Essays in fiscal policy: political determinants and effects on private consumption.

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ESSAYS IN FISCAL POLICY: POLITICAL DETERMINANTS AND EFFECTS ON PRIVATE CONSUPTION.

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ABSTRACT

The three essays in this study investigate a series of issues recently emerged in the literature on fiscal policy. The first two chapters are more related to each other and are contributions (theoretical the former, empirical the latter) to the Political Economy approach to fiscal policy that has emerged in the last two decades. The third chapter abandons that perspective to investigate fiscal policy no longer from the point of view of its determination, but from the point of view of its effects.

The recent contributions investigating the relation between the degree of government fractionalisation and fiscal policy see the strategic interaction between coalition partners as a consequence of their incomplete information. In chapter 1 I propose a complete information model in which it is the lack of binding commitments that makes the decision-making process of a coalition difficult, which is related to the type of institutional environment. This also allows for a better insight into the welfare analysis of delayed stabilisations. I also consider the problem why coalition governments with conflicting fiscal goals exist. My answer is that this happens when economic agents care for some extra-economic issue a great deal and there is a strong polarisation on the subject.

Some empirical contributions have already answered affirmatively to the question whether the presence of coalition governments favours excessive public spending and fiscal deficits. In Chapter 2 I consider whether it is possible to do better by looking not at the type of government in charge (single party vs. coalition), but at its nature. I distinguish between homogeneous and non-homogeneous governments: the latter are held together only by extra-economic motives, while in the former there is also a common view on economic policy, as is the case not just with single party, but also with a number of coalition governments. By using cluster analysis on data regarding 11 OECD countries from 1960 to 1990 I come to the conclusion that treating homogeneous and non-homogeneous coalitions as two separate items makes more sense, as it isolates those coalitions where a strategic interaction over fiscal policy takes place between partners. Non-homogenous coalitions have a greater probability to be associated with strong positive fiscal impulses, but also with strong negative ones. I argue this is not in contrast with the conclusions of Chapter 1 and Alesina and Drazen (1991).

As for Chapter 3, its focus is consumption. In recent years a number of works have considered the possible direct crowding out effect caused by government consumption and embedded it in the neoclassical approach to fiscal policy. The relevance of this effect, however, is debated, and though many have tried to assess empirically how much public consumption substitutes for private consumption, they have come to different conclusions. Here I follow the approach suggested by Darby and Malley (1996), who stress the importance of making a distinction between the various components (defence/nondefence) of government consumption. The regression results obtained using Italian annual data on the 1862-1996 sample confirm that composition matters: the direct crowding out effect is higher when the relative weight of government consumption in nondefence increases. The degree of substitutability has therefore followed an upward trend in the post WW2 period, reaching values as high as 0.67 in the most recent years.

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To Leonardo

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Introduction.

1. Putting this thesis in context.

There has been a constant effort to know more about fiscal policy in the last three decades. The interest in the subject is primarily justified by the fact that in a large number of countries, especially in Europe, public spending keeps being an extremely relevant heading in national accounts, a feature that dates back to the end of World War II[1]. Besides, some countries[2] have witnessed in their recent history a rapid rise of the public debt over GDP ratio, which reached unprecedented levels for peace periods. This phenomenon has stimulated a lively debate about its possible effects. Finally, the process of creation of a single European currency has suggested the opportunity of fiscal policy rules for national governments, because running large deficits would seriously undermine the credibility of a rigorous monetary conduct.
The effort has not been in vain, and though some questions remain unanswered, a substantial progress in the understanding of fiscal policy has been reached. The New Classical Macroeconomics has deeply investigated fiscal policy effects in an intertemporal context where agents have rational expectations and all markets clear. The Political Economy literature has offered new interesting insights into the process of fiscal policy determination, thus making the positive approach to the subject richer in suggestions for institutional design. This thesis is an attempt to contribute to both these streams of macroeconomic literature.

As far as economic theory is concerned, the New Classical school has highlighted that fiscal policy effects are mainly on private consumption, with agents consuming less as a consequence of being taxed. However, aggregate demand does not necessarily stay the same in the short run, and, when it does not, there are also effects on the growth rate. Much depends on the kind of fiscal measure: whether temporary or permanent, expected or unexpected. How elastic labour supply is also relevant, as well as the availability of either distortionary or non-distortionary taxes, as these factors determine the type of wealth effects. As for the debt option, how deep intergenerational altruism is determines whether the Ricardian Equivalence holds or not, the overlapping generation model conclusions being the alternative. Debt

[1] The relative weight of public consumption (G) in government current expenses has seen a constant decline in recent years, transfers being much more dynamic. Not all studies about fiscal policy have taken account of this change in the nature of the State's intervention in the economy, it has to be said. The usual approach considers transfers just as negative taxes, so that fiscal policy enters agents' utility maximisation problem through the introduction of the G and (T-TR) terms into the budget constraint. Therefore, fiscal policy is still mainly intended as the determination of the value of G and of the way it is financed (debt or taxes net of transfers).

neutrality is denied also if taxes are distortionary, in which case tax-smoothing is suggested as a benchmark.

Also as far as the empirical literature is concerned the most hotly debated issues have been the effects of government expenditure in goods and services on private consumption and debt neutrality. In some of these works a further element highlighted by the theoretical literature has been considered, namely that even the type of goods a government purchases does make a difference, so that not just the distinction between capital and consumption goods is relevant, but different types of consumption goods are to be considered separately.

