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BARGAINING IN LEGISLATURE: NUMBER OF PARTIES AND IDEOLOGICAL POLARIZATION

OSKAR NUPIA[1]

Abstract

There is a common perception in the political economy literature that a larger number of parties makes it more difficult and more expensive – in terms of pork barrel programs - to implement policy-changes in a legislature. This paper proves that this perception is not necessarily true. The driving idea behind this result is that the number of parties should matter for legislative outcomes only to the extent that the ideological polarization between them is high. The model developed in this paper shows that it can be cheaper - in terms of pork barrel programs-, and also more likely, for a government party to negotiate its preferred public policy with several parties that are less polarized than with a few parties that are strongly polarized.

Keywords: number of parties, bargaining, legislature.

JEL Classification: D72, D78

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NEGOCIACIÓN EN LEGISLATURAS: NÚMERO DE PARTIDOS Y POLARIZACIÓN IDEOLÓGICA

Resumen

Este artículo estudia si un partido de gobierno siempre prefiere negociar con un solo partido compacto en lugar de negociar con más de un partido en una legislatura. Nuestro punto central es que la interacción entre polarización ideológica y número de partidos juega un papel central en esta decisión. En el artículo se modelan dos tipos de legislaturas: La legislatura con *2*-partidos, en la cual el partido de gobierno negocia con otro partido compacto; y la legislatura con *m+1*-partidos, en la cual éste negocia con *m>2* partidos. En nuestro modelo, los partidos negocian sobre dos políticas: Una política pública (ideológica) y una política distributiva (privada). Nuestro principal resultado muestra que un partido de gobierno no siempre prefiere negociar en una situación bilateral. Si el nivel de polarización ideológica en la legislatura con *2*-partidos es suficientemente grande, este preferiría negociar con *m* partidos menos polarizados. Nuestros resultados también muestran que, si el partido de gobierno decidiera entre dos legislaturas con el mismo número de partidos pero con diferente nivel de polarización ideológica, este preferiría negociar en la legislatura menos polarizada.

Palabras clave: Número de partidos, negociación, legislaturas.

Clasificación JEL: D72, D78.

1. Introduction

During the last two decades, economists have concerned themselves with how political fragmentation affects economic outcomes, in particular, fiscal policy (government spending, budget deficits, etc.). The leading theory in this area follows from the common-pool problem (Weingast et al., 1981). The general argument is that when a pool of common resources is used to finance public projects with concentrated benefits, the result is overspending. Such overspending increases with the number of interested parties that have influence over government budget-related choices. A similar result for pork barrel programs can be found for legislative bargaining in a minimal (non-universal) winning coalition setting (Baron 1991).

Political scientists have also shown an interest in this relationship, though they have mainly concentrated on whether or not a government party is more successful promoting policy in a less fragmented atmosphere. The main argument is that, inasmuch as the number of players with veto power reduces the probability of promoting a change in the status quo, negotiations in a legislature become increasingly difficult as the number of parties increases, regardless of their respective ideological positions (A survey along these lines is found in Tsebelis, 2002).

In sum, the common perception is that political fragmentation—reflecting here the number of interested parties involved in the policy-making process—negatively affects both economic and political outcomes. This theory has been tested mainly in the fiscal policy literature—the so-called weak government hypothesis. Cross country studies have analyzed whether budget deficits and public spending increase as the number of parties in the government and/or legislature increases (de Haan et al., 1999; Elgie and McMenamin, 2008; Perotti and Kontopolous, 2002; Roubini et al., 1989; Volkerink and de Haan, 2001; Woo 2003). The available evidence does not provide unified support for the weak government hypothesis.

This paper proposes a parsimonious model, one that allows for a new interpretation regarding how political fragmentation affects fiscal and political outcomes, in particular, spending on pork barrel programs. The novelty in our framework is that we introduce an ideological dimension to the legislative bargaining, one that is absent in previous models (Baron, 1991; Weingast et al., 1981). We thus distinguish between two elements, the number of parties and the degree of ideological polarization. So as to remain focused on the role played by ideological polarization in legislative negotiations, for most of the presentation we assume that political parties do not face a common-pool problem.[2]

[2] We discuss in section 3.4 how our results are affected if, within our framework, parties do in fact face a common-pool problem.

Under the circumstances described above, we demonstrate that a greater number of parties does not necessarily have a negative effect on economic and political outcomes. The driving idea underlying this result is that the number of parties only matters vis-à-vis legislative outcomes to the extent that the ideological polarization between them is high. Moreover, even if parties face a common-pool problem, the number of parties will not affect these outcomes if the ideological polarization between them is sufficiently low.

Our model considers the following situation in a legislature. The governing party has the support of its legislators in promoting a particular public policy, yet still requires some extra votes in order to get it through the legislature. This situation opens up the possibility of vote trading. How much the governing party will need to spend in negotiating with the other party(ies) is directly related either to government spending in its distributive policy or the successful probability of promoting its public policies—for a given budget, this probability decreases as the required expenditure increases. Under these circumstances, we need to determine whether is it cheaper (in terms of the distributive policy) to promote a particular public policy under a bi-party scenario or a multi-party one?

We use a model of non-cooperative bargaining (Austen-Smith and Banks, 1988; Baron and Ferejohn, 1989). We model the bargaining process assuming a unicameral legislature, but with a closed agenda that only allows for one session (i.e., a take-it-or-leave-it bargaining procedure).[3] The key point in our framework is that we introduce two dimensions to the bargaining process, a public decision (ideological) and a distributive decision (private). Most of the papers in this area have only concerned themselves with distributive policies, and have not taken into account pork barrel programs such as are commonly used by governments in order to obtain the necessary support for promoting its public policies in the legislature.

