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POLITICAL DATA FOR APPLIED POLITICAL ECONOMY RESEARCH

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Abstract

The availability of appropriate empirical measures to represent political and institutional factors is a crucial issue in the applied political economy research. This paper is intended as a contribution to the collection and circulation of political data. Having been involved for quite a considerable time in projects on the empirical analysis of political economy models, I have in the end assembled a data-set for the group of western European countries that includes a variety (about 40) of indicators. Some of these indicators have been previously used in the literature, but others are innovative. The categories of variables in the data set are presented and two econometric applications discussed. The first application is an analysis of the determinants of government duration. Differently from most of the literature in this area, the specification of the statistical model is theory-based and not driven by an inductive approach. The second application is an analysis of the determinants of government spending decisions. Again, specific theoretical predictions are tested. The focus is on the role of the ideological (and numerical) fragmentation of the government. The data-set will be soon made available on the WWW and, for the time being, is available from the author upon request.

Keywords: political economy, data collection, government duration, government expenditure.

JEL Classification: C80, D72, D78, H50.

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Introduction

Political economy, defined as the analysis of the interactions between politics and economics, is currently one of the most active fields of research in the economic literature. The typical model in this area combines some relevant aspects of the economic cycle and of the political cycle to address issues concerning the design of institutions, the characteristics of policy-making and the formation of economic policy outcomes. Theoretical predictions are thus obtained that can be tested through systematic econometric analysis. However, taking the models to the data involves the problematic task of defining empirical proxies for a variety of political factors. In principle, such proxies should be strictly theory-based, that is, designed to be fully consistent with the representation of the political cycle as it is given in structural models. Nevertheless, some political phenomena are of an intrinsically qualitative nature, not directly measurable and/or for which only limited raw information is available. This implies that in the construction of political data, scholars must sometimes make concessions to practical convenience. [1]

This paper is intended to be a contribution to the collection and circulation of political data for applied political economy research. Having been involved for quite a considerable time in empirical testing of political economy models, I have in the end assembled a data-set for the group of western European countries that includes most of the indicators previously used in both the economic and the political science applied literature plus a set of new measures specifically constructed to provide an alternative representation of some political factors central to the working of several analytical models.

When presenting a data-set, one has to choose between two possible formats. The first one would be a detailed description of the definition and computational procedures for each individual variable. The second one would be a discussion of a few applications that the data-set allows to undertake. Given the large number of indicators (over 40) and the broad range of theories they refer to, I feel that the first route would produce quite an unsatisfactory output: variables would appear isolated from any theoretical context and the rationale behind their definition would be probably, at least partially, missed. Thus, I prefer the second strategy. After a brief overview of the contents of the data-set (Section 1) and a discussion of the basic sources of raw data (Section 2), I focus on two econometric applications. In Section 3 an empirical test of a structural model of government formation is presented. Section 4 contains a test of a version of the "Fishing from a common pool" model of government expenditure. For both models, a brief description of the formal set-up is proposed, mostly with the purpose of explaining the econometric specification. Moreover, for all the political variables effectively used, a detailed discussion of their definition and computational procedure as well as of their links to the theories is undertaken (that is, political data are placed within a theoretical context). In this way it is possible to stress the theoretical underpinning of indicators

[1] Drazen (2000) and Persson and Tabellini (2000) provide excellent accounts of the state of the art in the theoretical political economy literature. Alesina, Roubini and Cohen (1997) represents a classical example of how theoretical models in this area can be taken to the data.

and hence obtain a better understanding of how such indicators can be used within contexts that differ from those specifically outlined in this paper.[2]

1. An overview of the data-set: sample size, period and categories of political variables

The countries originally covered by the data-set are: Austria, Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway and Sweden. Subsequently, Greece, Spain, Portugal and United Kingdom have been added. The period of observation is the whole of the post World War II era (1945-2000). Of course, for Greece, Spain and Portugal only the periods of effective democratic government are covered. For Germany, given that a temporary administration was in office right after the conclusion of the war, time series start in 1948, with the first political cabinet headed by Mr. Adenauer.

More than 40 indicators (including institutional dummy variables) are collected. These are aimed at representing various dimensions of the political process as they are incorporated in several political economy models. As mentioned in the introduction, some of the indicators have been previously proposed in the economic and political science applied literature. With respect to them, the value added of the data-set is that it provides complete time-series that cover the five post war decades, thus bringing together information that is currently dispersed in various contributions. Other variables are instead innovative, the innovation being related to either the definition of the variable or the type of political factor represented. Such innovative variables can be used to shed additional light on debated issues (as, for example, it is the case of Sections 3 and 4) or to analyse the relevance of theoretical links that so far have received little attention in the applied literature (as it is the case of the analysis in Carmignani, 2001).

Variables in the data-set can be grouped into seven broad categories according to the specific political features they are meant to reflect. The *structure and fragmentation of the ruling coalition* is proxied by indicators of parliamentary size of the coalition, effective number of parties in the coalition (as defined by Laasko and Taagepeera, 1979) and ideological heterogeneity of policy views. Moreover, indicators of the relative size of coalition partners and of the degree of balance of the cabinet formation process are also provided to undertake specific tests of game theoretical models of political bargaining (see, Carmignani, 2001). The *structure and fragmentation of the legislature* is represented again by the effective number of parties in the legislature and by three indices of polarisation reflecting the share of support for extremist parties (Powell, 1982), the overall distribution of political preferences in the party system and the average Euclidean distance on a Left-Right continuum between any two parties in the parliament. Furthermore, an indicator of ideological concentration of the opposition is also computed following the definition proposed by Strom (1985).

Data are also collected to measure the *ideological location of parties and governments.* Basic sources and methods for the definition of a time-varying location of parties on the Left-Right ideological continuum are described in Section 2. Measures of the ideological location of governments are then obtained as weighted averages of the

[2] Both the set of data required to reproduce the results of Sections 3 and 4 and the full data-set will be soon made available on the web. For the time being, they can be obtained from the author upon request.

locations of parties in the ruling coalition, with weights designed to reflect the effective contribution of each party to the process of policy formation. For each legislature, the median party is also identified as the party whose share of seats added to the share of seats of the parties on its right on the ideological scale makes the cumulative sum of shares larger than the majority threshold. Using a similar procedure, based on the share of votes rather than the share of seats, a location for the median voter is also defined from the basic information on the location of individual parties. The Euclidean gap between the location of the median voter (or median party) and the location of the government is then computed for each cabinet.

A further group of variables in the data-set is aimed at capturing basic attributes of the *formateur parties*. Models of cabinet formation stress the central role of the formateur in the process of bargaining over the allocation of portfolios and/or the definition of a common policy proposal. Indicators of the relative size of the formateur, of his share of portfolios, of the relative centrality of his location *vis-à-vis* the location of other coalition partners are thus provided to represent the strength of his bargaining position. This type of information is useful to undertake tests of various theoretical predictions concerning the ability of the formateur to negotiate more favourable agreements. Again, Carmignani (2001) reports evidence on the determinants of the share of portfolios secured in equilibrium by formateur parties.

The *political background and history of incumbent governments and coalitions* is a category in the data-set that includes measures of the cumulative duration in office of all cabinets supported by the same coalition of parties supporting the incumbent and the cumulative duration of all cabinets headed by the same prime minister heading the incumbent (Merlo, 1998). The duration of the process of government formation (defined as the time elapsing between the appointment of the formateur and the swearing-in ceremony of ministers or the investiture vote of the parliament) is also included, together with the time horizon to next scheduled elections, expressed as a proportion of total maximum time between any two scheduled elections.

The *stability of policymakers and legislators* is represented by a group of variables measuring the survival in office of governments and legislatures as well as the effective size of government and legislative turnover. In particular, in addition to the simple duration (in days) of cabinets and legislatures and the associated survival rates (effective duration divided by maximum potential duration), this category includes indices of total and partisan portfolios volatility, alternation in office, parliamentary and electoral volatility. Portfolios volatility (Huber, 1998) essentially refers to the observed number of changes in the structure of portfolios allocation. Alternation in office (Strom, 1985) measures the extent to which parties in an outgoing government are also members of the coalition supporting the new incoming cabinet. Parliamentary and electoral volatility (Powell, 1982) account for the changes in the preferences of the electorate and the distribution of seats in the legislature between two consecutive elections.

Finally, a set of dummy variables are included to account for differences in *institutional arrangements and budgetary procedures*. In terms of institutional arrangements, the focus is on the rules disciplining the cabinet formation process (Diermeier and Van Roozendaal, 1998), the dissolution of the government and the legislature (Laver and Schofield, 1990) and on the electoral law (i.e. proportional versus plurality systems). With respect to budgetary procedures, the dummies included in the data set reflects different arrangements concerning the centralisation of the process (Hallerberg and Von Hagen, 1997).

2. Sources of raw data for the construction of the data-set.

This Section describes the sources of raw information used for the practical computation of the variables in the data-set. First, sources of data on electoral results, government composition, portfolios allocation and partisan membership of individual ministers are considered. Then, the sources and methods for the construction of ideological scales of political parties are discussed.

2.1. *Sources of data on elections, government composition and portfolios allocation.*

Electoral results and distribution of seats for a large group of industrial democracies throughout the XX century are collected by Mackie and Rose (1991 and 1997). They also report a brief summary of major political events in each country (i.e. changes in the form of the State, modifications of the electoral rule, etc.) and provide a detailed directory of parties, with indication of merges, breakaways and splits. This latter bit of information is particularly useful when constructing measures for countries characterised by heavily fragmented legislatures and continuous creation and disruption of political formations. Data in Mackie and Rose have been cross checked with those reported by Mair and Katz (1990) and, for the last decade, with those in the *Political Data Yearbook* (various issues). Updated information on recent electoral contests (i.e. those occurred during 1999 and 2000) and ideological orientation of recently formed parties have been obtained from the web page at www.agorà.stm.it.
Woldendorp et al. (1993 and 1998) is the primary reference for data on the composition of governments. For the group of countries that have experienced an uninterrupted post-war history of democratic party-government, Woldendorp, Keman and Budge provide detailed information concerning the date of formation and the date of termination of each cabinet, the reason for that termination, the composition of the ruling coalition, the name and partisan membership of the prime minister and the name and partisan membership of any individual minister in the executive. They also classify governments on the basis of their type (for instance they separate caretaker governments from ordinary ones) and on the basis of the ideological orientation (left, centre or right) of the supporting coalition. The widespread interest received by the first edition of their data-set implied that country experts double checked the original information and eventually suggested corrections which were then incorporated in the second edition. This in turn guarantees the consistency and reliability of the data. Moreover, I have cross checked the information from this primary reference with data contained in the *Keesing's record of world events* (various issues). Keesing's Archives have also been used to compute for each cabinet the duration of the process of its formation[3] and the allocation of portfolios in the three countries not included in the primary reference (Greece, Spain and Portugal). Finally, the information on the sequence of government transfers has been further checked with the data provided by Alesina et al. (1996), available at the web

[3]At some point of my research, Daniel Diermeier kindly made his data-set on the duration of government formation process (see Diermeier and Van Roozendaal, 1998) available to me. However, in the construction of my own data-set I make use of criteria for the identification of the beginning of the formation process which are slightly different from those adopted by Diermeier and Van Roozendaal, the difference being essentially due to differences in the underlying theoretical hypothesis.

page www.nuff.ox.ac.uk/, and Alesina, Roubini and Cohen (1997, Appendix to Chapter 6).

