisational and institutional effects. From the equilibrium conditions in (18) one gets a better idea of the reason for the organisational effect. A marginal increase of the contribution of agent j in sector i increases also the denominator in the LHS of (18) proportionally to the number of agents active in sector i . Therefore the marginal benefits from such investment for agents in the smaller groups falls much more slowly than those in the larger one, while the

¹³ The equality in (18) holds for large n_i for which is, reasonable to assume that n_i approximates n_i-1 . For the reasons given in Fiorentini (1993), we do not analyse here the possibility of corner solutions.

¹⁴ Differentiating (18) with respect to s_{ij} , it is easy to check that U_i is concave (and therefore also quasi-concave) in s_{ij} and therefore satisfy such a condition for the existence of Nash equilibria.

marginal cost is equal across groups. What increases the individual consumption is the proportion of contributions held by the group as a whole, so that at the margin, agents in the smaller group are in a better position to increase such proportion¹⁵.

Proposition 4.1. $\partial s_i / \partial \gamma \leq 0 \quad i = r, b$

Proof. By differentiation of (19).#

The relation in proposition 4.1 holds with strict equality when $n_r = n_b$. An institutional setting which increases the comparative disadvantage to reach direct political representation for small groups decreases the incentives to supply contributions. The more so the more uneven is the distribution of agents across groups. This inverse relation between γ and the individual supply of contributions to pressure groups is true for agents in both sectors and does not change the fact that agents in the minority group invest more heavily in contributions. What changes is the absolute amount of income which is converted into contributions.

The most direct way to see how the distribution of agents and of shares of contributions affects the fiscal equilibrium is to substitute (19) into (16) so that the equilibrium tax rates become:

$$(1 - t_l^N) = \frac{l_b n_r^{\gamma-2} (n_r B - n_b^{\gamma-1} C)}{l_r n_b^{\gamma-2} (n_b B + n_r^{\gamma-1} C)} \quad (21)$$

$$(1 - t_y^N) = \frac{n_b^{\gamma-2} Y (n_b B + n_r^{\gamma-1} C)}{l_b B (n_r^{\gamma} + n_b^{\gamma})}$$

where $C = n_r^{\gamma+1} - n_b^{\gamma+1}$.

Proposition 4.2. $n_r \gtrless n_b \Rightarrow t_l^N \gtrless t_l^R \quad \text{and} \quad t_y^N \gtrless t_y^R$

Proof. By comparing (13) and (21).#

For $n_r = n_b$, the regulated and non-cooperative regulated settings do not give rise to any difference as for the fiscal equilibrium. This is because in this specific case the equilibrium supply of

¹⁵ In other words, when agents in the larger group convert a marginal unit of income into contributions to pressure groups, they generate aggregate benefits which are shared by a larger number of agents and therefore are individually lower.

contributions does not differ between agents of different groups and the distributive implications do not differ from those in the previous section. However, in the more general case of uneven distribution of agents across sectors, for any given γ , the fiscal equilibrium under a non-cooperative setting is more favourable to agents in the smaller group than that under the regulated setting.

Proposition 4.3. The electoral equilibrium in the non-cooperative setting is such that:

$$n_r^{\gamma-1} \gtrless n_b^{\gamma-1} \quad \Rightarrow \quad U_r \gtrless U_b \quad (22)$$

Proof. Substituting (19) into (16) we get:

$$U_i = \frac{Y n_i^{\gamma-1}}{(n_i^\gamma + n_k^\gamma)} \left(\frac{2(n_i^\gamma + n_k^\gamma)^2}{n_i^{\gamma-1} n_k^{\gamma-1} + 2(n_i^\gamma + n_k^\gamma)^2} \right) \quad i \neq k = r, b \quad (23)$$

from which the proposition follows. #

For any given level of γ , agents in the smaller group are better off than those in the larger one in the non-cooperative setting because of the institutional and organisational effects in the contribution to the activity of pressure groups. The utility level reached in (23) is univocally smaller than that obtained in equilibrium in the regulated setting in (14), due to the wastefulness of the contributions to pressure groups. The above results allow us to draw some constitutional implications for the fiscal structure under the assumption that $n_r > n_b$.