In our framework, the governing party (party *A*) wishes to promote a public policy in the legislature. It needs *n* votes in order to promote the policy, but has only $n_A < n$ seats. Consequently, party *A* still requires $m = n - n_A$ votes. Two extreme cases are considered. In the first case, each *m* legislator (i.e., vote) needed by the governing party represents a different political party and takes his or her decision independently. This situation is represented as an *m+1*-party legislature. In the second case, the *m* legislators collectively form a distinct political party, *B*; they thus take their decisions jointly. This situation is represented as a *2*-party legislature. In the latter case, the members of party *B* commit to a distinct and unified position with respect to the proposed public policy; this outcome reflects an ideological dimension.

Regardless of the type of legislature, the governing party makes a proposal to the legislature; this proposal consists of both a concrete public policy proposal

[3] Baron and Ferejohn model a unicameral legislature with multiple sessions (an alternating offer-bargaining process). We restrict our model to one session in order to avoid the technical complications that emerge when comparing the multiplicity of stationary sub-game perfect equilibria in a multi-person alternating-offer model with the unique stationary sub-game perfect equilibrium in a bilateral framework.

and a distributive policy vector on private good. The cost of this distributive policy is the government spending required to promote the public policy and this is related to the public spending in projects with concentrated benefits (Baron, 1991; Weingast et al. 1981). The legislators vote on this proposal against the *status quo*. If the proposal passes, both the distributive and the public policies are implemented. If it is rejected, the *status quo* is assigned.

Our model shows that the cost of promoting a public policy under a *2*-party legislature is not always less than the cost under an *m+1*-party legislature. In particular, it is found that if the level of polarization under a *2*-party legislature is high enough, then it is always cheaper for the governing party to promote its preferred public policy (thus making it more likely to succeed) under an *m+1*-party legislature. It is also demonstrated that, if the degree of polarization under a *2*-party legislature is higher than under an *m+1*-party legislature, then the cost of promoting a public policy is greater under the former legislature. This result only fails under certain particular cases.

These and previous results in the literature suggest that there are two channels by which political parties might affect spending on pork barrel programs. The first is through the degree of polarization between them, provided that pork barrel programs are used to promote public policies. The second concerns the number of parties, provided that parties face a common-pool problem when deciding on the level of spending on pork barrel programs. Moreover, as we argue, if both channels are active, an additional implication emerges, namely that the number of parties will directly affect pork barrel spending only if the degree of polarization is not zero or near to zero.

The rest of the paper is organized as follows. Section 2 describes the frameworks of both a *2*-party and an *m+1*-party legislature and their respective equilibria. Section 3 compares the cost to the governing party of promoting its preferred public policy with respect to each type of legislature, and provides the main results of the paper. Section 4 concludes and discusses some empirical implications of our findings. The appendix contains all the proofs.

2. Model

A policy-maker, or the governing party - henceforth party *A* - wish to promote a particular public policy in the legislature. It needs *n* votes in order to promote that policy, but it only has $n_A < n$ seats. Party *A* thus still requires $m = n - n_A$ votes.

The utility of each individual legislator depends on two arguments: A public policy *y* (ideological decision), with feasible set $Y \in [0,1]$; and a distributive policy $(x_1,...,x_n)$, with $x_i \geq 0 \quad \forall i$, and $\sum_{i=1}^{n} x_i \leq X$. Accordingly, the utility function is given by $u_i(y,x_i): [0,1] x \Re_+ \rightarrow \Re$, where $u_i(.)$ is continuous and strictly increasing in x_i for every $y \in Y$. We make two assumptions on these preferences. First, the ideological decision is separable from the distributive decision; second, u_i is single peaked at *y* for every x_i. The peak of u_i is denoted by $\hat{y}_i$. We restrict our analysis to the utility function, $u_i(y, x_i) = -|y - \hat{y}_i| + x_i$, which satisfies the previous conditions.[4]

Without loss of generality, only $i = 1,2,...,n_A$ belong to party *A*. $\forall i \in A$, u_i has a unique local maximum or is peaked at $\hat{y}_A$. In other words, all legislators belonging to party *A* share the same preferred ideological position.

We model the bargaining process assuming that there is a closed agenda and only one session (a take-it-or-leave-it bargaining procedure). This assumption let us to avoid the technical complications that emerge when comparing the multiplicity of equilibria in a multi-person alternating-offer model with the unique equilibrium in an alternating-offer bilateral framework.

During this session, party *A* makes an offer $(y, x_1,...,x_n)$ to the legislators in order to maximize its total utility $\sum_{i \in A} u_i(y, x_i)$, subject to $\sum_{i=1}^{n} x_i \leq X$, and $x_i \geq 0$ $\forall i$. The legislators then vote on the proposal against the *status quo* $(y^s, 0,...,0)$. If $n_A + m$ legislators accept party *A*'s offer, then both the distributive and the public policy are implemented. Otherwise, the *status quo* is assigned.

Under this framework, party *A* always prefers to negotiate with those legislators who are nearest to its ideological position. Notice that by doing so, it minimizes the cost of promoting its preferred public policy. From now on, we restrict our analysis to the *m* legislators with the closest ideological position to $\hat{y}_A$. These legislators are indexed by $i = n_A + 1,...,n$. This simplification does not imply that party *A* requires unanimity in order to promote its policy in the legislature, but only needs a minimum winning coalition.[5]

Notice that in our framework, legislators do not face a common-pool problem. This is because each individual legislator does not perceive any negative externality from the distributive policy spending allocated to other legislators. Correspondingly, we do not take into account the well-known overspending effect related to the number of parties when there is a common-pool of resources for distribution. We come back to this issue in our discussion in section 4.

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[4] A somewhat more general function is $u_i(y, x_i) = -b_i|y - \hat{y}_i| + x_i$, where b_i measures the intensity with which legislator *i* defends his or her ideological position. Since our focus is on ideological polarization and not on conflict intensity, we prefer to set $b_i = 1$ $\forall i$. Nevertheless, the main results presented in this paper hold for any $b_i > 0$.