2.2 Sources of data on the ideological location of political parties

The construction of some of the indicators in the data-set (such as, for instance, the index of ideological fragmentation used in the applications of Sections 3 and 4) requires basic information on the ideological location of political parties. In the applied political science literature this information is usually provided in the form of empirical policy scales. These are uni-dimensional Left-Right representations of the party space. On these scales, individual parties are assigned a specific position according to expert's judgements of the contents of their policy proposals as stated in electoral manifestos. An example of one of such scales is reported in Figure 1 below for the case of the Italian party system in the early '90s. Notice that the ideological continuum is assumed to be defined over the interval [1,10], so that the location of a party *i* is effectively represented as a number θ_i included between 1 and 10, with 1 indicating extreme-left and 10 extreme-right.

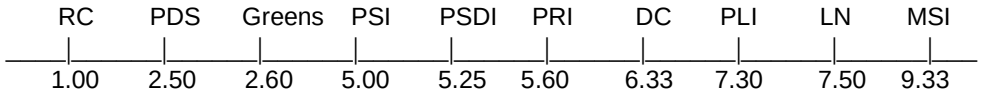


Figure 1. *Ideological location of political parties in Italy in the early '90s* (Huber and Inglehart, 1995). Parties are: Communist Refoundation (RC), Democratic Party of the Left (PDS), Greens, Socialist Party (PSI), Social Democratic Party (PSDI), Republican Party (PRI), Christian Democracy (DC), Liberal Party (PLI), Northern League (LN), Social Movement (MSI).

In fact, given that the policy space is likely to be multi-dimensional, the aggregation of party's policy positions in a uni-dimensional cardinal location might appear as an over simplification. However, there exists both theoretical and empirical arguments to support this approach. On the theoretical side, although models of legislative bargaining with two dimensions have been recently proposed (Baron, 1991; Lupia and Strom, 1995; Laver and Shepsle, 1996 and Diermeier and Merlo, 1998), the problem of identifying stable solutions to voting games implies that most of the contributions in political economy do assume that parties compete on a single dimension. On the empirical side, country experts notice that party's locations on different dimensions tend to be positively correlated (see Laver and Hunt, 1992; Browne and Dreijmaanis, 1994; Laver and Shepsle, 1994 and Huber and Inglehart, 1995).

A major problem in the construction of political indicators for a sample of 16 countries observed over a period of five decades is that comparability in time and space of locations must be ensured. Consider, for instance, a location θ (θ will be a number included between 1and 10). Comparability in space means that the ideological contents of the policy proposals of parties located at θ must be the same in all countries. That is, if party *i* in country A is located at θ and party *j* in country B is located at θ then it must be possible to conclude that their policy preferences are characterised by the same degree of "leftism". Similarly, comparability in time means that if a party *i* is located at θ at time *t* and at time $t + n$ (with $n > 0$), then it must be possible to conclude that the ideological orientation of that party has not changed between *t* and $t + n$.

To guarantee comparability in space what is needed is that the criteria used to evaluate the contents of policy manifestos are the same for all countries. This in turn suggests that only cross-sectional studies that report scales for a large group of countries must be considered as basic sources of information. Fortunately, such studies are rather popular in the applied political science literature. More subtle is instead the issue of how to ensure comparability in time. As a matter of fact, political parties tend to re-locate over time. For example, they could decide to move from extremist positions to more centrist positions in order to attract support from median voters or they might decide to become more extremist so to better differentiate their identity and political message. Whatever the reason that engines this re-location process, its implication is that a unique scale, produced at some specific point in time, cannot be used as the sole reference for the whole sample period 1945-2000. Thus, scales produced at different times and covering different periods must be considered. Then comparability in time is ensured to the extent that these different scales are produced following identical (or similar) criteria for the evaluation of the ideological contents of the policy proposals specified in the electoral manifestos. To select scales with such a desirable feature, among the many available in the literature, I adopted the following strategy. First, I identified spells of overlapping coverage for any two scales compiled at different points in time. Second, for any of such spells and for any country, a group of "non-relocating" parties was identified. Non-relocating parties are parties that, according to the literature, did not significantly change their policy platform over the overlapping periods. Key references for this purpose were the *Political Parties of the World*, Keesing's Publications, the Keesing's Record of World Events, the *Political Data Yearbook* plus several issues of *Comparative Political Studies* and the *European Journal of Political Research*. Third, I selected those empirical scales that for any non-relocating party report the same (or a very similar) location. The rationale behind this strategy is indeed very simple: if a party does not re-locate, then two scales produced at different times must report the same location for that party, otherwise it means that they are not comparable.

In the end, four empirical scales that meet the criteria of comparability in time and space have been used as basic sources of information: Dodd (1976), Browne et al. (1984), Castle and Mair (1984), Huber and Inglehart (1995). Each of these four studies includes most of the countries in the sample. Exceptions are mostly represented by Greece, Portugal and Spain (when non-democratic) and by Luxembourg and Iceland, for which additional sources taken from Laver and Schofield (1990, Appendix B) have been used. Given the coverage explicitly stated by the authors, the post-war era has been partitioned as follows: data in Dodd and Browne et al. cover the period from the second half of the '40s to the first half of the '70s, data in Castle and Mair cover the period between the second half of the '70s and the first half of the '80s, data in Huber an Inglehart cover the period from the late '80s to the '90s. The specific year of switch from one scale to another is set for each country so to coincide with the beginning of an electoral campaign (i.e. the electoral year or the pre-electoral year, depending on when elections are actually held in the electoral year) and hence with the release of new manifestos. A consequence of this approach is that changes in the location of parties are modelled as sudden movements rather than as gradual adjustments that take place over a considerable length of time. In fact, an important decision such as the one of modifying public policy position usually takes time to be made. However, once the decision making process is completed (i.e. a sufficiently large consensus is formed among party delegates to support the new policy views), its outcome (the new location in the policy

space) is incorporated in a new electoral manifesto as a break relative to previous manifestos. Thus, modelling relocations as structural breaks is consistent with the idea of taking electoral manifestos as the basis for judgements on the ideological orientation of parties.

3. Econometric application I: an empirical model of government duration.

Several theoretical models suggest that an excessively high government turnover significantly alters the process of economic policy formation by making politicians more myopic and focused on the short-term. Government instability also affects private agents' incentive to invest by increasing their uncertainty over the future course of economic policy.[4] The analysis of what determines the duration in office of cabinets is therefore of interest to economists as well as political scientists.

In the literature, the issue of cabinet duration has been mostly tackled from the empirical point of view. Early contributions in this area essentially focus on the identification of those attributes of a government which are somehow correlated with its duration in office (see, inter alia, Warwick, 1979 and Strom 1985). This "attributes approach" was challenged by Browne et al. (1984 and 1986), who suggested that stochastic (and hence unpredictable) events determine cabinet termination. King et al. (1990) reconcile these two views by using *event-history analysis* to model the history of a cabinet as a stochastic process whose termination can be affected by structural factors (that is, the attributes of the government) as well as stochastic events. Warwick (1994) develops a comprehensive statistical analysis of cabinet duration in parliamentary democracies building on the unified approach suggested by King et al.[5]

As noted by Laver and Shepsle (1998), empirical research on government duration has been long characterised by an inductive approach: once the appropriate statistical tool is identified (the event-history analysis just mentioned), independent variables are selected on the basis of simple *prima facie* relevance to government survival. What is missing is thus an underlying theory that justifies the choice of a particular specification for the statistical model and/or the design of the empirical indicators that proxy political factors. In fact, the reliance on inductive modelling has been probably due to the lack of a systematic theoretical analysis. Only recently scholars have started building theoretical models of government turnover that are able to explain observed stylised facts in parliamentary democracies (see, for instance, Lupia and Strom, 1995; Baron and Diermeier, 1998; Diermeier and Merlo, 1998; Laver and Shepsle, 1998).

In this Section I consider a version of the model proposed by Lupia and McCubbins (1998) to derive a set of theoretical predictions concerning the stability of cabinets. These predictions are then tested using the political indicators of the data-set previously described. The specification of the econometric model is strictly theory-based. The

[4] A classical argument is elaborated by Alesina and Tabellini (1990) and Tabellini and Alesina (1990) with respect to the accumulation of public debt. Alesina et al. (1996) investigate the impact of the frequency of government changes on the rate of economic growth. Lohman (1996) studies myopia in monetary policy when the incumbent faces a positive probability of being replaced in office. Detailed surveys of this type of literature can be found in Drazen (2000), Persson and Tabellini (2000) and Carmignani (2000).

[5] For a detailed survey of the empirical literature on cabinet survival see Grofman and Van Roozendaal (1997).

design of the political indicators is described in details in order to stress their links with the theory and the differences from similar indicators previously used in the literature.

3.1 The theoretical framework for the analysis of government stability

Consider a three-party system $N = \{1, 2, O\}$. Relative shares of parliamentary seats for these three parties are denoted by the vector $s = (s_1, s_2, s_O)$, with $s_i \in (0, ½)$, $\Sigma_{i \in N} s_i = 1$ and $i = 1, 2, O$. Thus, none of the parties controls an absolute majority of seats, but any two-party coalition is winning under majority rule.[6] Furthermore, assume that parties ideal policies are represented on a uni-dimensional Left-Right continuum by the vector of cardinal locations $\theta = \{\theta_1, \theta_2, \theta_O\}$: $\theta_i \in [0,1]$, 0 represents extreme-left and 1 extreme-right.
The utility of generic party *i* is defined as:

$$(3.1) \quad U_i = s_i + u(g_i^j); \quad u' > 0; \; j = 1, 2, O \text{ and } j \neq i.$$

The parameter g_i^j represents the total valuable product created by a government agreement of party *i* with party *j*. Following Diermeir and Merlo (1998) and Lupia and McCubbins (1998), this product depends on two factors: the degree of homogeneity of the policy preferences of the two coalition partners an the state of the economy. Formally:

$$(3.2) \quad g_i^j = g\left(\left|\theta_i - \theta_j\right|, W\right) \quad \text{with } \frac{\partial g}{\partial\left|\theta_i - \theta_j\right|} < 0 \text{ and } \frac{\partial g}{\partial W} > 0$$

The intuition underlying equation (3.2) is that a government agreement is likely to produce a higher utility for its members if their socio-economic interests are similar and if positive economic conditions (i.e. high output growth and low inflation) are generated. Equations (3.1) and (3.2) imply that parties care about parliamentary seats *per se* as well as benefits from holding office and policy outcomes. That is, parties in this model have both electoralist and partisan motivations.
In line with the literature, government is interpreted as the equilibrium outcome of a bargaining process over the partition of the product g_i^j. This partition can be operationalised through a specific allocation of key portfolios, for instance, or the definition of a common policy proposal located at some intermediate point between θ_i and θ_j. Formally, let c_i be the quota of total valuable product secured by party *i*: $c_i \in (0,1)$ and $c_i + c_j = 1$. The utility of coalition partners *i* and *j* can then be written as:

$$(3.3.a) \quad U_i = s_i + c_i g_i^j \quad \text{and} \quad (3.3.b) \; U_j = s_j + c_j g_j^i$$

whilst the utility of the opposition party is simply equal to its share of parliamentary seats.