First, the above model of competition between pressure groups shows that when non-cooperative agents freely supply contributions to pressure groups, the resulting fiscal equilibrium is shifted to the advantage of those working in the shadow sector. This having as a benchmark the regulated setting examined in the previous section, and keeping constant the features of the electoral rules for the legislative body. Second, such bias of the fiscal equilibrium in favour of those working in the shadow sector decreases as the electoral rules increase the costs for small groups to reach representation in the legislative body. Third, as we noticed in the end of section 2, the supply of contributions to pressure groups is negatively affected by the degree of convexity of the transaction cost function, (which is here assumed to be quadratic), but not by the parameter c .

5 Cooperation within pressure groups

In this section agents in each group can costlessly coordinate their actions, as it is approximately the case when well-rooted political institutions - unions, lobbying organisations, or political parties - are at work. As a consequence, we assume that agents maximise the group utility function with respect to their own individual contributions. Following the steps described in section 4, the new individual contribution to pressure groups becomes:

$$s_i^C = \sqrt{\frac{Y n_i^{\gamma+1/2} n_k^{\gamma+3/2}}{2c B'}} \quad i \neq k = r, b \quad (24)$$

where $B' = n_i^{\gamma+3/2} n_k^{\gamma+3/2} + (n_k^{\gamma+1/2} + n_i^{\gamma+1/2})^2$. The main features of the non-cooperative supply functions are preserved when the cooperative investment is analysed. As before, the supply of contributions to pressure groups is inversely related to γ and the marginal transaction costs, while it depends positively on the overall disposable income Y . An interesting implication of (24) is that:

$$s_i = s_k \sqrt{(n_k/n_i)} \quad i \neq k = r, b \quad (25)$$

The individual supply for agents in the smaller group is still greater than that in the larger group giving a measure of the institutional effect on the contribution to the activity of pressure groups. Comparing (25) and (20) allows one to isolate the institutional from the organisational effect because the difference between the two expressions is entirely due to the organisational effect.

Proposition 5.1. $s_i^C > s_i^N$.

Proof. Comparing (19) and (24) we can get:

$$s_i^C > s_i^N \Leftrightarrow 2(n_i/n_k)^{\gamma+1/2} (1 - n_i^{1/2} n_k^{3/2}) + 2(n_k/n_i)^{\gamma+1/2} (1 - n_k^{1/2} n_i^{3/2}) < (2n_i n_k - 3) \quad i \neq k = r, b \quad (25')$$

which always holds for $n_i > 1$.#

Proposition 5.2. $\partial(s_i^C - s_i^N)/\partial\gamma > 0$.

Proof. By inspection of (25').#

As expected, the cooperative supply of contributions for agents in sector i is larger than the non-cooperative one. Moreover, the larger is the weight given to the larger group in collective decision making, the larger also the difference between cooperative and non-cooperative supply of contribution. Hence, a change towards electoral rules which increase the costs of political representation for small groups in the legislative body reduces the individual incentives to supply contributions (see proposition 3.1) particularly in a setting where agents in the same sector do not coordinate themselves.

Substituting (24) into (16), the equilibrium tax rates become:

$$(1 - t_i^C) = \frac{l_b n_r^{\gamma-1/2} (2YB' - n_r n_b^{\gamma+3/2} C')}{l_r n_b^{\gamma-1/2} (2YB' + n_r^{\gamma+3/2} n_b C')} \quad (26)$$

$$(1 - t_y^C) = \frac{n_b^{\gamma-1/2} Y (2B' - n_r^{\gamma+3/2} n_b C')}{2l_b (n_r^{\gamma+1/2} + n_b^{\gamma+1/2}) B'}$$

where $C' = n_r^{\gamma-1/2} - n_b^{\gamma-1/2}$.

Proposition 5.3. $n_r \gtrless n_b \Rightarrow t_i^N \gtrless t_i^C \gtrless t_i^R$ and $t_y^R \gtrless t_y^C \gtrless t_y^N$

Proof. Comparing (13), (21) and (26).#

For any given γ and distribution of the agents across sectors, the fiscal equilibrium under the regulated setting is intermediate between the non-cooperative and the cooperative settings.