[5] Political science literature has studied whether non-minimal winning coalitions are cheaper than minimal winning coalitions (Groseclose and Snyder, 1996). In our framework, we compare two cases in which there is a minimal winning coalition in the legislature, one with two parties and another with more than two parties.

We consider two extreme types of party organization with respect to the legislature. One wherein each of the m legislators not belonging to party *A* represents a different political party; and another wherein all the m legislators unaffiliated with party *A* belong to the same political party.

2.1. The *m+1*-party legislature game

In an *m+1*-party legislature, each of the m legislators unaffiliated with party *A* required to promote the governing party's proposal represents a different political party with a different ideological position. Under our framework, this implies that each of these legislators has a different peak in the utility function - that is, $\hat{y}_A \neq \hat{y}_i \quad \forall i \notin A$, and $\hat{y}_i \neq \hat{y}_j \quad \forall i, j \notin A$. Furthermore, there is no possibility of commitment among these legislators. Without loss of generality, we assume that the peaks of the $i's \notin A$ are such that $\hat{y}_{n_A+1} < \hat{y}_{n_A+2} < ... < \hat{y}_n$.

An equilibrium offer under an *m+1*-party legislature is represented by the vector $\left(y^*_{(m+1)}, x^*_{1(m+1)}, ..., x^*_{n(m+1)}\right)$, such that the following conditions are satisfied:

$$\left(y^*_{(m+1)}, x^*_{1(m+1)}, ..., x^*_{n(m+1)}\right) \in \arg\max\left\{\sum_{i \in A} u_i(.)\right\} \quad (1)$$

$$-\left|y^*_{(m+1)} - \hat{y}_i\right| + x^*_{i(m+1)} \geq -\left|y^s - \hat{y}_i\right|, \quad \forall i \notin A \quad (2)$$

$$-\left|y^*_{(m+1)} - \hat{y}_A\right| + x^*_{i(m+1)} \geq -\left|y^s - \hat{y}_A\right|, \quad \forall i \in A \quad (3)$$

$$\sum_{i=1}^{n} x_i \leq X \quad (4)$$

$$x_i \geq 0, \quad \forall i \quad (5)$$

where the subscript *m+1* refers to the type of legislature. Condition 2 assures that the $i's \notin A$ always accept party *A*'s offer (the participation constraint for the $i's \notin A$). Condition 3 assures that party *A*'s offer is at least as good as the *status quo* for the $i's \in A$ (the rationality constraint for the $i's \in A$). Conditions 4 and 5 imply that party *A*'s offer is feasible and that there are non-negative transfers.

2.2. The *2*-party legislature game

Following studies about party formation (Baron, 1993; Jackson and Moselle, 2002; Levy, 2004; Morelli, 2004), we assume that parties are policy-oriented in their ideological position. This implies that members of a party commit to a unique position with respect to the public policy dimension *y.* Actually, we have already assumed this policy-oriented party assumption for party *A*. Since explicit modeling of party formation and platform setting is beyond the scope of this paper, we do not study how legislators commit to this unique ideological position.

Under a *2*-party legislature then, those legislators not belonging to party *A* constitute a unique political party, *B*, with a single ideological position, $\hat{y}_B$. In order to make a comparison with the *m+1*-party legislature interesting, we concentrate on the case wherein $\hat{y}_B \in \left(\hat{y}_{n_A+1}, \hat{y}_n\right)$.

An equilibrium offer under a *2*-party legislature is represented by the vector $\left(y_{(2)}, x^*_{1(2)}, ..., x^*_{n(2)}\right)$, such that:

$$\left(y^*_{(2)}, x^*_{1(2)}, ..., x^*_{n(2)}\right) \in \arg\max\left\{\sum_{i\in A} u_i(.)\right\} \quad (6)$$

$$-\left|y^*_{(2)} - \hat{y}_B\right| + x^*_{i(2)} \geq -\left|y^s - \hat{y}_B\right|, \quad \forall i \in B \quad (7)$$

$$-\left|y^*_{(2)} - \hat{y}_A\right| + x^*_{i(2)} \geq -\left|y^s - \hat{y}_A\right|, \forall i \in A \quad (8)$$

$$\sum_{i=1}^{n} x_i \leq X \quad (9)$$

$$x_i \geq 0 \quad \forall i \quad (10)$$

Conditions 6 through 10 correspond to conditions 1 through 5 in an *m+1*-party legislature. These conditions assure optimality, the participation of $i's \notin A$, the rationality of $i's \in A$, feasibility, and that there are non-negative transfers. Formally, the only equilibrium condition that changes is the participation constraint. Under a *2*-party legislature, $i's \notin A$ do not care at $\hat{y}_i$ but at $\hat{y}_B$.

3. Analysis

Our aim is to compare the total spending on distributive policies required to promote the governing party's preferred public policy in each type of legislature. The amount of this resource can be directly related to pork barrel spending (Baron, 1991; Weingast et al. 1981). This category of government spending can also be related to the probability of the government successfully promoting its public policies –for a given budget, the probability decreases as the required expenditure increase.

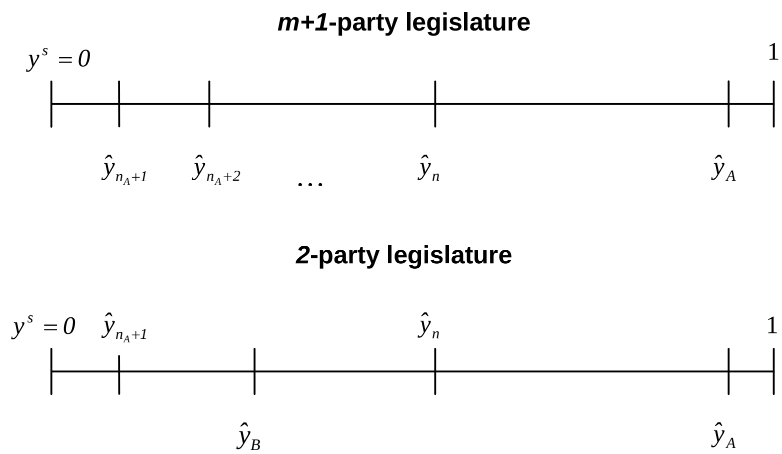
The equilibrium for each type of legislature is not independent of the ideological configuration of parties. In what follows, we consider the three main different situations. Any other ideological configuration can be considered like a mixture of these.