[6] This set of assumptions concerning the number and the relative size of parties are common to most theoretical models of government formation and disruption.

As suggested by Laver and Shepsle (1998), an appropriate approach to the theoretical analysis of government stability is to assume the existence of a status-quo equilibrium government (that is an original government agreement) and then identifying under what circumstances such a status-quo survives the realisation of critical events (shocks). The type of shock I have in mind is a *public opinion shock* (Laver and Shepsle, 1998 consider other possible types of critical events). At some stage of government life, before that the constitutionally established term of office of the legislature expires, opinion polls are released (or local/European elections are held) so that parties can formulate new expectations about their likely share of seats and coalition-forming opportunities were elections held immediately (or in the near future).
Formally, let $E(s_i^*)$ be the expectation of party *i*, based on the opinion polls, of its share of seats s_i^* in the hypothetical new legislature. Similarly, $E(c_i^* g_i^{j*})$ is the expectation on coalition-forming opportunities. The overall expected benefit from terminating the current legislature is thus equal to:

(3.4) $b_i = E(s_i^*) + E(c_i^* g_i^{j*})$.

However, anticipated elections are also assumed to involve an opportunity cost d_i which is larger the earlier these elections are held relative to the conclusion of the parliamentary term as established by the Constitution. Therefore, the net benefit from terminating the current regime is $b_i - d_i$. Notice that the presence of a subscript *i* on *d* means that the opportunity cost is not necessarily identical for all parties.
Let the status-quo be represented by a coalition of parties 1 and 2: the total valuable product associated to such coalition is allocated between the two parties with quotas equal to c_1 and $c_2 = 1\text{-}c_1$. As the public opinion shock is realised and expectations formed, the original government agreement is subject to re-negotiation. The structure of this re-negotiation process is assumed to be as follows. Party 1 has the right to move first. It can either make no new offer or make a new offer to any of the other two parties. If it makes no new offer, then party 2 has the right to move (see below). If an offer is made, then the party to which this offer is directed can either accept or reject it. If the offer is accepted, then a new equilibrium is achieved. If the offer is rejected, party 2 has the right to move. Similarly to party 1, party 2 can either make no new offer or make a new offer to any of the other two parties. If party 2 makes no new offer, then new elections might be called as long as there is a legislative majority demanding them. If party 2 makes a new offer, then the party to which such an offer is directed can either reject or accept. If the offer is accepted, then a new equilibrium is reached. If the offer is rejected, then new elections can be called to the extent that there is a legislative majority demanding so. Finally, bargaining is costly for the two offering parties (party 1 and party 2): each of them pays a cost K_i (in this case $i = 1, 2$) that is inversely related to the returnability in office. The underlying idea is that when making a new offer (that is, when starting the re-negotiation process) party 1 and 2 modify a status-quo in which they are favoured, relative to O, in exchange for an uncertain future. Since the more favourable status-quo condition of 1 and 2 relative to O essentially originates from to the fact that they hold office, it seems appropriate to relate the size of the cost of bargaining they bear to the probability that after the re-negotiation they are still included

in the new government . This probability is in turn captured by the degree of returnability in office.[7]

The possible outcomes of the re-negotiation process are summarised as follows:

1. none of the two offering parties makes a new offer and there is no legislative majority demanding new elections;
2. a new offer is made by at least one of the two offering parties, but it is rejected and there is no legislative majority demanding elections;
3. none of the two offering parties makes a new offer, but there is a legislative majority demanding new elections;
4. a new offer is made by at least one of the two offering parties, but rejected and there is a legislative majority demanding elections;
5. a new offer is made by one of the two offering parties and accepted,
   (a) the offer is made to the other offering party,
   (b) the offer is made to the opposition party O.

The status-quo is preserved (that is, the original government agreement survives) only in cases 1 and 2. Cases 3 and 4 gives rise to an anticipated election. Case 5a generates a reshuffle (that is, an amendement to the existing agreement). Case 5b produces a new coalition. It is worth stressing that reshuffles are here considered as new cabinets: the composition of the ruling coalition does not change, but the structure of portfolios allocation and/or the set of policy proposals that characterise the new government are different from those that characterised the original one.

Lupia and McCubbins (1998) characterise the Subgame perfect Nash equilibrium for this type of games. It turns out that two necessary and sufficient conditions must be jointly met for case 1 or case 2 to occur after a public opinion shock. The first condition is that there must be no legislative majority that prefers new elections to the maintenance of the status-quo. The second condition states that both offering parties (1 and 2) must prefer the status-quo to an alternative agreement that does not involve new elections.

The first condition requires that for at least two parties in the system the following inequality holds:

$$(3.5) \quad b_i - d_i < s_i + c_i g_i^j$$

On the l.h.s. of (3.5) is the net expected benefit of party *i* from terminating the current legislature. On the r.h.s. is the utility of party *i* in the status-quo. Notice that, being the status-quo represented by a coalition of party 1 and 2 with quotas c_1 and c_2 respectively, the term on the r.h.s. is equal to $s_1+c_1g_1^2$ for party 1, to $s_2+c_2g_2^1$ for party 2 and to s_O for the opposition party O. Any party for which (3.5) holds will prefer preserving the existing government to anticipated elections. If there are at least two parties (any two parties) for which this is true, then no legislative majority can be formed that demands new elections.

Two implications of equation (3.5) are worth mentioning. The probability that the inequality holds is increasing in the value of g_i^j for the two governing parties. It can be therefore concluded from equation (3.2) that the stability of the existing agreement is enhanced when the coalition is more ideologically homogeneous and when economic

[7] The bargaining model is static. For dynamic games of political bargaining see Diermeier and Merlo (1998).

conditions are positive. Furthermore, since the opportunity cost of changing regime is assumed to decrease as the constitutional maximum term of office for the legislature approaches, one should observe rising hazards for the incumbent government. That is, the probability that a government is terminated should increase with the tenure in office of the government itself (in such a case the stochastic process used to represent the life of a cabinet would exhibit *positive duration dependence*). Alternatively, one can also conclude that a longer time horizon to next scheduled elections makes the government more stable. These theoretical predictions will be subject to empirical test.

The second necessary and sufficient condition for the survival of the existing government agreement is met if and only if no offering player prefers the best acceptable offer it can make to sustaining the agreement (see again Lupia and Strom, 1995 and Lupia and McCubbins, 1998 for a proof). The best acceptable offer a player *i* can make to a player *j* is a quota c_j of g_i^j such that player *j* is indifferent between accepting or rejecting it. Given the two-stage structure of the re-negotiation process, the best possible new agreement that does not involve new elections for any of the offering players is one where a coalition is formed by this offering player with the opposition party and the offering player gets almost the whole of the valuable product associated to that coalition. That is, the second condition for survival is met iff:

$$(3.6) \quad (1-\varepsilon)g_2^0 - K \leq c_2 g_2^1 \quad \text{and} \quad (1-\varepsilon)g_1^0 - K \leq c_1 g_1^2$$

where ε is a small positive constant.

An interesting theoretical implication of equation (3.6) is that the stability of the existing agreement is higher the lower the cost of re-negotiation. This means that low returnability in office makes the incumbent less stable. This result should not be surprising: the low the probability of being included in the next governing coalition, the smaller the incentive for offering parties to terminate the incumbent government.

A final word should be spent on the role of the size of the ruling coalition. According to equation (3.5), if the two offering parties together control a large share of parliamentary seats, given that seats are valued *per se*, then in a three-party system it is very unlikely that a legislative majority preferring new elections to the status-quo will be formed. In this sense, the larger the size of the ruling coalition, the more stable the resulting government agreement. However, one can well imagine the case of a polarised society where the opposition party is non-coalitionable and controls slightly less than 0.5 of seats and where one of the other two parties is small. In such a case, the ruling coalition will be minimal winning in the sense of controlling slightly more than the absolute majority of seats. In spite of that, stability of the cabinet would be ensured by the fact that neither the large coalition member nor the opposition party (which can hardly expect to increase its share of seats and has no chances to be included in the next coalition) would prefer elections to the status-quo. Thus, according to the analytical model here proposed, the effect of the size of the coalition on the stability of the cabinet would be ambiguous. Nevertheless, also considering that Diermeier and Merlo (1998) conclude that the majority status of the coalition enhances its stability, in addition to the theoretical arguments just discussed, I will also test the proposition that larger coalitions are more stable.

3.2 Design of empirical proxies and econometric specification.

In line with the previous literature I use event history analysis and estimate the following statistical model of cabinet duration:

$$(3.7) \quad \lambda_t(t;\mathbf{z}) = \exp(\mathbf{b}'\mathbf{z})\lambda_0(t)$$

where λ_t (the hazard function) is the probability that a cabinet that lasted until time t will terminate between t and $t+dt$, $\mathbf{z}$ is a set of covariates (explanatory variables), $\mathbf{b}$ is a set of coefficients to be estimated and λ_0 (the baseline hazard function) is the hazard function for a cabinet such that $E(\mathbf{z})=0$. The model is formulated so that a positive coefficient on a covariate means that higher values of that covariate increase the probability that a government terminates and hence reduce duration.
As first discussed by Cox (1972 and 1975), coefficients in model (3.7) can be estimated by a semi-parametric procedure that does not require any *ad hoc* assumption to be formulated concerning the underlying distribution of duration data. Given a sequence of observed terminations at times $t_1<\ldots<t_m$, the likelihood function is formed by the product taken over all terminations of the conditional probability that a cabinet still in office at a generic time t_{j-} will terminate at time t_{j+}:

$$(3.8) \quad \frac{\lambda(t_j;\mathbf{z}_j)}{\sum_{k\in\Re_{(t_j)}}\lambda(t_j;\mathbf{z}_j)} = \frac{\exp(\mathbf{b}'\mathbf{z}_j)}{\sum_{k\in\Re_{(t_j)}}\exp(\mathbf{b}'\mathbf{z}_{(k)})}$$

where $\mathbf{z}_j$ is the set of covariates associated to the cabinet terminating at t_j, k denotes the generic cabinet still alive at time t_j, $\mathbf{z}_{(k)}$ is the set of covariates associated to the generic cabinet still alive at t_j and $\Re_{t(j)}$ is the set of all cabinets still alive at t_j (that is, the risk st at time t_j).[8]
Differently from most of the literature in this field, a strictly theory-based approach is adopted in the specification of the set of covariates $\mathbf{z}$ in model (3.7). According to the theretical arguments developed in Subsection 3.1, $\mathbf{z}$ will include proxies for the size of the coalition, the degree of fragmentation of the coalition, the degree of returnability in office and the state of the economy. The empirical relevance of the prediction that hazards are rising over time will instead be verified by looking at the curvature of a integrated hazard function (see below): if such function, plotted against time, displays a convex curvature, then this can be taken as supportive evidence of positive duration dependence.