Proposition 5.4. The electoral equilibrium in the cooperative setting is such that:

$$n_r^{\gamma-1/2} \gtrless n_b^{\gamma-1/2} \Rightarrow U_r \gtrless U_b$$

Proof. Substituting (26) into (16) we get:

$$U_i = \frac{Y n_i^{\gamma-1/2}}{n_i^{\gamma-1/2} + n_k^{\gamma-1/2}} \left(\frac{(n_i^{\gamma+1/2} + n_k^{\gamma+1/2})^2}{(n_i^{\gamma+3/2} n_k^{\gamma+3/2} + (n_i^{\gamma+1/2} + n_k^{\gamma+1/2})^2)} \right) \quad i \neq k = r, b \quad (27)$$

from which the proposition follows.#

Notice that the utility levels in (27) are smaller than the utility levels obtained by agents in both groups in the regulated and in the non-cooperative settings (cfr. (14) and (23)). Moreover, the

switching in the consumption ranking between agents in different groups now occurs for lower level of γ with respect to the non cooperative setting. Though agents in the smaller group individually supply more contributions, their relative advantage with respect to the regulated setting is much lower because they cannot exploit the organisational effect in the supply of contributions to pressure groups. Moreover, the general increase in the supply of wasteful contributions to pressure groups, is such to further reduce the advantage of the agents in the smaller group in terms of final consumption. This notwithstanding, the cooperative setting is still more favourable for the smaller group than the regulated one where the ban on non-voting participation to the political activity is strictly enforced.

The comparison of cooperative and non-cooperative supplies of contributions has brought forward some new features of the collective decision mechanism and of its implication for the fiscal equilibrium. First, the level of pressure groups' activity is generally higher when binding agreements take place, but is more evenly distributed across sectors. Second, when contributions to pressure groups are somehow institutionalised, the supply of contributions becomes less subjected to decline, at the individual level, in response to an increase of the costs to reach political representation for small groups in the legislative body. Third, the aggregate supply of contributions is equal across groups so that agents in smaller groups are still characterised by a greater individual supply of contributions which is due to the different effect of legislation on the aggregate groups' payoffs. Fourth, in terms of fiscal equilibrium, agents in the shadow sector, are worse off with respect to the non cooperative case, but they are still better off than in the regulated setting where smaller groups can be badly damaged by the features of the electoral rules for the legislative body.

As for the constitutional implications of these results, the second point suggests that an increase of γ - which in the previous section has been seen to counterweigh the implications of the independent supply of contributions on the fiscal equilibrium - has a smaller effect when agents are organised in institutionalised political groups. On the other hand, if we suppose that agents in the regular sector have the upper hand in the competition between pressure groups, the first and third point seem to indicate that a similar change in the constitutional setting may be less needed than in the non-cooperative political setting.

6 Empirical evidence

In this section we test the above model on a sample of 21 OECD countries in the period 1970-89. In order to make the model operational we approximate the number of people active in the regular sector with the number of the employees and of those working in the shadow sector with the self employed workers. This is because of the differences in the enforcement costs of the fiscal legislation on labour incomes across the two types of workers.

The model allows us to derive the equilibrium outcome of the legislative stage in terms of compact formulae for both the income and the expenditure tax rates. In such formulae, the tax rates depend deterministically on the values taken by the number of agents across sectors, their income, and by the index of concentration or disproportionality which signals the comparative disadvantage for small groups to have their interests represented in the legislative body. In absence of stochastic elements, the main empirical test of the model is represented by a comparison of the income and expenditure tax rates as computed from the formulae in the model with the historical values taken by the two variables.

Notice that the model allows us to derive formulae also for the level of contributions to politically active pressure groups. Indeed, the possibility to have completely different sources of data on which to measure the performances of the model represents in itself a valuable characteristic of the model itself. Unfortunately, however, data on pressure groups activity are rarely available, and authors working in this field are often forced to recur to very indirect sources¹⁶. Moreover, even if for some countries (especially for the United States) such data are more reliable, the nature of our analysis which requires a comparison of the effects of different constitutional settings on policy making does not allow us to pursue this interesting direction of research.