3.1. Case I

Our first case assumes $y^s = 0$. Additionally, it considers the following ideological positions for an *m+1*-party legislature: $\hat{y}_i < \hat{y}_A \quad \forall i \notin A$. Since $\hat{y}_B \in \left(\hat{y}_{n_A+1}, \hat{y}_n\right)$, this last assumption also fixes under a *2*-party legislature the ideological position of party *B* with respect to $\hat{y}_A$. The ideological positions for each type of legislature are depicted in figure 1. Notice that when $\hat{y}_A > 2\hat{y}_n$, party *A* has to offer $x_i > 0 \ \ \forall i \notin A$ if it wants to promote its preferred public policy. From now, we concentrate on the case in which this always happens.[6]

The equilibrium vector for each type of legislature depends, among other things, on party *A*'s willingness to promote its preferred public policy, $\hat{y}_A$. Notice that under some circumstances, party *A* may have incentives to take the full amount of private good, X, for itself, and therefore does not promote any public policy that implies a positive transfer to the other parties. For the purposes of our analysis, we concentrate on the case in which party *A* is always willing to promote its preferred public policy. It can be proved that this is always the case when the number of the governing party's members is greater than the number of votes required to promote its proposal - that is, $n_A \geq m$. (See the appendix.)

Figure 1.
Case I: Ideological positions of legislators.



The equilibrium vector also depends on the amount of private resources, X. If X is small, then the governing party will only be able to promote public policy $y^* < \hat{y}_A$. From now on, we concentrate on the case in which X is great enough to promote $\hat{y}_A$ under both types of legislatures. It allows us to analyze the total cost of promoting this public policy in each type of legislature.

At equilibrium, when $n_A \geq m$ and *X* is great enough, party *A* promotes $\hat{y}_A$ under both types of legislature (that is, $y^*_{(m+1)} = y^*_{(2)} = \hat{y}_A$), and offers the following private policies:

$$x^*_{i(m+1)} = \hat{y}_A - 2\hat{y}_i \, , \ i = n_A + 1, \ldots, n \qquad (11)$$

[6] This assumption is used in order to simplify the exposition. However, it does not affect the results presented below.

$$x^*_{i(2)} = \hat{y}_A - 2\hat{y}_B \text{, for any } i \in B \qquad (12)$$

Equations 11 and 12 follow from equations 2 and 7, respectively. Let us make c_{m+1} the total cost of promoting $\hat{y}_A$ under a *m+1*-party legislature, and c_2 the respective cost under a *2*-party legislature. These costs are given by $c_{m+1} = \sum_{i=n_A+1}^{n} (\hat{y}_A - 2\hat{y}_i)$, and $c_2 = m(\hat{y}_A - 2\hat{y}_B)$. Notice that these costs are the total spending on distributive policies (pork barrel programs) that the government party must face in order to promote its ideal public policy in each type of legislature.

Proposition 1. Suppose that $n_A \geq m$, and that X is such that $\hat{y}_A$ can be promoted under both an *m+1* and a *2*-party legislature. Then $c_2 \leq c_{m+1}$ if and only if $\hat{y}_B \geq \frac{\sum_{i \notin A} \hat{y}_i}{m} = \tilde{y}_1$, where $\tilde{y}_1 \in (\hat{y}_{n_A+1}, \hat{y}_n)$.

Proposition 1 states that if polarization[7] within a *2*-party legislature is high enough, then it will be cheaper for the government party to promote its preferred public policy under an *m+1* than a *2*-party legislature. Consequently, it will be more likely to succeed. Whether ideological polarization within a *2*-party legislature is high or low depends on the threshold $\tilde{y}_1$, which belongs to the interval of interest $(\hat{y}_{n_A+1}, \hat{y}_n)$.

This result also shows that a governing party is not necessarily more successful in promoting its preferred public policy when negotiating with a single unified party. If a high level of polarization exists between the two parties, the governing party could be more successful negotiating its preferred policy with several different parties.

The difference between $\hat{y}_A$ and $\tilde{y}_1$ can be understood as the maximum level of ideological polarization within a *2*-party legislature for which $c_2 \leq c_{m+1}$. We call this difference the maximum level of polarization party *A* is willing to countenance in a 2-parties legislature. Thus, if $\hat{y}_A - \hat{y}_B$ is smaller than $\hat{y}_A - \tilde{y}_1$ (that is, $\tilde{y}_1 < \hat{y}_B$), then $c_2 \leq c_{m+1}$.

The result from proposition 1 explicitly takes into account the level of polarization in a *2*-party legislature (that is, the distance between $\hat{y}_A$ and $\hat{y}_B$), though they do not take into account the level of polarization in a *m+1*-party legislature. One would be interested in comparing the two types of legislatures when the level of polarization in both is the same.

[7] Measured as the distance between $\hat{y}_A$ and $\hat{y}_B$. This measure is introduced formally below.

Let us designate V_{m+1} and V_2 the levels of ideological polarization (relative to the governing party's position) in an *m+1* and a *2*-party legislature, respectively. We use the following two simple measures of polarization:[8]

$$V_{m+1} = \frac{\sum_{i \notin A} (\hat{y}_A - \hat{y}_i)}{m} \qquad (13)$$

$$V_2 = \hat{y}_A - \hat{y}_B \qquad (14)$$

Proposition 2: Consider two types of legislatures, one with *2* parties and another with *m+1* parties: (i) If $V_2 = V_{m+1}$, then $c_2 = c_{m+1}$; (ii) if $V_2 < V_{m+1}$, then $c_2 < c_{m+1}$, and; (iii) if $V_2 > V_{m+1}$, then $c_2 > c_{m+1}$.