To represent the size of the coalition I use the share of seats held by the coalition as a proportion of total parliamentary seats (SHARE). In addition to that, a dummy variable MAJORITY is defined that takes value 1 if the coalition effectively controls the absolute majority of seats. Although coalitions are the norm in most western European countries (with the exception of the UK), there are several cases of single-party governments, especially in Sweden, Norway and Denmark. For these cabinets, SHARE

[8] The estimation method proposed by Cox (1972 and 1975) also accounts for possible ties and censoring of duration data. Details can be found in Kiefer (1988).

is simply equal to the share of parliamentary seats held by the supporting party, excluding all parties eventually giving external support.
More difficult is the design of a proxy for the degree of fragmentation of the coalition. In a two-party coalition (as it is the case of the theoretical model of the previous subsection), the appropriate measure of ideological diversity (the inverse of ideological homogeneity) would be the Euclidean gap between the location of the two coalition partners on the Left-Right policy scale. However, one needs to consider that in the real world, coalitions often involve more than two parties. A first possibility would be using a dummy variable coded as one if the coalition is ideologically connected. Such a dummy would discriminate between homogenous and non homogenous coalitions, but it would not capture different degrees of heterogeneity (or homogeneity). Warwick (1992) takes the range and the standard deviations of the locations of parties on a ten points Left-Right scale as proxies for ideological heterogeneity. This solution seems indeed to be consistent with the theoretical formulation of the model of cabinet turnover. I thus build on Warwick's suggestions to construct four different proxies for ideological heterogeneity. These are defined as follows:

(3.9.a) $\text{ID1} = \dfrac{n\sum_{i=1}^{n}\theta_i^{\,2} - \left(\sum_{i=1}^{n}\theta_i^{\,2}\right)}{n(n-1)}$, (3.9.b) $\text{ID2} = \dfrac{\sum_{i=1}^{n}(\theta_i - \delta)^2}{n}$,

(3.9.c) $\text{ID3} = \sum_{i=1}^{n} l_i(\theta_i - \delta)^2$, (3.9.d) $\text{ID4} = \sum_{i=1}^{n} l_i\left|\theta_i - \delta\right|$

where $\delta = \sum_{i=1}^{n}(l_i\theta_i)$, l_i is the share of coalition seats of generic coalition partner *i*, θ_i is the location on a ten points Left-Right scale of generic coalition partner *i*, *n* is the number of partners in the coalition and absolute values in (3.9.d) indicate Euclidean gaps.
ID1 is a simple measure of the variance of the policy locations of parties in the coalition. the other three measures are instead based on the Euclidean distance between a party's location and the weighted average of all parties locations. This latter can be taken to represent the location of the coalition as a whole and under the hypothesis of a "party government" form of decision making (see Lave and Shepsle, 1994), it also represents the ideological location of the cabinet. Notice also that in ID3 and ID4 the Euclidean gap is weighted by the size of the party so that ideological homogeneous increases when a significant contribution to total coalition seats comes from a party with relatively different policy views from those of the other partners.
In addition to ideological fragmentation, the vector **z** will include the effective number of parties in the coalition (ENP) as a measure of the numerical fragmentation of the coalition. Following Laasko and Taagepeera (1979), ENPis defined as:

(3.10) $\dfrac{1}{\sum_{i=1}^{n} l_i^2}$

The rationale behind the inclusion of ENP among the set of covariates is that in the real world not all coalitions consists of two parties. As a matter of fact, the average number of coalition partners in the group of western European countries (excluding the UK) over the period 1945-1999 is slightly larger than 3 (3.17) and two-party coalitions (albeit the most frequently observed type of coalition) represent less than 50% of all observed cases of coalition governments. The larger the number of parties in the coalition, the more likely it is that these parties will experience ideological conflicts, thus reducing the total valuable product of their government agreement.
The degree of returnability in office is proxied by the average past alternation in office. Strom (1984) defines alternation in office as the total share of seats held by parties entering the government plus total share of seats held by parties leaving the government. Suppose that there are three parties in the legislature, 1, 2 and O. Their share of parliamentary seats are s_1, s_2, s_O, where $s_1 + s_1 + s_O = 1$. Consider two cabinets, cabinet I is supported by parties 1 and 2. Cabinet II is supported by parties 2 and O. Alternation in office between Cabinet I and Cabinet II is thus $s_1 + s_O$. Clearly, the higher the alternation in office, the lower the returnability. For each cabinet, I compute the average of past values of alternation in office and obtain an indicator RETURN which is an inverse measure of returnability. Implicit in this definition is the assumption that parties have adaptive expectations over their chances of being included in the next governing coalition. Such an assumption is probably restrictive, nevertheless, as it will be discussed below, RETURN has quite a strong explanatory power in the econometric model.
Finally, the state of the economy is proxied by the average monthly growth rate of the industrial production index (IPG) and the consumer price index (CPI) over the life of a cabinet. Larger values of IPG represent positive economic conditions. In fact, it could be argued that rather than at industrial production, agents form their perception of the state of the economy by looking at the rate of unemployment. The choice of IPG as explanatory variable is motivated by the fact that monthly time series of the rate of unemployment going sufficiently back to the past are not always available for all countries of the sample.
CPG instead is a measure of inflation and hence higher values are indicators of negative economic conditions. Negative economic conditions are also captured by the rate of change of CPG (DCPG) and the volatility of inflation (VOLCPG).

3.3 Empirical results

The sample of this analysis includes 224 cabinets (both coalitions and single-party) formed between 1960 and 1995 in 11 western European democracies (Austria, Belgium, Denmark, Finland, France, Germany, Italy, Luxembourg, the Netherlands, Norway and Sweden). In line with the literature on cabinet duration, I exclude the UK from the sample since they are characterised as a single-party majority system, the other countries being coalition systems. I also exclude Greece, Portugal and Spain that were not democracies for part of the sample period. Finally, I must exclude Iceland and Ireland because my primary sources of economic data do not provide sufficiently long and comparable monthly time-series for the industrial production index. The beginning of the sample period is set at 1960 since this is the year in which economic time-series start for most countries. All cabinets formed in 1995 are included. Duration is computed according to the criteria stated in Woldendorp et al. (1998).

According to the theory outlined in Subsection 3.1, government duration should increase the more homogeneous the coalition and the lower the degree of returnability in office. Positive economic conditions during the term of office as well as the majority status of the coalition (or alternatively its relative size) should both produce more stable cabinets. This implies, given the formulation of the econometric model in equation (3.2), that the estimated coefficients on MAJ (or SHARE) and RETURN should be negative, whilst those on any of the ID variables and on ENP should be positive. To the extent that positive economic conditions are represented by high growth and low and stable inflation, I also expect to find a negative coefficient on IPG and a positive coefficient on CPG (or DCPG) and VOLCPG.

Table A1 in the Appendix reports the results obtained for the full sample.[9] Model (1) is a purely political specification. Notice immediately that all variables display estimated coefficients of the expected sign, thus providing support to the theoretical model. However, the coefficient on ENP is not statistically different from zero at usual confidence levels. This implies that the type of fragmentation that really matters for cabinet stability is ideological rather than numerical (that is, the one captured by the ID variables). The variable ID displayed in the table is computed according to (3.9.a). When the other definitions of ideological diversity are used instead of ID1, the estimated coefficient remains positive, but the standard error increases (albeit not for ID2). The marginal effect of RETURN on the hazard function is smaller in absolute value than the one of MAJ and ID, but strongly significant in statistical terms (the estimated coefficient is different from zero a the 1% level of confidence). Results are not qualitatively altered when SHARE replaces MAJ: larger coalitions are more stable than smaller ones once controlling for their degree of ideological (and numerical fragmentation). The coefficient on ENP does not become significant even when the model is re-estimated after dropping ID. This result is in contrast with most of the literature (see Grofman and Van Roozendaal, 1997) and could be explained by the differences in the specification of the r.h.s. of the statistical model.

In Model (2) economic variables are added to the set of covariates. All previous findings concerning the political variables hold true. Moreover, the pattern of coefficients on CPG and IPG suggests that effectively economic conditions do influence cabinet stability: the higher the rate of production growth and the lower the rate of inflation the higher the survival rate of the incumbent government. Again, results do not significantly change when SHARE replaces MAJ and definitions of ID other than ID1 are used (only in the case of ID4 the coefficient becomes not statistically different from zero even at the 10% confidence level). In Model (3) the rate of change of inflation DCPG is used instead of the rate of inflation CPG. Its estimated coefficient is however largely insignificant, whilst all other results are confirmed. The inclusion of CPGVOL on the r.h.s. does not produce substantial modifications and its estimated coefficient is not even close to being significant.

Model (4) is equivalent to Model (2), but it is estimated on the sample of coalitions rather than governments. The focus is thus on the determinants of ruling coalition duration and hence reshuffles are not treated as government terminations. This approach is in contrast to the theoretical model of Subsection 3.1, but in line with Diermeier and Merlo (1998). The size of the coalition and the degree of returnability in office still significantly affect duration, whilst indicators of fragmentation (both numerical and

[9] Additional results mentioned in this section and not reported in the Appendix (to save space) can be obtained from the author upon request.

ideological) do not seem to have much explanatory power. As for economic variables, the coefficient on IPG fails to pass a zero restriction test at usual confidence levels and the one on CPG is unexpectedly negative. The idea that inflation should enhance stability is at odds with the theoretical formulation. However, when DCPG is used instead of CPG a more intuitive result is obtained: the faster the growth of inflation during the term of office, the lower the survival of the incumbent. Moreover, the effect of DCPG is particularly strong. It turns out that for a 1% increase in the rate of inflation, the probability of a coalition to collapse increases by slightly more than 1/3.
The last bit of evidence is presented in Figure 1 in the Appendix. This is a plot of the integrated hazard function against time. The integrated hazard function is defined as:

$$(3.11) \quad \Lambda(t) = \int_0^t \lambda(u)du$$

The plot in Figure 1 is generated from Model (2), but those obtained for other model specifications are almost identical. It is clear that the integrated hazard is convex. This means that the hazard rate is increasing over time: the longer a cabinet has been in office, the higher the probability that it will terminate in the near future. This positive duration dependence of cabinet hazards is consistent with the theoretical prediction based on decreasing opportunity costs of ending the current regime. An additional result that supports the theory in this respect is obtained when entering the time horizon to next scheduled elections (computed as the number of days separating the formation of a new cabinet from the constitutionally fixed term of the next electoral contest and expressed as a proportion of the total maximum number of days between two consecutive elections) among the set of covariates. This variable displays a negative coefficient. A longer time horizon thus guarantees longer survival by rising the opportunity costs of dissolution of the legislature.[10]

3.4 Summary of results from the first econometric application.

The econometric analysis of Subsection 3.3 yields the following results. Cabinet survival is positively correlated to the size and the degree of ideological homogeneity of the ruling coalition and to the state of the economy (as represented by production growth and inflation). A negative impact on survival comes from returnability in office (higher returnability reduces stability). There is also evidence that the degree of numerical fragmentation of the coalition does not play any statistically significant role. Finally, the probability that a government will collapse at some point in the near future increases the longer the tenure of the government itself.
All these results have a solid theoretical underpinning and broadly support the analytical framework outlined in Subsection 3.2. More specifically, when coalition partners have similar policy preferences (that is, when they are ideologically homogeneous), then the total valuable product generated by a government agreement is greater. This in turn

[10] All econometric models of cabinet duration in Table A1 have been subject to sensitivity analysis by splitting the sample on the basis of values of the covariates and then checking the stability of estimated coefficients. As a test of model adequacy I have performed a Log-rank test of the null hypothesis H_0 : **b** = 0. As suggested by Kiefer (1988), low p-values in this test are supportive of good model adequacy. I obtain a p-value of .000 for all the four models.

makes the agreement itself more stable when critical events occur that might engine a re-negotiation process. The total valuable product of the government agreement is also affected by the economic conditions during the term of office of the cabinet. This explains why high growth and low inflation increases cabinet stability. The degree of returnability in office is inversely related to he size of bargaining costs. When a political shock is observed, the incentive to re-negotiate the status-quo decreases the higher the probability for parties in the ruling coalition not to be included in the next government agreement. A high returnability (measured by past alternation in office) increases this probability and rises the hazard for the incumbent cabinet. Finally, as the constitutionally established parliamentary term approaches, the opportunity cost of changing regime decreases and, for any given realisation of the public opinion shock, this makes cabinet terminations more likely. In empirical terms, this mechanism is reflected by the curvature of the integrated hazard function.