Two are the possible procedures to perform the aforesaid comparison between computed and historical tax rates. The first procedure is to compute the values for the electoral years included in the sample period, to perform the comparison with the corresponding historical values for those years, and to summarise the results by constructing suitable indexes of the average distance between the computed and the historical values. This procedure, however, faces two main problems. Policy measures which are part of a political manifesto are not immediately

¹⁶ On this point see, for instance see Choi (1983) who attempts a comparative analysis of Olson's (1982) hypothesis of the negative effects on the rates of growth of the activity of pressure groups.

implemented and therefore do not show up in the historical data. Moreover, in some of the countries there have been less than four electoral years in the sample period so that the resulting indexes are not likely to be significant. For this reason we preferred to adopt the following procedure. We have computed for every year the tax rates values from equations (13), (21), and (26) for the regulated, the cooperative and the non-cooperative setting, respectively¹⁷. We can now briefly list our main findings.

1) In no country are the values computed in the regulated setting the nearest to the historical tax rates. This finding indicates that the features of the electoral rules - although relevant elements in determining the tax rates - represent only a part of the description of the political equilibrium. More specifically, this finding points to the fact that in most - if not all - large communities collective decisions are not simply taken following the logic of voting mechanisms. In most communities such decisions are instead strongly influenced by the bargaining between pressure groups which only partially is reflected in the electoral competition. This point has been argued theoretically by Tullock (1981) and more recently, from an empirical point of view by Peltzman (1990) and Snyder (1992). It is a relevant point because it should encourage to re-route some theoretical efforts in social choice and public choice theory from the analysis of the features of pure voting mechanism to the analysis of how such mechanisms are influenced by the working of pressure groups.

2) In all countries - with the exception the Scandinavian, and of the two smallest countries, Luxembourg and Iceland - the computed values which are nearer to the historical data are those obtained in the non cooperative setting (equation (21)). This is not a completely unexpected result because the two groups under consideration (self-employed and employees) are very encompassing ones and include in themselves several other politically active sub-groups. In these circumstances it is very unlikely that agents in each group can reach an agreement on how to produce political pressure with respect to the issue at stake. As we will see, this is not the case for the competition between pressure groups in the definition of the subsidies to different sectors where the workers' as well as the manufacturers' organisations have very limited special interests and therefore are more likely to be able to enforce agreements among their members. This

¹⁷ The detailed tables with the individual values are available at request. Recall that in (21) and (26) a quadratic cost function is at work ($\lambda = 2$).

conjecture seems to be confirmed by the fact that for the smallest countries the best setting is the cooperative one. Indeed, in countries such as Luxembourg and Iceland, but also Norway and Finland, one expects that the intra-group free riding effects are less relevant than in the other OECD countries. A possible explanation for the exception represented by Sweden has to do with the special characteristics of the Swedish unions which have always had an unusually encompassing character, especially in comparison with those in Great Britain or in the United States. Such large unions have often advocated policies in favour of the employees at large more than in favour of smaller sub-groups¹⁸.

3) The computed values for the cooperative and the non-cooperative settings are often nearer between them than to those in the regulated setting. In this respect most of the exceptions are again represented by the countries which are exceptions to the second finding (Scandinavian countries and the two smallest ones). This seems to reinforce the relevance of pressure groups' activities which distinguishes the regulated setting from the other two, notwithstanding the presence of opportunistic behaviour (the Olsonian logic of the collective action) which distinguishes the cooperative from the non cooperative settings.

4) The values computed for both direct and indirect taxation under the extreme assumptions concerning the electoral mechanism that is that in the legislative body a very large number of groups are directly represented ($\gamma = 0$) or that there is only one group ($\gamma = 1$), are never near to the historical data¹⁹. More specifically, the more concentrated is the political representation in the legislative body, the lower (higher) is the income (expenditure) tax rates. In other words, the more costly is the political representation of the small groups at the legislative stage, the more favourable the fiscal equilibrium for the agents in the regular sector. This is because when the index of concentration is higher the encompassing groups such as the group of the employees have a lower comparative disadvantage in the competition with pressure groups which represent specific interests.

In order to help the reader to ascertain the relative strength of the model in the different specifications, we summarise the informations concerning the income (expenditure) tax rates, and the various countries, in tables 1 and 2. More specifically, we show the absolute values of

¹⁸ For more of this argument see Olson (1983).