Proposition 2 states that the cost of promoting the preferred public policy of the governing party is exactly the same under both types of legislatures if the level of polarization is the same. However, when the level of polarization in the *2*-party legislature is larger than the level of polarization in the *m+1*-party legislature, it is cheaper for the governing party to promote its preferred public policy (thus making it more likely to succeed) through a multilateral rather than a bilateral negotiation.

The main conclusion that we draw from proposition 2 is that the effect of the number of parties on pork barrel spending (the cost of the distributive policy) is positive only if a greater number of parties implies a larger degree of ideological polarization. Moreover, under the circumstances considered in this section, it can be shown that if there are two legislatures with $k \in \{2, m+1\}$ parties, pork barrel spending will increase as ideological polarization increases.[9] These two results imply that ideological polarization is the only driving force behind pork barrel spending when parties are not confronted with a common-pool problem.

The rest of this section explores whether these findings are true for different assumptions about the ideological configuration of parties.

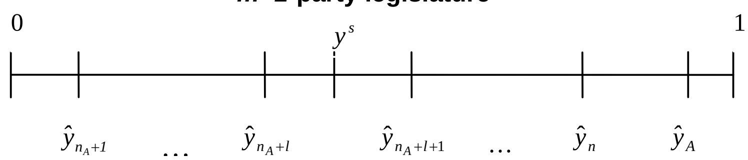
3.2. Case II

Let us consider the situation in which $y^s \in (0, \hat{y}_A)$, but where it is still the case that $\hat{y}_i < \hat{y}_A \;\; \forall i \notin A$. Figure 2 depicts this situation for each type of legislature.

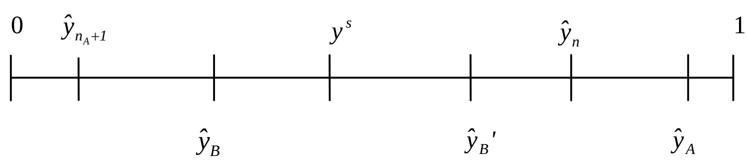
[8] From our assumptions about ideological positions ($\hat{y}_A > \hat{y}_i \;\; \forall i$), these measures are always positive.
[9] The proof of this statement is not presented here, but is available upon request.

Figure 2.
Case II: Ideological positions of legislators.

***m+1*-party legislature**



***2*-party legislature**



Once again, we concentrate on the case in which the governing party has an incentive to promote its preferred public policy (in this context, willingness is also assured if $n_A > m$), and *X* is high enough to see this policy promoted in both types of legislatures. When at equilibrium then, $y^*_{(m+1)} = y^*_{(2)} = \hat{y}_A$. Additionally, as before, we focus on the case in which party *A* has to transfer a positive amount of private good to every $i \notin A$ in order to promote $\hat{y}_A$.[10]

The equilibrium distributive policy required to promote $\hat{y}_A$ in each type of legislature changes with respect to case I. Let us first consider an *m+1*-party legislature. Without loss of generality, we assume that $\hat{y}_i \leq y^s$ for $i = n_A + 1, ..., n_A + l$, and that $\hat{y}_i > y^s$ for $i = n_A + l + 1, ..., n$. From equation 2, the equilibrium distributive policy required to promote $\hat{y}_A$ under this type of legislature is given by:

$$x^*_{i(m+1)} = \begin{cases} \hat{y}_A - y^s & if \quad \hat{y}_i \leq y^s \\ \hat{y}_A + y^s - 2\hat{y}_i & if \quad \hat{y}_i > y^s \end{cases}, \qquad \forall i \notin A \tag{15}$$

Let us now consider a *2*-party legislature. The equilibrium private policy offer in this type of legislature depends on whether $\hat{y}_B \leq y^s$ or $\hat{y}_B > y^s$. From equation 7, it follows that this offer is given by:

[10] Under an *m+1*-party legislature, $x^*_{i(m+1)} > 0 \;\; \forall i \notin A$ if $\hat{y}_A > 2\hat{y}_n - y^s$. Under a *2*-party legislature, when $\hat{y}_B \leq y^s$, then $x^*_{i(2)} > 0 \;\; \forall i \notin A$. However, when $\hat{y}_B > y^s$, it is necessary that $\hat{y}_A > 2\hat{y}_B - y^s$.

$$x_{i(2)}^{*} = \begin{cases} \hat{y}_A - y^s & if \quad \hat{y}_B \le y^s \\ \hat{y}_A + y^s - 2\hat{y}_B & if \quad \hat{y}_B > y^s \end{cases}, \qquad \forall i \notin A \qquad (16)$$

From equations 15 and 16, we are able to compute the total cost of promoting $\hat{y}_A$ under both types of legislatures. We still call the costs c_2 and c_{m+1}.

Proposition 3. Suppose that $n_A \ge m$, and that X is such that $\hat{y}_A$ can be promoted under both an *m+1* and a *2*-party legislatures. Then $c_2 \le c_{m+1}$ if and only if $\hat{y}_B \ge \frac{ly^s + \sum_{i=n_A+l+1}^{n} \hat{y}_i}{m} = \tilde{y}_2$, where $\tilde{y}_2 \in \left(y^s, \hat{y}_n\right)$.

Proposition 3 extends the result stated in proposition 1 to any $y^s \in \left(0, \hat{y}_A\right)$. The novelty is that the relevant threshold for determining whether the degree of polarization under a *2*-party legislature is high or not is restricted to the interval $\left(y^s, \hat{y}_n\right)$, rather than the interval $\left(\hat{y}_{n_A+1}, \hat{y}_n\right)$. Thus, if $\hat{y}_B < y^s$, it is always cheaper to negotiate $\hat{y}_A$ under a *m+1* legislature than a *2*-party legislature (thus making it more likely that the governing party will succeed in promoting the desired public policy).