Relative to the existing literature in this area, the analysis of this Section introduces some innovation. First, when considering a strictly theory-based specification for the statistical model, numerical fragmentation (as measured by the effective number of parties in the coalition) is not found to be an important determinant of cabinet duration. What really matters for duration is the degree of ideological fragmentation, of which I propose four different measures that build on Warwick (1992). Second, a systematic account of returnability is provided. A theoretical mechanism linking returnability to duration is suggested and the empirical relevance of such a mechanism tested. Third, the econometric model is estimated using observations on the duration of both cabinets and ruling coalitions. In this latter case, reshuffles are not considered as cabinet terminations. Although there is little difference in the role of political variables between the two cases, the role of economic variables does change. When coalitions are the object of investigation, more than the growth rate of industrial production, it is the rate of change of inflation that captures the effect of worsening economic conditions on the probability of cabinet collapse.

4. Econometric application II: determinants of public expenditure in Europe.

A largely debated issue in the political economy literature concerns the determinants of fiscal policy outcomes. Building on the observation that there is considerable heterogeneity in the cross-country patterns of deficits, debt accumulation and public expenditure growth, several authors propose models where political and institutional features affect the fiscal policy formation process.[11]

Specific attention has been devoted in recent times to the "fishing from a common pool argument". In a nutshell, the idea goes that in countries characterised by decentralised spending and centralised financing, parties with different preferences over the composition of public consumption internalise only a fraction of the cost of current spending. A non-cooperative equilibrium with spending in excess over revenues is then determined. (see Velasco, 1998 and Drazen, 2000; see also Alesina and Drazen, 1991 and Alesina, 2000 for a related approach based on the model of war of attrition). The punch-line of this strand of the literature is thus that more fragmented governments should be associated to greater spending and, possibly, larger deficits.

[11] Optimal surveys of this strand of the literature are available, *inter alia*, from Alesina and Perotti (1995), Drazen (2000) and Persson and Tabellini (2000).

Making use of the political indicators of the data-set described in Section 1, in this Section I investigate the empirical relevance of a version of the common pool argument. More specifically, I test the prediction that more fragmented governments are associated with higher levels public consumption once controlling for other potential economic and political determinants of expenditure. It turns out that results are sensitive to the design of the proxies that represent fragmentation and this could explain the somehow contradictory findings so far obtained by the empirical literature (see below the discussion in Subsection 4.2). As for the previous econometric application, I start with an outline of the theoretical framework and then move to the description of the econometric specification and of the empirical indicators.

4.1 A theoretical model of decentralised spending

The following two-period theoretical model is a slightly modified version of the approach proposed by Persson and Tabellini (1998). Suppose that two parties (*L* and *R*) are involved in the process of budget formation.[12] Each party maximises the utility function of the representative individual in its supporting constituency (constituencies and parties are of equal size):

$$(4.1) \quad U^i = u(g_1^i) + u(g_2^i) \qquad i = L, R.$$

where g_t is public spending (t = 1,2) , $g^L{}_t$ and $g^R{}_t$ are two types of public consumption and $u(\cdot)$ is a concave function.

Equation (4.1) incorporates the assumption that individuals in the supporting constituency of party *R* only care about g^R and individuals in the supporting constituency of party *L* only care about g^L. Thus, both parties and constituencies hold different preferences over fiscal policy outputs. Results would not be affected if it were assumed that individuals in group *i* also care about g^j ($j \neq i$, j = L, R), as long as they assign a greater weight to g^i. In other words, the mechanism that generates the over-issuance of public debt is effective if the two constituencies (and hence the two parties) maintain policy views that are to some extent heterogeneous.

Financing of public spending is *centralised*: a common pool of resources is available to pay for both types of public consumption. Since tax distortions are not central to the argument, it can be assumed that these resources are equal to one unit of output in each period. Moreover, debt can be issued in the first period to cover deficit, but it must be repaid in the second period. All this implies that the government budget constraint in the two periods can be written as follows:

$$(4.2.a) \quad g_1 = g_1^L + g_1^R = 1 + b \quad \text{and} \quad (4.2.b) \quad g_2 = g_2^L + g_2^R = 1 - b$$

where *b* denotes debt.

Spending instead is *decentralised*: in each period, both parties simultaneously and non co-operatively propose a spending level g_t^i for their constituency. If the two

[12] The most obvious situation is one where *L* and *R* share office in a coalition government. Alternatively, one might think of a case where party *L* (or *R*) alone forms the executive, with party *R* (or *L*) giving external support in exchange for the possibility of effectively contributing to budget formation.

proposals are jointly feasible (in the sense that they imply a total public spending which is not larger than the total amount of resources available inclusive of debt), then they are implemented. If, instead, they are not, then each party gets half of the total available output (net of debt repayment in the second period). Formally:

$$\text{(4.3.a)} \quad g_1^i = \begin{cases} p(g_1^i) \text{ if } p(g_1^i) + p(g_1^j) \le 2 \\ 1/2 \quad \text{otherwise} \end{cases}$$

$$\text{(4.3.b)} \quad g_1^i = \begin{cases} p(g_2^i) \text{ if } p(g_2^i) + p(g_2^j) \le 1 - b \\ \frac{1}{2}(1-b) \quad \text{otherwise} \end{cases}$$

where $p(g_t^i)$ is the time t proposal of party i and the maximum amount of debt which can be issued in the first period under the assumption that it must be paid back in the second period is 1.

The model can be solved by backward induction. Consider the second period Nash strategy. Since utility is strictly increasing in g_2^i, both parties go for the whole pie: $p(g_2^i) = 1\text{-}b$. However, these two proposals are not jointly feasible and hence each party will get half of total feasible spending:

$$\text{(4.4)} \quad g_2^R = g_2^L = \frac{1}{2}(1-b) \text{ and total spending is } g_2^* = 1 - b.$$

In the first period, bidding for the whole pie is not costless (as instead it is in the second period) since higher spending in period 1 reduces the resources available to finance spending in period 2. Spending in the two periods are linked through equation (4.4). To see this, use equation (4.4) to define the second period utility in equation (4.1):

$$\text{(4.5)} \quad U^i = u\left(g_1^i\right) + u\left(\frac{1-b}{2}\right)$$

From budget constraint (4.2.a), $b = (g_1^R + g_1^L - 1)/2$. Equation (4.5) can be immediately rewritten as:

$$\text{(4.6)} \quad U^i = u\left(g_1^i\right) + u\left[1 - \frac{(g_1^i + g_1^j)}{2}\right]$$

The first order condition for the maximisation of (4.6) yields:

$$\text{(4.7)} \quad u_g\left(g_1^i\right) - \frac{1}{2}u_g\left[1 - \frac{(g_1^i + g_1^j)}{2}\right] = 0$$

where a subscript g on u denotes the first derivative of the u function w.r.t. to argument g.

Equation (4.7) implicitly determines the proposal of party *i* in period 1. The symmetry of the problem implies that $p(g_1^i) = p(g_1^j)$ which in turn guarantees that proposals are implementable. Given the assumption that the function *u* is concave, the first order condition also implies that $g_1^i > g_2^i$ and hence that $g_1^R + g_1^L > g_2^R + g_2^L$ or $g_1 > g_2$. Since $g_1 = 1 + b$ and $g_2 = 1 - b$, then for g_1 to be greater than g_2 it must be that $b > 0$: in equilibrium, a positive amount of debt is issued.

This result can be compared with what would be obtained if the two parties co-operate (centralised spending setting) or if a benevolent social planner that weighs the two constituency equally were in charge of fiscal policy making. The maximisation problem would be defined as:

$$(4.8) \quad \max_{g_1, g_2} u(g_1) + u(g_2) \quad \text{subject to } g_1 + g_2 \leq 2$$

The corresponding first order condition is:

$$(4.9) \quad u_g(g_1) = u_g(g_2)$$

so that in equilibrium $g_1 = g_2 = 1$, $g_t^i = ½$ and $b = 0$.

The intuition behind the result is that in the decentralised spending setting, each party internalises only ½ of the cost of current spending (see equations (4.6) and (4.7)) and this represents an incentive to overspend in the first period. Notice also that the larger the number of parties fishing from the common pool of resources, the greater the equilibrium level of debt in the first period. This is clear since, with *n* parties, each of them internalises only $1/n$ of the cost of current spending. In the centralised spending setting (co-operation or benevolent social planner), costs of current spending are fully internalised and public consumption is smoothed over time to maximise the concave utility function of individuals.

The clear-cut implication of the model is that the number of parties in the government affects the pattern of public spending. However, for the common pool argument to work, parties must have different policy preferences; that is, ideological fragmentation is important in addition to numerical fragmentation. Notice also that for any given number of parties, the fraction internalised by each of them depends on its relative size. In this sense, the effective degree of fragmentation of a coalition of two parties of relatively equal size is different from the effective degree of fragmentation of a coalition of two parties of which one is significantly larger than the other.

The above considerations suggest testing the theoretical model by looking at the impact of the fragmentation of the decision making process on public spending, where fragmentation is defined with respect to both the ideological dispersion of parties and their effective number. The two empirical measures of ideological diversity (ID) and effective number of parties (ENP) discussed in Section 3 will therefore come in handy for the empirical analysis of this Section as well.