¹⁹ See also point 6 below.

the following t scores concerning the null hypothesis that there is no difference between the computed mean and the historical mean of the tax rates:

$$t = \frac{|\bar{X}_c - \bar{X}_d| (\sqrt{N_c + N_d - 2})}{(\sqrt{1/N_c + 1/N_d}) (\sqrt{N_c s_c^2 + N_d s_d^2})}$$

where \bar{X}_c, \bar{X}_d are the means of the computed values and the historical values, and s_c, s_d are their standard deviations. In tables 1 and 2 such t scores are computed for each country in the non-cooperative setting by making use of the concentration index, the disproportionality index and of $\gamma = 0$.

5) The hypothesis that the means of the best computed values (with the concentration index) and the means of the historical data are the same cannot be refused at the 0.01 level of significance for all countries with the exception of Canada and the United States. At the 0.05 level of significance, the above hypothesis can be refused also for the two smallest countries: Iceland and Luxembourg. This can be an important finding because it allows to introduce what we regard as one of the main limitations of our model: the lack of analysis of the degree of federalism of the institutional setting. Indeed, our model does not perform well for the two federal countries which have the largest fiscal autonomy. One possible reason for this result is that in a federal state are usually active pressure groups - such as ethnic groups - which do not fully reflect homogeneous economic interests. Less convincing would be an explanation of the inferior performance of the model based on the consideration that both Canada and the United States are countries with a plurality system of political representation. This for two reasons. First, because we cannot find a theoretical reason to explain why the model should perform differently according to the specific electoral rule. Second, because the model works rather well in the cases of Great Britain and Australia, which have a similar electoral mechanism.

6) The computed values under the assumption of purely proportional electoral rules, that is assuming that all voters are equally influential on the government choices, are not the values nearer to the historical data with the partial exception of Iceland, Luxembourg and Norway. This means that the introduction of a variable which signals the different costs to reach political representation at the legislative stage is necessary to achieve a better positive analysis of the political equilibrium.

7) The computed tax rates which are usually nearer to the historical data are those obtained using

the index of concentration as a measure of how costly is to reach political representation in the legislative stage for smaller groups. In this respect the index of disproportionality of the electoral rules is significantly inferior. A possible explanation for this finding is that the latter index reflects only on of the features of the electoral rules - although one of the most relevant in the short run - and therefore cannot give reason of the distribution of the political representation in the legislative body. A few examples will make this clearer. Germany is characterised by a relatively high concentration index and by a relatively low disproportionality index, while France experiences the opposite phenomenon. This is because in Germany a substantially proportional electoral rule is integrated by an amendment which does not allow the parties below the 5% of the expressed to enter the legislative body. In the period under consideration such amendment has kept the index of concentration very low reducing the number of the groups wishing to enter the electoral competition. On the other hand, in France a strongly disproportional electoral rules has had only a limited success in reducing the number of the groups in the legislative body. This is because even relatively small groups can constitute organic coalitions with larger ones at the second stage of the electoral mechanism. In this sense, the index of disproportionality is a relatively imperfect signal of the costs of entering the legislative body for small groups. Moreover, such index does not allow to understand the possibility that groups are endogenously determined by the very existence of specific electoral rules. For instance, the countries with a plurality system (in our sample Australia, Canada, Great Britain, and the United States) have very high indexes of concentration, but low indexes of disproportionality. This is because agents who are part of small groups understand that they cannot have access to the legislative body as representatives of their groups, and therefore enter encompassing political parties in which they need to bargain with members of other groups to define their positions on policy issues.

7 Conclusions

In this paper we have analysed the fiscal mix between direct and indirect taxation as an equilibrium of a non-cooperative game where members of pressure groups compete at the legislative level to get distributive gains. Their choice of participation in the activity of pressure groups is constrained by a set of constitutional rules which are embodied in a reduced-form model of electoral competition. Focussing on the relations between different institutional settings

of the political mechanism and the features of the fiscal equilibrium we move the analysis from the design of fiscal rules to that of constitutional rules. In this respect our major results are as follows.