Under this ideological configuration, the maximum level of polarization that party *A* is willing to countenance under a *2*-parties legislature is given by $\hat{y}_A - \tilde{y}_2$. The only result that changes in a significant manner with respect to case I is that anticipated in proposition 2. The relationship between the level of polarization under each legislative type and the respective cost of promoting $\hat{y}_A$ is stated in the following proposition.

Proposition 4. Consider two types of legislatures, one with *2* parties and another with *m+1* parties. If $V_2 \ge V_{m+1}$, then $c_2 > c_{m+1}$.

The result from proposition 4 replicates part of the result from proposition 2. It states that if the level of polarization under a *2*-party legislature is larger or equal to that under an *m+1*-party legislature, then it is more expensive for the governing party to promote its preferred public policy (thus making it less likely to succeed) under a *2*-party legislature. Nevertheless, it is possible to observe that $c_2 > c_{m+1}$, even when $V_2 < V_{m+1}$. Only when the level of polarization under a *2*-party legislature is small enough vis-a-vis the level under an *m+1*-party legislature is the cost to the governing party less expensive.

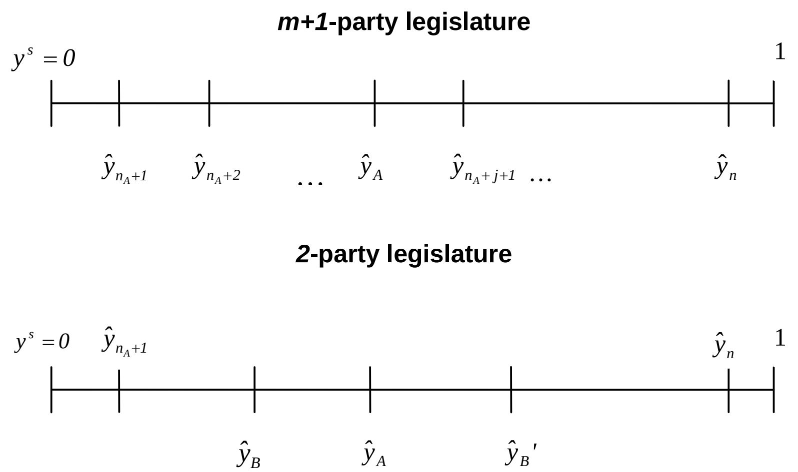
In this case, we also conclude that the effect of the number of parties on pork barrel spending is positive only if a larger number of parties implies a higher degree of ideological polarization. However, the effect of ideological polarization on pork barrel spending is not as straightforward as in case I. First, the ideological polarization in the *m+1*-party legislature must be significantly larger than the ideological polarization in the *2*-party legislature if we are to observe greater spending in the former type of legislature. Second, it cannot be generalized that in two legislatures with $k > 2$ parties, pork barrel spending is always greater in the legislature with the higher degree of ideological polarization.[11]

3.3. Case III

In this subsection we relax the assumption that $\hat{y}_i < \hat{y}_A \ \ \forall i \notin A$, though revisit the case wherein $y^s = 0$. In other words, we consider the case wherein the preferred public policy of some legislators not belonging to the governing party is to the right of $\hat{y}_A$. This ideological configuration is depicted in figure 3 for each type of legislature.

The main particularity in this case is that party *A* always has the support of those legislators whose preferred public policy is to the right of $\hat{y}_A$. In other words, regardless the type of legislature, those legislators with $\hat{y}_i > \hat{y}_A$ do not require a positive private transfer in order to support $\hat{y}_A$.

Figure 3.
Case III: Ideological positions of legislators.



For the standard case of analysis - that is, where party *A* has an incentive to promote $\hat{y}_A$, and *X* is high enough to do so - the equilibrium for the private offer required by the $i's \notin A$ in order that they promote $\hat{y}_A$ under an *m+1*-party legislature is given by:

[11] This result can be generalized when $k = 2$.

$$x^*_{i(m+1)} = \begin{cases} \hat{y}_A - 2\hat{y}_i & if \quad \hat{y}_i < ½\hat{y}_A \\ 0 & if \quad \hat{y}_i > ½\hat{y}_A \end{cases}, \qquad \forall i \notin A \qquad (17)^{12}$$

The respective offer under a *2*-party legislature is given by:

$$x^*_{i(2)} = \begin{cases} \hat{y}_A - 2\hat{y}_B & if \quad \hat{y}_B < ½\hat{y}_A \\ 0 & if \quad \hat{y}_B \geq ½\hat{y}_A \end{cases}, \qquad \forall i \notin A \qquad (18)$$

Without loss of generality, under an *m+1*-party legislature, we assume that $\hat{y}_i \leq \hat{y}_A$ for $i = n_A + 1,..., n_A + l$, and $\hat{y}_i > \hat{y}_A$ for $i = n_A + l + 1,..., n$. Proposition 5 shows that the main result of this paper still holds under this ideological configuration. Once again, for the sake of simplicity in the exposition we assume that at equilibrium $x^*_{i(m+1)} > 0$ and $x^*_{i(2)} > 0$ $\forall i \notin A$.

Proposition 5. Suppose that $n_A \geq m$, and that X is such that $\hat{y}_A$ can be promoted under both an *m+1* and a *2*-party legislature. Then $c_2 \leq c_{m+1}$ if and only if $\hat{y}_B \geq \dfrac{(m-l)\hat{y}_A + 2\sum_{i=n_A+l+1}^{n} \hat{y}_i}{2m} = \tilde{y}_3$, where $\tilde{y}_3 \in (\hat{y}_{n_A+1}, \hat{y}_A)$.