4.2 An econometric model of government consumption expenditure.

The econometric specification I use to test the prediction of the theory discussed in Subsection 4.1 is:

$$(4.10) \quad g_{it} = \mathbf{X}_{it}\mathbf{b}_1 + \mathbf{Z}_{it}\mathbf{b}_2 + \varepsilon_{it}$$

where *i* denotes a generic country of the sample and *t* a generic year.
The dependent variable *g* is defined as the change in the government consumption expenditure to GDP ratio between two consecutive years (in short, change in fiscal spending or DG). **X** is a set of economic variables that affect the size of government spending (including a column of 1), **Z** is a set of political variables (including an index of fragmentation) and ε is a residual term.
The economic variables used as controls are the lagged value of the primary deficit to GDP ratio (LDEF) and the rate of economic growth (DY). These two variables are chosen to account for the theoretical predictions incorporated in the *tax smoothing approach* first proposed by Barro (1979) and Lucas and Stokey (1983). According to this approach, policymakers will follow a counter-cyclical spending policy: government consumption as proportion of GDP increases during recessions (low economic growth) and decreases during expansions (fast economic growth). Furthermore, the intertemporal budget constraint of the government implies that current spending decisions must be corrected for past unbalances between expenditures and revenues. Therefore, the estimated coefficient on both LDEF and DY are expected to be negative. The specification of the set of economic variables is in line with the one adopted by Perotti and Kontopoulos (1999) and most of the literature in this area (see Alesina, Roubini and Cohen, 1997).[13]
The set of political variables includes, in addition to the proxy for the degree of fragmentation (which is required for a direct test of the theoretical model previously outlined), various measures that account for potential forms of political bias in policy formation. SH is the share of seats controlled by the coalition. The rationale for its inclusion builds on Diermeier and Merlo (1998). In their model of cabinet turnover, governments make payments to outside parties to obtain their supports. The need for these payments is less pressing the more stable the cabinet is. As the results of Section 3 show, stability is increasing in the size of the coalition. Therefore, after controlling for fragmentation, the larger the parliamentary base of the incumbent, the smaller the expected increase in government consumption,. The estimated coefficient on SH should thus be negative.
The second political variable in **Z** is LOC, a measure of the ideological location of policymakers. This is obtained as the weighted average of the cardinal locations of the ten points Left-Right scale described in Section 2 of all parties in the ruling coalition. Weights are designed to reflect the contribution of each party to policy formation according to various structures of the decision making process. More specifically, political scientists (see, inter alia, Laver and Shepsle, 1994, Chp. 1) identify four different forms of decision making with empirical relevance in western European countries: (i) cabinet government, (ii) prime minister government, (iii) party government and (iv) ministerial government. In a cabinet government, decision making is a collective activity to which all ministers contribute. The weight of each party in the policy formation process is thus proportional to its share of portfolios. In a prime minister government, decision making is heavily influenced by a strong prime minister, so that maximum weight must be assigned to the policy preferences of the party holding

[13] Perotti and Kontopoulos (1999) add inflation to their set of control variables. I inlcuded the rate of inflation in the sensitivty analysis and found that results on political variables do not change signficantly.

the prime minister office. In a party government, policy decisions are made by party leaders (whether or not members of the cabinet) and automatically implemented by the executive. The weight of each party is here correlated to its relative parliamentary size. Finally, in a ministerial government, decision making displays a strong departmental character. The contents of a policy undertaken on a specific issue reflect the preferences of the party in control of the portfolios whose jurisdiction extends over that specific issue. In the case of budget and fiscal spending decision, the relevant preferences are therefore those of the party holding the portfolio of finance.[14] Based on this argument, five versions of LOC are constructed for each cabinet in the sample:

(4.11.a) $LOC1 = \sum_{i=1}^{n} p_i \theta_i$;

(4.11.b) $LOC2 = \theta_{pm}$;(4.11.c) $LOC3 = \sum_{i=1}^{n} s_i \theta_i$;(4.11.d) $LOC4 = \theta_{mf}$

(4.11.e) $LOC1 = \sum_{i=1}^{n} f_i \theta_i$

where n is the number of coalition partners, θ_i is the ideological location of the generic coalition partner i, p_i is the share of portfolios controlled by party i, s_i is the share of coalition seats held by party i, f_i is the share of key portfolios (including the office of prime minister) held by party i, θ_{pm} is the ideological location of the party controlling the office of prime minister, θ_{mf} is the ideological location of the party controlling the portfolio of finance. The list of key portfolios for each country is taken from Laver and Hunt (1992) and updated using the country case studies in Laver and Shepsle (1994).

Once measures are computed for each cabinet, they are transformed into annual time-series, so that cabinet location in any given year t is equal to the location of the cabinet in office during that year. If two or more cabinets are in office in year t, then the corresponding annual observation is given by the weighted average of the cabinet-based measures, with weights equal to the proportion of time each cabinet stayed in office in that year. This same procedure of transformation into annual time series is used for the other cabinet-based measures (namely SH and the indicators of fragmentation discussed below)

The conventional wisdom is that left oriented government tend to spend more than right oriented ones (see, for instance, Borrelli and Royed, 1995 and Petterson, 2000). Therefore, in fiscal spending regressions, the estimated coefficient on any of the above five measures should be negative (recall that the higher LOC, the more right oriented the cabinet). Estimated coefficients on all the LOC measures can be given usual partial derivatives interpretation. However, for each measure a set of dummies is constructed: LR is a dummy that takes vale 1 if the corresponding LOC measure is smaller than the threshold value 5.5; LL (left) is a dummy that takes value 1 if the corresponding LOC measure is smaller than the threshold 4.6; CC (centre) is a dummy that takes value 1 if

[14] Laver and Hunt (1992) notice that in most western European countries, the importance attached by voters, and hence politicians, to economic issues makes the portfolio of finance the most sought after by parties involved in bargaining over cabinet formation.

LOC is between 4.6 and 6.4 and RR (right) is a dummy that takes value 1 if LOC is larger than 6.4.[15]

The third variable in **Z** is a simple electoral dummy coded as 1 in years when elections occur (if elections are held in the third or fourth term of the electoral year) or in the pre-electoral yeas (if elections are held in the first or second term of the electoral year). According to the theory of fiscal illusion ((Buchanan and Wagner, 1977), when voters overestimate the benefits of current spending and do not recognise the costs of future taxation, an opportunistic incumbent has the incentive to manipulate fiscal policy so to maximise his share of consensus in the proximity of new elections. Thus greater increases in fiscal spending should be observed in electoral (or pre-electoral years) and the estimated coefficient on ELE should be positive.

Finally, **Z** includes proxies for the degree of fragmentation. In the literature, fragmentation has been typically represented by the (effective) number of parties in the coalition. Roubini and Sachs (1989) construct an index that takes higher values the larger the number of coalition partners and it is highest for minority governments (independently from the number of parties that form these governments). They find that such an index significantly affects fiscal policy outcomes in a sample of OECD economies. The very concept underlying the Roubini and Sachs' index has been criticised by Edin and Ohlsson (1991), who instead make use of a set of dummies to separate the effect of the number of parties from the effect of the minority status of the government. They conclude that only the latter matters. De Haan and Sturm (1994) use the same index as Roubini and Sachs and obtain that it does not significantly affect budget deficit and government spending in the group of EU countries during the '80s. In a subsequent paper (De Haan and Sturm, 1997) they extend the analysis to 21 OECD countries for the decade 1982-1992 and again reject the hypothesis that fragmentation (as measured by the above mentioned index) affects fiscal policy outputs. A similar conclusion is reached by Hahm et al. (1996). Franzese (1998) reports that the number of parties is relevant for fiscal policy outcomes only for very high debt levels. A statistically significant effect of the number of parties is found by De Haan, Sturm and Beekhius (1999). Perotti and Kontopoulos (1999) undertake a systematic analysis of "fragmented fiscal policy". They measure fragmentation as the number of parties in a coalition and as the number of spending ministers in the cabinet and find that both are strongly correlated to fiscal outcomes in a panel of 20 OECD economies over the period 1960-1995.

The mechanism underlying the theoretical model in subsection 4.1 builds on the existence of different policy preferences between parties in the same coalition. This implies that, in addition to numerical fragmentation, a concept of ideological (or political) fragmentation should be considered to account for the impact of the heterogeneity of the interests of parties. Franzese (1998) uses the variance of the complexion of the parliament as an index of political fragmentation. He finds that this index displays a significant coefficient in fiscal policy regressions. However, using essentially the same index, Volkerink and De Haan (2000) reach the conclusion that

[15] The threshold values are defined having a ten point scale in mind. With 1as extreme left and 10 as extreme right, 5.5 is the point that divides the policy space in two sides: Left and Right. Similarly, 4.6 and 6.4 corresponds to an exact tri-partition of the space of actual (observed) locations in Left, Centre and Right. Results are not sensitive to the choice of the threshold values.

political fragmentation has no effect, whilst size fragmentation tends to increase deficits.
I slightly depart from Franzese and Volkeirink and De Haan and include, in addition to an indicator of numerical fragmentation, different indicators to represent the ideological fragmentation of both the government and the parliament. The measures ID, previously introduced in Section 3, is used to account for the heterogeneity of the policy views of the coalition partners. The polarisation of the legislature (POL), defined as the share of supports for extremist parties (Powell, 1982), instead proxies for the conflict of interest in the parliament as a whole.
To represent the numerical fragmentation of the government I make use of the effective number of parties in the coalition, ENP, already introduced in Section 3. I think that ENP is here more appropriate than the simple absolute number of parties (instead used by much of the previous literature) since it takes into account the different size of parties. The numerical fragmentation of the parliament is accounted for by a variable ENPLEG. This is simply the effective number of parties in the legislature and it is computed using the formula suggested by Laasko and Taagepeera (1979).
According to the theoretical model of fishing from the common pool, the estimated coefficients on all the measures of fragmentation (ID, ENP, POL and ENPLEG) should be positive.

4.3 Econometric results

As it is well known, the procedure for the estimation of the panel model (4.9) depends upon the specific assumptions concerning the form of the disturbance term ε. If it is assumed that $\varepsilon_{it} \sim iid\ (0,\sigma^2)$ for all *i* and *t*, then a standard *pooled OLS estimator* can be used. If instead it is assumed that ε_{it} consists of an individual (country-specific) effect plus a random component, then an alternative *Random Effect* (RE) or *Fixed Effect* (FE) estimator must be used, depending on whether or not the individual effect is uncorrelated to the set of exogenous variables. To discriminate between these estimators statistical tests are available. It turns out that in most of the cases, the pooled OLS estimator is to be favoured. Table A2 in the Appendix reports the results obtained with the favoured estimator. Results obtained from the other estimators as well as additional results which are mentioned in the discussion below, but not displayed in the Table (to save space), are available from the author upon request.[16]
The sample includes fourteen countries: Austria, Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxemborg, the Netherlands, Norway, Sweden and United Kingdom. The sample period is 1960-1995. However, following Perotti and Kontopoulos, results are also presented for three subperiods: 1960-1973, 1974-1983 and 1984-1995. I refer to these subperiods as the first, the second and the third decade respectively.
Column (1) of Table 2 reports full-sample estimates. All coefficients are of the expected sign, but only those on LDEF, DY and RR1 (the dummy RR based on values of LOC1) are significantly different from zero. Thus, once controlling for key economic factors, the only political factors that contributes to the change in government expenditure is the

[16] The tests used to discriminate among the three possible estimators are the Hausman test of orthogonality (Hausman, 1978) and the version of the Lagrange Multiplier Test suggested by Breusch and Pagan (1979 and 1980). Furthermore, when the panel is unbalanced, the estimation procedure follows Verbeek and Nijman (1996).