First, when constitutional rules are such as to enforce a ban on pressure groups' activity, fiscal rules are strictly determined by the features of the electoral rules for the legislative body. The higher is the comparative disadvantage for small groups to reach political representation in the legislative body, for instance because of highly disproportional electoral rules, the better off are the members of larger groups who are better represented in the collective decision mechanism. Second, when the transaction costs are low enough as to allow for pressure groups' activity, small groups have a comparative advantage in supplying contributions to pressure groups in a decentralised way and therefore can shift the fiscal equilibrium to their advantage. This is due to the fact that contributions to pressure groups' activities share the nature of public goods since there is no complete appropriability on their effects. If the agents in the regular sector are the larger group this means that, when pressure groups are active, the fiscal equilibrium shifts in favour of the agents in the shadow sector. Third, such comparative advantage of smaller groups is reduced - though not eliminated - if there is the possibility to undertake binding agreements inside the groups in order to coordinate the supply of contributions. Accordingly, when well-established political organisations are active, the fiscal equilibrium gives a smaller advantage to the agents in the shadow sector. Fourth, when decentralised agents can adjust their choices in the economic sphere towards new policy rules, there is less scope for redistributive fiscal policies, but the direction of the redistributive activity itself is not basically affected. Fifth, the interaction between pressure groups in shaping policy rules reduces the dead-weight losses implicit in such rules if the agents who are negatively affected by the rules are in a smaller group. This is because, due to their comparative advantage in influencing the fiscal equilibrium, they succeed in reducing the amount of the redistribution with respect to the case in which pressure groups are excluded from the analysis. The opposite occurs if the agents negatively affected are in larger groups.

Most of these results have been confirmed by an empirical test of our model. More specifically, we have seen that, since the two groups under observation are encompassing ones, they are unlikely to reach cooperative agreements for the production of political pressure. It follows that agents in the shadow sector, which can minimise the effects of opportunistic behaviour in the political arena, are able to obtain fiscal equilibria which rely more heavily on income taxation

than on expenditure taxation. Such a fiscal equilibrium represents indeed an equilibrium at the legislative stage, so that policy proposals to modify it should take into account the features of the institutional setting which have determined such equilibrium in the first place. Moreover, we have seen that the features of the electoral rules for the legislative body are indeed relevant variables in shaping the fiscal equilibrium. In this respect we have shown that the index of disproportionality of the electoral rules is not a proper measure of the comparative disadvantage to reach direct political representation for agents in small groups. A much better measure is given by the index of concentration (an inverse measure of fractionalisation) of the legislative body. This is because only the latter takes into account the circular relations which link the electoral rules with the growth of special interest pressure groups.

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Table 1 - Performance of the model in reproducing historical data: Income.

t statistics for the hypothesis that there is no difference between the computed mean and the historical mean of the income tax rates. Means computed for the non-cooperative setting with the concentration index, the disproportionality index, and with $\gamma = 0$, respectively, in the period 1970-89.

	t(conc)	t(dis)	t(0)	rank	t(conc)
AUS	0.88010	9.44483	36.6603	AUT	0.0148
AUT	0.01488	62.85455	72.22584	SWE	0.016538
BEL	2.68589	10.81376	13.24824	FIN	0.13774
CAN	10.88389	21.22633	44.76756	GER	0.16080
DEN	2.65522	9.22168	29.09164	ITA	0.26029
FIN	0.13774	0.33353	0.81873	NET	0.65583
FRA	2.26418	3.27264	14.47122	GRE	0.80566
GER	0.16080	32.84822	33.78022	JAP	0.82297
GRE	0.80566	1.87764	2.49912	AUS	0.88010
ICE	2.82812	0.42465	2.61294	POR	1.16069
IRE	2.40511	5.74145	19.58717	NOR	1.37898
ITA	0.26029	1.18538	3.59679	LUX	1.54485
JAP	0.82297	9.61423	42.35463	UK	2.20264*
LUX	1.54485	1.92393	0.55223	FRA	2.26418*
NET	0.65583	15.14706	18.14831	IRE	2.40511*
NOR	1.37898	1.14491	0.01694	SPA	2.62321*
POR	1.16069	2.67046	9.55617	DEN	2.65522*
SPA	2.62321	1.11125	10.28499	BEL	2.68589*
SWE	0.01653	2.74337	10.62889	ICE	2.82812**
UK	2.20264	30.09837	57.28692	USA	8.78892**
USA	8.78892	38.47915	189.19936	CAN	10.88389**

Table 2 - Performance of the model in reproducing historical data: Expenditure.

t statistics for the hypothesis that there is no difference between the computed mean and the historical mean of the expenditure tax rates. Means computed for the non-cooperative setting with the concentration index, the disproportionality index, and with $\gamma = 0$, respectively, in the period 1970-89.