In this case, the relevant threshold ($\tilde{y}_3$) wherein $c_2 \leq c_{m+1}$ belongs to the interval $(\hat{y}_{n_A+1}, \hat{y}_A)$. Therefore, if $\hat{y}_B > \hat{y}_A$, it will be always cheaper for the governing party to promote $\hat{y}_A$ under a *2*-party legislature. This particularity does not allow us to determine a general relationship between the level of polarization under both types of legislatures and the respective costs of promoting $\hat{y}_A$. For instance, when party *B* is highly polarized with respect to party *A,* but its ideological position is to the right of $\hat{y}_A$, we get both $V_2 > V_{m+1}$ and $c_2 < c_{m+1}$. This is true even though that, if party *B* is (left) highly polarized with respect to party *A*, promoting $\hat{y}_A$ is cheaper and more likely to succeed under an *m+1* than under a *2*-party legislature.

3.4. Common pool problem

With few exceptions, we have shown that a greater number of parties positively affects the amount of resources spent on distributive policies only when it implies a larger degree of political polarization. Furthermore, with some exception, it also has been shown that if there are two legislatures with the same number of parties, then spending on pork barrel programs is greater for the legislature with the higher degree of polarization. From these results we conclude that, in the absence of a common-pool problem, it is the degree of

[12] Notice that in equation 17 and 18, we make explicit the interval for which the private offer is strictly positive.

polarization and not the number of parties that affects spending on these types of programs.

Let us consider the effect of introducing a common-pool problem to our framework. For instance, this would be the case if each party in each type of legislature faced a tax utility cost for covering the distributive policy (as in Baron, 1991; and Weingast et al., 1981). Under these circumstances, there will be two channels via which political parties affect spending on pork barrel programs. The first is via the degree of ideological polarization that exists between parties, provided that the government party uses these programs to promote its public policies. The second concerns the number of parties, provided that the parties in the governing coalition face a common-pool problem when deciding on the level of spending on pork barrel programs.

Nevertheless, if these two channels are active, a new prediction emerges, namely that the effect of the number of parties on pork barrel spending must be zero when the level of polarization is sufficiently low.[13] Under this scenario, the governing party do not have to spend resources on distributive policies in order to promote their preferred public policy; consequently, the number of parties in the governing coalition does not have any effect on pork barrel spending.

4. Discussion and conclusions

This paper has analyzed how the interaction between number of parties in a government coalition and polarization between them affects the cost (and the likelihood) of promoting public policies in a legislature. Two types of legislatures have been compared. One with *m+1* parties, where the governing party has to negotiate with *m* different parties; and another with *2* parties, where it only has to negotiate with a single unified party.

The main lesson learned is that the cost to a governing party of promoting a particular public policy (i.e. its spending in pork barrel programs) does not always increase with the number of parties in the legislature. In actual fact, it can be cheaper for a government party to negotiate a public policy (thus making it more likely to succeed) with several but less polarized parties than with a few more polarized parties.

Our results have direct implications on empirical work in this field—namely, the effect of fragmentation on legislative outcomes should be conditioned not only by the number of parties, but also by the degree of polarization between them and some kind of interaction between these two factors. This interaction should allow to test whether the effect of the number of parties on legislative outcomes depends on the degree of polarization between them.

As mentioned in the introduction, the empirical literature has tested whether a greater number of parties in a governing coalition implies larger public spending

[13] For instance, in case I, the total spending on distributive policies is zero if $\hat{y}_A \leq 2\hat{y}_i \ \ \forall i \notin A$.

or debt—the so called weak-government hypothesis. The available evidence does not provide unified support for the weak government hypothesis. At the light of our results, these estimations might suffer from biases inasmuch as there are omitting some of the relevant variables mentioned above. Most of the studies (de Haan et al., 1999; Perotti and Kontopoulos, 2002; Roubini et al., 1989; Woo, 2003) control their estimations only with respect to the effect of the number of parties and some of the usual macroeconomic variables. More specifically, none of these studies take into account the effect of ideological polarization on fiscal outcomes.

Only few studies (Elgie and McMenamin, 2008; Volkerink and de Haan, 2001) control their estimations with respect to both number of parties and polarization. The empirical results documented in these studies are quite mixed, but some interesting results emerge. For instance, Volkerink and de Haan find that the number of parties in a legislature has a positive and robust effect on government spending. They also report a positive, though somewhat less robust effect of polarization on spending. Nevertheless, since in these estimations the effect of the number of parties on government spending is independent of the degree of political polarization, these results might still suffer from a misspecification bias.

Appendix

Willingness to promote $\hat{y}_A$. Let us consider an *m+1*-party legislature. Party *A* prefers to promote $\hat{y}_A$ to y^s if and only if $\sum_{i\in A} u_i\left(y^s, x^*_{i(m+1)}(y^s)\right) \leq \sum_{i\in A} u_i\left(\hat{y}_A, x^*_{i(m+1)}(\hat{y}_A)\right)$. Replacing the utility function, assuming the feasibility of $\hat{y}_A$, and using the fact that $\sum_{i\in A} x^*_{i(m+1)}(y) = X - \sum_{i\notin A} x^*_{i(m+1)}(y)$, where $x^*_{i(m+1)}(y)$ is given by equation 11, the previous inequality reduces to $n \geq m$. Following the same steps, one finds that $n \geq m$ guarantees that party *A* will also promote $\hat{y}_A$ under a *2*-party legislature.

Proposition 1. Let us assume that $\hat{y}_A$ is feasible under both types of legislatures. Thus, the cost of promoting $\hat{y}_A$ under a *2*-party legislature is smaller or equal to that under an *m+1*-party legislature if and only if $c_2 = \sum_{i\notin A} x^*_{i(2)} \leq \sum_{i\notin A} x^*_{i(m+1)} = c_{m+1}$. Using equations 11 and 12, a simple algebraic manipulation shows that this condition reduces to $\hat{y}_B \geq \sum_{i\notin A} \hat{y}_i \big/ m = \tilde{y}_1$.