ideological location of the policymaker: right-oriented government spend significantly less than Centre and Left-wing ones. This result holds when definitions of location LOC2 and LOC3 are used to construct the dummy RR; when LOC4 and LOC5 are used the coefficient on the dummy remains negative, but not different from zero. Analogous results are obtained when the continuous variables LOC are used directly. Furthermore, changing the threshold values to separate Left, Right and Centre does not affect results.
None of the ID variables ever displays a significant estimated coefficient, not even when ENP is dropped from the set of regressors (to avoid possible multicollinearity problems). Thus, there is no evidence of a significant effect of government fragmentation (either numerical or ideological) on spending decisions, at least in the full sample estimates. However, when measures of fragmentation of the legislature are used instead of ID and ENP, the theoretical argument receives support: the coefficient on POL is positive and significant (.008847 with a standard error of .003833 and a p-value of .0215), whilst the one on ENPLEG is still positive, but not different from zero. I re-estimated the model using as an alternative definition of POL the variance of the distribution of locations of all parties in the legislature. This alternative definition is closer in spirit to the notion of political fragmentation considered by Franzese (1998) and De Haan and Volkerink (2000). The estimated coefficient turns out to be positive and again statistically different from zero, albeit only at the 10% level of confidence. Thus, ideological fragmentation at parliamentary level does seem to affect the annual change in the government consumption to GDP ratio.
Column (2) displays the results for the first decade (that is, the sub-period 1960-1973). Again, all estimated coefficients are of the predicted sign. However, only those on DY and SH are statistically different from zero. Thus, a first important difference from the full-sample results concerns the economic variables: in the first decade the impact of past deficits on the change in government consumption expenditure is negligeable. A possible explanation for this finding has to do with the fact that for most countries in the sample deficit and debt do not exhibit explosive patterns prior to 1973 and hence do not represent a tight constraint on spending decisions during the period 1960-73.
Turning to political variables, it appears that governments with a larger parliamentary support sustain a smaller increase in the government expenditure to GDP ratio. This result is consistent with the idea that smaller coalitions, being intrinsically less stable, must pay transfers to outsiders in order to obtain their support (or neutrality) and thus enhance cabinet's survival rate. Alternatively, one might also argue that the shorter time horizon of governments supported by smaller coalitions incentivate parties to appropriate as much as possible of the cake before the executive collapses. This myopic behaviour would be in line with the theory of political uncertainty recently proposed by Darby et al. (2000).
Neither ID nor ENP display a significant coefficient. However, when ENP is dropped (column (3)), the coefficient on ID1 passes a zero restriction test, although only at the 10% level (the estimated coefficient is +.002399 with a standard error of .00142 and a p-value of .093). Therefore, there is evidence in this decade of an impact of ideological fragmentation on spending decisions which is supportive of the common pool argument. Since SH remains significant, it can be concluded that both coalition size and the ideological fragmentation of the government matter. This result is interesting in the light of the debate on coalition effects versus minority effects raised by the findings of Edin and Ohlsson (1991). They provide evidence that the well known result in Roubini and Sachs (1989), namely that deficit and spending are increasing in fragmentation, is

almost entirely due to minority governments generally conducting less tight fiscal policies. The result I obtain for this first decade could be seen as a possible "reconciliation": when measured by indicators such as ID and SH, both ideological fragmentation and coalition size do appear to have a significant impact on spending choices.

The other three definitions of ID however all display positive coefficients which are not different from zero. Of the two measures of fragmentation of the legislature, POL is again the one that plays a relevant role. Its estimated negative coefficient is significant at the 10% level. Interestingly, when POL and ENPLEG are used in the regression for the first decade, the statistical tests favour the Fixed Effect estimator relative to the pooled OLS. The inclusion of country dummies however does not alter the results on political variables.

Results for the second decade (sub-period 1974-1983) are given in Column (4). Notice that now the coefficient on both ELE and ENP is negative rather than positive. However, both are largely insignificant. As a matter of fact, only LDEF and DY, the two economic variables, seem to determine the change in the government consumption to GDP ratio in this period. The impact of past deficits is particularly strong. This confirms the previous intuition: throughout the '70s and the first half of the '80s, the occurrence of large deficits in most western European countries makes spending decisions more sensitive to the budget constraint.

None of the political variables plays a significant role, not even when such indicators are added one at the time (to avoid possible multicollinearity) to the two economic variables. The same is true for the measures of fragmentation of the parliament as a whole. I also conduct an additional experiment. Using the data in Hallerberg and Von Hagen (1997), I construct three dummy variables that separate countries according to the structure of the budget formation process. The dummy MF is coded 1 for those countries where fiscal policy formation is centralised in the hands of a strong minister of finance. The dummy TAR is coded 1 for those countries where commitments to negotiated fiscal targets defined in contract agreed upon by coalition partners are usually taken. The dummy DEC is coded as 1 in countries where spending decisions are decentralised and no commitment to fiscal contracts is taken. According to the theory of Subsection 4.1, spending should be lowest in countries classified as MF and highest in countries classified as DEC. Results are displayed in Column (5). The three dummies all have positive and significant coefficients. As it is expected, the one on MF is smaller than the one on TAR which is smaller than the one on DEC. This pattern suggests the existence of a differential effect: as the degree of centralisation decreases (from MF to TAR and from TAR to DEC), the increase in government consumption gets quantitatively larger. To evaluate the statistical significance of this differential effect, I re-estimate the model dropping MF and find that only DEC displays a significant coefficient (+.00507 with a standard error of .00274 and a p-value .0667). Thus, moving from decentralised setting with no commitment to fiscal targets to one of centralisation significantly reduces the growth of public spending. The difference between centralisation and negotiated fiscal targets is instead empirically less relevant.

In Column (6) the results for the third decade (the sub-period 1984-1995) are reported. Of the two economic variables, DY has a statistically robust effect, whilst the coefficient on LDEF is not statistically different from zero in the basic specification and becomes significant at the 5% level of confidence in the extended specification of Column (7). Of the political variables, RR is again the only one to have a relevant

impact on spending decisions, but only if defined from the continuous variables LOC1 and LOC3 (the Table reports the estimated coefficient when RR is based on values of LC1). I also construct an additional measure of location: LOCJ, which is equal to LOC4 for countries where the budget process is centralised in the hands of strong ministry of finance and to LOC1 in all the other countries. The corresponding dummy RR is significant in the basic regression and its estimated coefficient is in absolute value slightly smaller than the one on RR in Column (6). There is thus evidence that the ideological location of the minister of finance does matter in the countries where the spending decisions are effectively placed under her control.
The coefficient on ID is surprisingly negative. However it is largely not significant at usual confidence levels. When ENP is dropped, the coefficient on ID returns negative, but still not different from zero. Therefore, there is no evidence of an effect of ideological (or numerical) fragmentation of the coalition on spending in the third decade. Results on the variables of fragmentation of the legislature as a whole are analogous to those obtained for the first decade (column (2)) and for the full sample (column (1)). The results of the estimates of the extended specification that includes the dummies for the structure of the process of budget formation (column (7)) are consistent with those obtained for the second decade (column (5)), although the estimated coefficient on TAR is unexpectedly smaller than the one on DEC. When MF is dropped, however, neither TAR nor DEC plays a significant role, so that it can be argued that different settings are not particularly relevant in the third decade.

4.4 Summary of the results from the second econometric application.

The main results of the analysis of this Section concern the role of fragmentation and ideology. There is evidence that fragmentation does matter. However, whilst most of the literature focuses on numerical fragmentation (e.g. the number of parties in the coalition), my analysis shows that ideological fragmentation is possibly more relevant. In particular, the degree of ideological heterogeneity of coalition partners is a significant determinants of the change in the government consumption to GDP ratio in the pre-oil shock period, whilst the dispersion of policy views in the party system as a whole plays an important role in both the full 1960-1995 period and in individual decades.
The ideological location of the policymaker also affects the decision making process: more right-oriented governments are associated to smaller increases in public spending. In the literature, there is no agreement on the effective importance of this effect. The fact that only some of the measures of location I propose display significant coefficients suggests that results on ideology are sensitive to the way in which individual parties' locations are aggregated into a unique government location.
A third interesting result concerns the impact of the size of the coalition. In the first decade, both ideological fragmentation and coalition size appear to determine the increase in the level of spending. This finding could reconcile the conflicting results in Edin and Ohlsson (1991) and Roubini and Sachs (1989): when appropriately measured, both a coalition effect and a fragmentation effect are observed, at least in a specific sub-period.

Finally, the importance of different degrees of centralisation of the fiscal policy formation process has been considered for the second and the third decade (data for the first decade are not available from my primary sources and hence I cannot extend the analysis to the full sample period regression). In the second decade there is evidence that countries characterised by centralised settings are effectively able to limit spending growth relative to countries where budget formation is not centralised in the hands of a strong minister of finance and parties do not commit to negotiated fiscal targets. The same result however does not extend to the third decade.

5. Conclusions

The econometric analysis of political economy issues requires the use of quantitative indicators to give an empirical representation to political factors incorporated in theoretical models. A data-set of indicators is constructed with the intention to make it available to interested scholars in this area. After a brief description of the contents of the data-set and of the basic sources of raw data, I focus on two econometric applications.

The first econometric application is the empirical test of a model of government duration. Measures of ideological and numerical fragmentation, returnability in office and size of the coalition are used as explanatory variables in a event-history analysis of cabinet survival in eleven western European democracies. Most theoretical predictions turn out to be supported by the data: more ideologically homogeneous and larger coalitions generate more stable executives whilst higher returnability in office reduces expected duration. The impact of economic conditions is also taken into account. Innovations relative to the existing literature relate to three main aspects. First, when considering a strictly theory-based econometric specification, numerical fragmentation (as measured by the effective number of parties in the coalition) is not found to be an important determinant of cabinet duration. Second, a systematic account of returnability is provided. A theoretical mechanism linking returnability to duration is suggested and the empirical relevance of such mechanism tested. Third, the econometric model is estimated using observations on the duration of both cabinets and ruling coalitions. In this latter case, reshuffles are not considered as cabinet terminations. Although there is little difference in the role of political variables between the two cases, the role of economic variables does change. When coalitions are the object of investigation, more than the growth rate of industrial production, it is the rate of change of inflation that captures the effect of worsening economic conditions on the probability of cabinet collapse.

The second econometric application is a systematic test of the common pool argument in fiscal spending decision-making. A panel regression of the change in the government consumption to GDP ratio is estimated for a sample of 13 countries. It turns out that ideological fragmentation more than numerical fragmentation contributes to determining the spending bias of the incumbent. In particular, the degree of polarisation of the legislature and, at least in the pre-1973 era, the ideological heterogeneity of coalition partners are positively correlated to spending growth. This result is important given that most of the applied literature focuses on numerical fragmentation. A strong impact also comes from the ideological orientation of the policymaker, especially if measured so to reflect a “cabinet government” structure of the decision-making process. The pre-1973 era is characterised by an interesting effect: both the degree of ideological

heterogeneity of the coalition and the size of the coalition display significant estimated coefficients. This suggests that both a coalition effect and a majority effect are at work. Finally, evidence on the different impact of various institutional settings concerning the degree of centralisation of fiscal spending decisions is provided.