	t(conc)	t(dis)	t(0)	rank	t(conc)
AUS	2.56245	0.11019	9.86694	NET	0.16632
AUT	1.64008	28.48401	31.47448	ITA	0.26191
BEL	0.65519	7.05480	9.96675	GER	0.32890
CAN	16.83386	11.37616	20.99885	FIN	0.45839
DEN	2.60158	9.82625	2.00161	FRA	0.65378
FIN	0.45839	1.58581	1.86293	BEL	0.65519
FRA	0.65378	0.68967	4.91928	JAP	0.67069
GER	0.32890	17.93131	18.61313	UK	0.67224
GRE	2.22783	14.40792	10.42843	SWE	1.02889
ICE	12.50253	1.68402	0.43593	SPA	1.20903
IRE	1.84088	8.79962	9.90602	NOR	1.36945
ITA	0.26191	6.38563	1.22381	AUT	1.64008
JAP	0.67069	12.18009	15.70134	IRE	1.84088
LUX	6.69863	0.24121	0.15283	GRE	2.22783*
NET	0.16632	9.66240	11.18487	POR	2.42092*
NOR	1.36945	0.22671	0.87621	AUS	2.56245*
POR	2.42092	2.59406	5.16483	DEN	2.60158*
SPA	1.20903	4.07629	5.44497	LUX	6.69863**
SWE	1.02889	5.72525	38.08002	ICE	12.50253**
UK	0.67224	10.34656	6.83427	CAN	16.83386**
USA	20.67068	31.91304	43.46883	USA	20.67068**

* hypothesis refused at the 0.05 level of confidence

** hypothesis refused at the 0.01 level of confidence

Appendix 1

The list of the countries in our sample is:

Australia Austria Belgium Canada
Denmark Finland France Germany
Greece Iceland Ireland Italy
Japan Luxembourg Netherlands Norway
Portugal Spain Sweden United Kingdom
United States

The sources of the data used in the calculations are as follows:

- n_r number of employees (OECD Labour Statistics 1970-89)
- n_b number of self-employed (OECD Labour Statistics 1970-89)
- L_r compensation of employees (OECD National Accounts and Eurostat National Accounts 1970-89)
- L_b non-corporate operating surplus (OECD National Accounts and Eurostat National Accounts 1970-89)
- T_i income taxation (OECD National Accounts 1970-89)
- T_y expenditure taxation (OECD National Accounts 1970-89)
- $t_i = T_i/L_r$ average income tax rate (OECD National Accounts and Eurostat National Accounts 1970-89)
- $t_y = T_y/(L_r + L_b)$ average expenditure tax rate (OECD National Accounts and Eurostat National Accounts 1970-89)
- conc average concentration index (1970-86) as calculated in Appendix 2.
- dis average disproportionality index (1970-86) as calculated in Appendix 2.

Appendix 2

The index of disproportionality of an electoral mechanism is usually measured as:

$$\gamma_d = \frac{1}{2} \sum_{i=1}^m |q_i - v_i|$$

where q_i and v_i indicate, respectively, the percentage of seats and of votes gained by the political party i , and where m indicates the number of the political parties participating in the electoral competition. In order to avoid logical problems and to ensure that γ_d is responsive to the actual features of the electoral mechanisms, one must also exclude that $q_i > v_i$ and $q_j < v_j$ if $v_j > v_i$.

Irrespective of the number of parties, $\gamma_d = 0$ when there is identity between the percentages of seats and of votes won by each party. In all the other cases, γ_d depends positively on the number of active parties. To verify that the upper limit of γ_d is 1, let us assume that there are m parties winning N/m votes each, where N is the overall number of the voters, but the electoral mechanism is such that $v_1 = 1$ while $v_j = 0$ for $\forall j \neq 1$. It is easy to show that in such a case the index of disproportionality can be written as:

$$\gamma_d = \frac{1}{2} + \frac{(m-2)}{2m} = \frac{m-1}{m}$$

In such extreme case of disproportionality, $\gamma_d \in (0, 1)$. Notice that for a two-party electoral competition the index of disproportionality cannot be higher than 0.5. On the contrary for electoral mechanisms which tend to favour the participation of many parties, the index can be significantly higher²⁰.