Now we prove that $\tilde{y}_1 \in \left(\hat{y}_{n_A+1}, \hat{y}_n\right)$. $\tilde{y}_1 < \hat{y}_n$ if and only if $\sum_{i\notin A} \hat{y}_i < m\hat{y}_n$. Since $\hat{y}_n \geq \hat{y}_i \ \ \forall i \notin A$, and $\hat{y}_n > \hat{y}_{n_A+1}$, this inequality always holds. On the other hand, $\tilde{y}_1 > \hat{y}_{n_A+1}$ if and only if $\sum_{i\notin A} \hat{y}_i > m\hat{y}_{n_A+1}$. Since $\hat{y}_{n_A+1} \leq \hat{y}_i \ \ \forall i \notin A$, and $\hat{y}_{n_A+1} < \hat{y}_n$, then this inequality always holds.

Proposition 2. Based on equations 13 and 14, we get $V_2 = V_{m+1}$ if and only if $m(\hat{y}_A - \hat{y}_B) = \sum_{i \notin A} (\hat{y}_A - \hat{y}_i)$. This equality reduces to $-m\hat{y}_B = -\sum_{i \notin A} \hat{y}_i$. Multiplying both sides by two, and adding and subtracting $m\hat{y}_A$, we get $m(\hat{y}_A - 2\hat{y}_B) = \sum_{i \notin A} (\hat{y}_A - 2\hat{y}_i)$, which implies $c_2 = c_{m+1}$. Statements (ii) and (iii) of proposition 2 are proved by following the same steps.

Proposition 3. First we prove that if $\hat{y}_B \le y^s$, then c_{m+1} is always smaller that c_2. The total cost of promoting $\hat{y}_A$ in an *m+1*-party legislature is always given by $c_{m+1} = l(\hat{y}_A - y^s) + \sum_{i=n_A+l+1}^{n} (\hat{y}_A + y^s - 2\hat{y}_i)$. In a *2*-party legislature, where $\hat{y}_B \le y^s$, the cost is given by $c_2 = m(\hat{y}_A - y^s)$. Simple algebraic manipulation shows that $c_2 > c_{m+1}$ if and only if $(m-l)y^s < \sum_{i=n_A+l+1}^{n} \hat{y}_i$. Since $y^s < \hat{y}_i$ for all $i = n_A + l + 1, ..., n$, this inequality always holds.

We now consider the situation in which $\hat{y}_B > y^s$. In this case, $c_2 = \sum_{i=n_A+l+1}^{n} (\hat{y}_A + y^s - 2\hat{y}_B)$. Simple algebraic manipulation shows that $c_2 \le c_{m+1}$ if and only if $\hat{y}_B \ge \frac{ly^S + \sum_{i=n_A+l+1}^{n} \hat{y}_i}{m} = \tilde{y}_2$.

Finally, we prove that $\tilde{y}_2 \in (y^s, \hat{y}_n)$. $\tilde{y}_2 < y^s$ if an only if $(m-l)y^s < \sum_{i=n_A+l+1}^{n} \hat{y}_i$. Since $y^s < \hat{y}_i$ for all $i = n_A + l + 1, ..., n$, then this inequality always holds. On the other hand, $\tilde{y}_2 < \hat{y}_A$ if an only if $l(\hat{y}_A - y^s) + (m-l)\hat{y}_A < \sum_{i=n_A+l+1}^{n} \hat{y}_i$. As much as $\hat{y}_A < \hat{y}_i \;\; \forall i$, and $l(\hat{y}_A - y^s) > 0$, this inequality always holds.

Proposition 4. Notice that $V_2 \ge V_{m+1}$ if and only if $\hat{y}_B \le \frac{\sum_{i=n_A+1}^{n} \hat{y}_i}{m}$. We prove that $\frac{\sum_{i=n_A+1}^{n} \hat{y}_i}{m} < \tilde{y}_2$. If this is true, then it is also true that if $V_2 \ge V_{m+1}$, then $\hat{y}_B < \tilde{y}_2$. Using our result from proposition 3, it follows that $c_2 > c_{m+1}$.

Simple algebraic manipulation shows that $\frac{\sum_{i=n_A+1}^{n} \hat{y}_i}{m} < \tilde{y}_2$ if and only if $ly^s > \sum_{i=n_A+1}^{n_A+l} \hat{y}_i$. Since $y^s > \hat{y}_i$ for all $i = n_A + 1, ..., n_A + l$, then this inequality always holds.

Proposition 5. Based on equations 17 and 18, it follows that $c_2 = m(\hat{y}_A - 2\hat{y}_B)$, and $c_{m+1} = \sum_{i=n_A+1}^{n_A+l}(\hat{y}_A - 2\hat{y}_i)$. Consequently, $c_2 \le c_{m+1}$ if and only if $m(\hat{y}_A - 2\hat{y}_B) \le \sum_{i=n_A+1}^{n_A+l}(\hat{y}_A - 2\hat{y}_i)$. Simple algebraic manipulation shows that this inequality holds if and only if $\hat{y}_B \ge \frac{m-l}{2m}\hat{y}_A + \frac{\sum_{i=n_A+1}^{n_A+l}\hat{y}_i}{m} = \tilde{y}_3$.

It is clear then that $\tilde{y}_3 < \hat{y}_A$. From this, we prove that $\tilde{y}_3 > \hat{y}_{n_A+1}$. This only happens if and only if $(m-l)\hat{y}_A + 2\sum_{i=n_A+1}^{n_A+l}\hat{y}_i > 2(m-l)\hat{y}_{n_A+1} + 2l\hat{y}_{n_A+1}$. By assumption, $\hat{y}_A > 2\hat{y}_{n_A+1}$, which implies that $(m-l)\hat{y}_A > 2(m-l)\hat{y}_{n_A+1}$. On the other hand, since $\hat{y}_i > \hat{y}_{n_A+1}$ for all $i = n_A + 2,...,n_A + l$, then $\sum_{i=n_A+1}^{n_A+l}\hat{y}_i > l\hat{y}_{n_A+1}$. Putting together this inequality with the inequality from the two lines above, it follows that $\tilde{y}_3 > \hat{y}_{n_A+1}$.

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