Appendix. Econometric results and data description

Table A1. Determinants of cabinet and coalitions duration in office.

Variables	Model (1)	Model (2)	Model (3)	Model (4)
MAJORITY	-.617073 (.182807)	-.571466 (.189619)	-.631468 (.185803)	-.816591 (.204335)
ENP	.0621474 (.095764)	.051858 (.097532)	.0732163 (.095890)	.140993 (.104568)
RETURN	-.011183 (004671)	-.011225 (.004775)	-.0117528 (.004737)	-.009550 (.005011)
ID	.200994 (.114090)	.241331 (.116289)	.204046 (.114208)	.181178 (.128641)
IPG		-.147379 (.075881)	-.157021 (.065592)	-.133607 (.076919)
CPG		.903172 (.229249)		-.0330834 (.1522201)
DCPG			.0850186 (.1523435)	
Number of observations	224	216	216	181
Log-likelihood	-984.3829	-932.3172	-939.3899	-752.0507
Chi square test stat. (p-value)	16.044 (.0030)	36.307 (.0000)	22.485 (.0010)	23.615 (.0006)

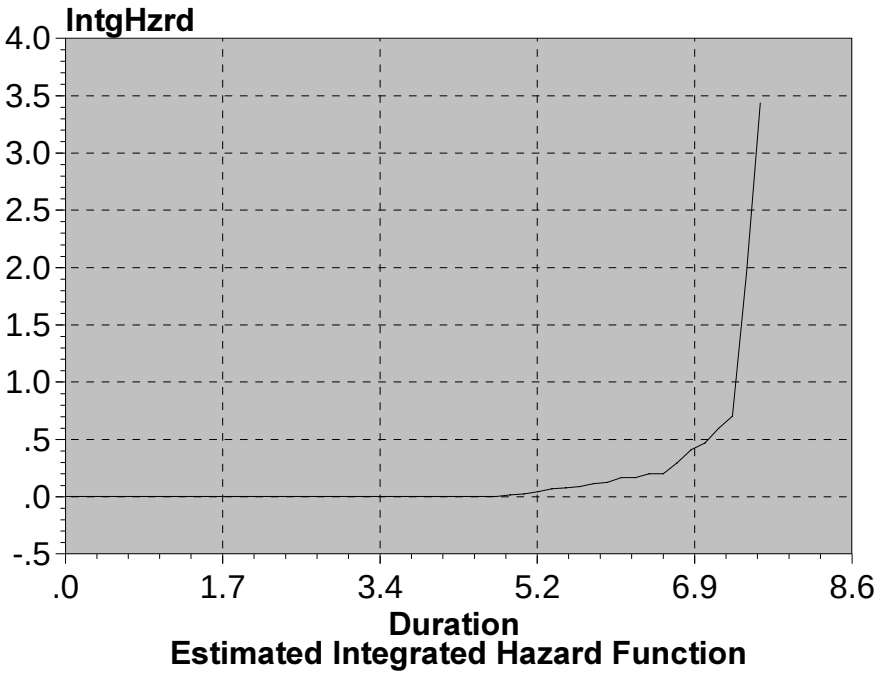
Note: standard errors are in brackets. The dependent variable is the probability that a cabinet terminates. Therefore positive coefficients on a variable imply that higher values of that variable reduce duration in office. The Chi-square test is a test of the joint significance of the coefficients on the covariates. High values of the test-statistic (low p-values) indicate an overall good model adequacy.

Table A2. Determinants of the change in government consumption expenditure (DG)

Variables	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)
LDEF	-.027258 (.010368)	-.014704 (.029683)	-.015843 (.029456)	-.042754 (.017209)	-.067011 (.021058)	-.020306 (.016364)	-.035968 (.018718)
DY	-.046761 (.009080)	-.114097 (.018611)	-.113709 (.018534)	-.023368 (.014494)	-.023766 (.014363)	-.119534 (.020061)	-.123990 (.198851)
RR	-.002689 (.000923)	-.000037 (.001779)	-.000170 (.001741)	-.001169 (.001577)	.000249 (.001749)	-.003469 (.001499)	-.002895 (.001661)
ENP	.000208 (.000535)	.000338 (.000883)		-.000196 (.000932)	-.001696 (.001204)	.000682 (.000923)	-.000085 (.001098)
ID	.000084 (.000669)	.002188 (.001529)	.0023994 (.001423)	.000628 (.000973)	.001428 (.001048)	-.000206 (.001141)	.001189 (.001269)
SHARE	-.005781 (.003847)	-.018753 (.007755)	-.018572 (.007720)	-.007448 (.007533)	-.002447 (.008297)	-.000857 (.006803)	.000298 (.007389)
ELE	-.000002 (.000846)	.000016 (.001272)	.0000007 (.001268)	-.000385 (.001394)	-.000183 (.001386)	.000291 (.001525)	.002436 (.001506)
MF					.010705 (.004477)		.010277 (.004545)
TAR					.011958 (.003949)		.007846 (.00480)
DEC					.015780 (.004391)		.012699 (.00340)
Number of observations	431	168	168	120	120	143	143
LM test	.05 (.821192)	1.84 (.174512)	1.85 (.173643)	.06 (.798864)		.01 (.931143)	
Hausman test	4.79 (.685100)	3.78 (.804303)	4.63 (.591444)	47.96 (.00000)		6.87 (.442994)	
Favoured estimator	OLS	OLS	OLS	OLS	OLS	OLS	OLS

Note: standard errors in brackets. The LM test is a test of the assumption of homoscedasticity: high values of the statistic (low p-values) favour the Fixed Effect/Random Effect models relative to the OLS pooled estimator. The Hausman test is a test of the assumption of orthogonality: low values of the statistic (high p-values) favour the Fixed effect model relative to the Random effect model. Models (5) and (7) have been estimated only by pooled OLS. Estimates of the constant term for the pooled OLS are not reported.

Figure 1: Plot of the integrated hazard function.



Description of the variables used for the econometric applications of Sections 3 and 4.

SHARE *Parliamentary size of the coalition*. Total share of parliamentary seats controlled by the ruling coalition.

MAJORITY *Majority Status of the government*. Dummy variable taking value if the incumbent is support by a coalition controlling at least 50%+1 of parliamentary seats.

ID *Ideological diversity*. Dispersion of the ideological locations of the parties in the cabinet. For computational details see equations (3.9.a), (3.9.b), (3.9.c) and (3.9.d) of Section 3 of the paper.

ENP *Effective number of parties in the government* (Laasko and Taagepeera, 1979). For computational details see equation (3.10) of Section 3 of the paper.

RETURN *Alternation in office* (Strom, 1985) sum of the shares of seats of parties entering the government plus the shares of seats of parties leaving the government. It is an inverse index of returnability in office: higher alternation implies lower returnabilty.

LOC *Ideological location of governments and coalitions*. Weighted average of the ideological locations of the parties in the government (or coalition). Weights are designed according to various structures of the cabinet decision-making process. See computational details and discussion in Section 4 of the paper (equations (4.11.a), (4.11.b), (4.11.c), (4.11.d) and (4.11.e)).

RR *Right-wing governments and coalitions*. Dummy variable taking value 1 if LOC is to the right of the threshold value 4.6 on a ten point Left-Right scale.

CC *Centrist governments and coalitions*. Dummy variable taking value 1 if LOC is to the right of 6.4 and to the left of 4.6 on a ten point Left-Right scale.

LL *Left-wing governments and coalitions*. Dummy variable taking value 1 if LOC is to the left of the threshold value of 6.4 on a ten point Left-Right scale.

LR *Ideological dummy*. Dummy variable taking value 1 if LOC is to the right of the threshold value 5.5.

ELE *Electoral dummy*. Dummy variable taking value 1 (i) in year *t* if *t* is an electoral year and elections are held in the third or fourth term of that year or (ii) in year *t*-1 i elections are held in the first or second term of the electoral year *t* (Alesina, Roubini and Cohen, 1997).

ENPLEG *Effective number of parties in the legislature* (Laasko and Taagepera, 1979). Technically defined as ENP (see equation 3.10), but whilst ENP includes only parties in the government, ENPLEG takes into account the shares of seats of all parties with parliamentary representation.

POL *Polarisation of preferences in the party system*. Two alternative definitions have been used.

1. According to Powell (1982) POL is the sum of the share of votes (or seats) received by extremist parties. Extremist parties are those whose ideological orientation is towards the radical change of the existing socio-political system. In my data-set, a party is classified as extremist if it falls into in one or more of the following categories. (i) parties explicitly labelled as Communists or neo-Fascists, (ii) parties included in the original list provided by Powell (1982), (iii) parties demanding the partition of existing nations on the basis of ethno-linguistic differences, (iv) parties located to the right of 8.5 or to the left of 2.5 on the ten point ideological scales described in Appendix A1.1 of Chapter 1, (v) parties whose ideological orientation, as stated in *Political Parties of the World* (Keesing's Publications, 1986), Keesing's Record of World Events (various issues), Mackie and Rose (1997) and the election page at *www.agorà.stm.it* is unambiguously extremist in the sense specified by Powell.

2. Overall dispersion of the policy positions of parties in the legislature:

$$\text{POL} = \frac{m\sum_{i=1}^{m}\theta_i^2 - \left(\sum_{i=1}^{m}\theta_i^2\right)}{m(m-1)}$$

where m is the total number of parties with parliamentary representation, i is a generic party and θ_i is party i's location on the ten point Left-Right scale.

MF *Centralisation/Delegation to MoF of budget formation.* Dummy variable taking value 1 for those countries where the process of budget formation is centralised in the hands of a strong Minister of Finance (MoF). Coding of this dummy is based on Hallerberg and Von Hagen (1997).

TAR *Commitment to fiscal targets.* Dummy variable taking value 1 for those countries where commitments to negotiated fiscal targets defined in contracts agreed upon by coalition partners are normally taken. Coding of this dummy is based on Hallerberg and Von Hagen (1997).

DEC *Unconstrained budget formation*. Dummy variable taking value 1 for those countries where the process of budget formation is not delegated to the MoF and commitments to fiscal targets are not normally taken. Coding of this dummy is based on Hallerberg and Von Hagen (1997).

IPG *Industrial Production Growth.* Source of data on Industrial Production: OECD Main Economic Indicators and IMF-International Financial Statistics

CPG *Consumer Price Index Growth.* Source of data on Consumer Price Index: OECD-Statistical Compendium and IMF-International Financial Statistics.

DCPG *Change of CPG*.

VOLCPG *Volatility of CPG*

DG *Annual change of government consumption expenditure*. Source of data on government consumption expenditure: IMF-International Financial Statistics and IMF-International Government Statistics.

DEF *Budget deficit*. Difference between the debt to GDP ratio of two consecutive years (Roubini and Sachs, 1989 ad Alesina, Roubini and Cohen, 1997). Source of data on deficit and GDP: IMF- International Financial Statistics.

LDEF *Lagged budget deficit*. One year lagged value of DEF.

DY *Rate of GDP growth.* Source of data on GDP: OECD-Main Economic Indicators and IMF-International Financial Statistics.

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