However, one should notice that most political scientists regard m as an endogenous variable which is determined, at least in the long run, by the values taken by γ_d . More specifically, the so-called Duverger's law predicts that high values of γ_d generate a strong tendency towards two-party systems, while low values of γ_d allow for the survival of many parties. Accordingly, one should expect that the values taken by γ_d are well below its upper boundary (see table 3).

This relation between disproportionality of an electoral mechanism and number of parties allows for an alternative interpretation of γ as an inverse index of political fractionalization which we will refer to as an index concentration of the political representation. Such an index gives an measure of how concentrated is the representation of different groups' interests in the legislative body, and it is calculated as follows²¹:

$$0 < \gamma_c = \sum_{i=1}^m q_i^2 < 1$$

From an empirical point of view the above index of concentration can be preferred on the ground that, due to Duverger's law, when potentially highly disproportional electoral rules (e.g. plurality-like systems) are at work, in the long run small political groups do not take part to electoral competition. As a consequence, the disproportionality index becomes a biased indicator of the comparative disadvantage for small groups to reach direct political representation in the legislative body.

The values taken by the above concentration and disproportionality indexes in the period of interest are shown in the first two columns of table 3. In the third and fourth columns, the reader can find the same values ranked in decreasing order. The main source for the index of concentration is Bartolini and Meir (1986), with the exception of the indexes for Greece and Japan which are from Bogdanor and Butler (1983) and of those for Australia, Canada, Iceland, and USA from Rae (1971). Again, the source of the disproportionality index is mainly Bartolini and Meir (1986), with the exceptions of Greece, Spain, and Portugal, from Rose (in Lijphart and Grofman (1983)) and of Australia, Canada, Iceland, Japan, and USA from Lijphart (in Lijphart and Grofman (1983)).

²⁰ The close relation between weakly disproportional electoral rules and the arising of coalitional governments apparently reinforce this correlation between the two indexes. With respect to the activity of pressure groups it is well known that coalitional governments must take into account very seriously the interests of small groups on which their majority in the legislative body is likely to rest. See Bogdanor and Butler (1983).

²¹ See Rae (1971) and Grofman and Lijphart (1986) for further details.

Table 3 Concentration and disproportionality indexes for 21 OECD countries

	conc	disp		conc(rank)		disp(rank)
AUSTR.	0.420002	0.07843	USA	0.510000	FRANCE	0.30750
AUSTRIA	0.433999	0.02399	GREECE	0.480003	SWEDEN	0.20399
BELGIUM	0.165285	0.04399	AUSTRIA	0.433999	SPAIN	0.17000
CANADA	0.370002	0.12152	AUSTR.	0.420000	CANADA	0.12152
DENM.	0.191285	0.02025	GERM.	0.409250	GREECE	0.12000
FINLAND	0.174833	0.04320	CANADA	0.370002	UN KING	0.08059
FRANCE	0.224750	0.30750	UN KING	0.361799	JAPAN	0.07980
GERM.	0.409250	0.03045	IRELAND	0.359800	AUSTR.	0.07843
GREECE	0.480003	0.12000	SPAIN	0.300000	PORTUG.	0.06800
ICELAND	0.280002	0.05549	SWEDEN	0.288714	NORWAY	0.06045
IRELAND	0.359800	0.03602	ICELAND	0.280002	USA	0.05885
ITALY	0.250000	0.04289	NORWAY	0.256600	LUXEMB	0.05760
JAPAN	0.240000	0.07980	ITALY	0.250000	ICELAND	0.05549
LUXEMB	0.245000	0.05760	LUXEMB	0.245000	BELGIUM	0.04399
NETH.	0.192499	0.03410	JAPAN	0.240000	FINLAND	0.04320
NORWAY	0.256600	0.06045	FRANCE	0.224750	ITALY	0.04289
PORTUG.	0.220002	0.05800	PORTUG.	0.220002	IRELAND	0.03602
SPAIN	0.300000	0.17000	NETH.	0.192499	NETH.	0.03410
SWEDEN	0.288714	0.20399	DENM.	0.191285	GERM.	0.03045
UN KING	0.361799	0.08059	FINLAND	0.174833	AUSTRIA	0.02399
USA	0.510000	0.05885	BELGIUM	0.165285	DENM.	0.02025

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