Chapter 3 is my contribution to this specific niche of the literature. I do believe that in some national contexts the degree of substitutability between government and private consumption is much higher than usually assumed, which makes a government's intervention in the economy just a redirection of resources from market to State control. My being Italian probably makes me particularly sensitive to the problem[3], and my intention has been to work on national time series both because these had not been thoroughly investigated before and because I wanted to see if my intuition of a higher substitutability between public and private consumption in Italy with respect to countries such as the US was right.

It is interesting to notice that in most of the New Classical Macroeconomics literature on fiscal policy the level of public spending is not considered as an issue. This has probably to do with the fact that we are in a world where public spending has no longer a role as an income stabiliser, as it was in the keynesian model, but, in theory at least, it is only a remedy for market failures such as the case of public goods. It is the amount of market failures to determine the value of G: in other words, it is a matter for Public Economics.

But since the Public Choice school, Public Economics has dealt not only with the problem of how much a government should spend, but also with the question of how much it spends in reality and why it does not possibly stick to the benchmark. The legacy of this stream of literature has interwoven in the last two decades with that branch of Macroeconomics known as credibility literature[4] to give birth to the so-called Political Economy of fiscal policy. This is essentially policy game literature with a strong stress on political (electoral and institutional) determinants. Although complicated by the nature of public debt as a state variable, which makes multistage games hard to deal with, and often characterised by the

[2] Italy, Belgium and Ireland were the most dramatic cases.

[3] Up to about the end of the 80s the Italian public sector would produce as wide a range of products as to include cars and chocolate bars, using tax revenues as the main source of financing.

[4] The credibility literature started as literature on monetary policy, but it soon invested the field of fiscal policy, as well.

usual problem of multiple equilibria, this stream of literature is particularly fascinating in that it concentrates on fiscal policy institutions, and it is a widely accepted idea that the greatest innovation in macroeconomics in the last years is the fact that policy institutions have become a centrepiece.

At first, the focus was on public debt, and the first models, dating back to the mid-Eighties, were Stackelberg games: the strategic interaction causing welfare loss[5] was the one between an incumbent and its successor. However, there was soon a shift to the analysis of the strategic interaction between parties in office at the same point in time. Since real-life coalition, minority and divided governments were found by extensive empirical work to be also characterised by higher levels of public spending, these models were conceived with the wider objective to explain the whole of a government's set of decisions regarding fiscal policy, from the level of public spending to its financing.

Chapter 1 of this thesis is an attempt to contribute originally to the theoretical literature focused on coalition governments. The model I present stresses the extra-economic motivation of voters and political actors, which is identified with the factor bringing parties without a common fiscal agenda together and the ultimate reason for the presence of strategic inefficiencies. Again, my national context has been an invaluable source of inspiration.

Chapter 2 is closely linked to Chapter 1, and may be read as its empirical counterpart. Two interesting conclusions reached by Chapter 1 are the idea that not all coalition governments are debt- and inflation-prone, but only those the cohesive element of which has to do only with extra-economic issues, and the fiscally irresponsible coalitions are not unable to stabilise, only they do it too late, so they must do it using a stronger hand. I use data from 11 countries from 1960 to 1990 to assess whether these conclusions are acceptable. My tool is cluster analysis on country-year cases; to my knowledge, it has never been used before in application to the subject.

2. Acknowledgements.

In the development of each chapter I benefited from the advice and suggestions kindly offered by a number of people. Although the responsibility for all errors is mine, I wish to express here all my gratitude to them.

Chapter 1: the material later used to write Part 1 is in a working paper: "What is the real problem with coalition governments?", University of Brescia, Discussion Paper del

[5] Tax-smoothing is the benchmark of this type of models.

Dipartimento di Scienze Economiche no. 9710, and some contents of Part 2 are in another working paper: "Ideological polarisation, coalition governments and delays in stabilisation", University of Glasgow, Discussion Paper in Economics no. 9710. However, some substantial revisions have been done after fruitful discussions with the participants to the seminars at the University of Brescia, Trento, Pavia. I must also thank Fabrizio Carmignani for his comments, and an anonymous referee.

Chapter 2 was inspired by the fact that Fracesco Daveri had used cluster analysis to test Political Business Cycle models, and I must thank him for introducing me to the literature on this methodology. I benefited also from discussions with the participants to the XI annual conference of the Società Italiana di Economia Pubblica (SIEP) in Pavia, where this work was presented and in the proceedings of which if it was published in Italian (V. Dardanoni and G. Sobbrio eds., 2000, "Istituzioni politiche e finanza pubblica", Franco Angeli Editore). A twin article, "I governi di coalizione sono tutti "fiscally irresponsible"? Un'indagine empirica con l'utilizzo della cluster analysis" was published in Politica Economica, 2000, 1. In rewriting the proceedings in English I have taken some elements of this article and added them to the text of the working paper presented in Pavia.

Chapter 3 has taken advantage of the elaboration of a data set which was constructed in collaboration with Mariacristina Cristini, a colleague of mine at the Department of Economic Sciences, University of Brescia, and of useful discussions with Jim Malley and Julia Darby. Other colleagues in Brescia offered important suggestions, among whom Stefano Fenoaltea for the data description part. Gianni Amisano's advice was of invaluable help in suggesting escapes out of ecometrical impasses. I would also like to thank Franco Spinelli, Paolo Panteghini and Rosella Levaggi and all the seminar participants at the University of Brescia for comments. The material in this chapter has been used for a discussion paper of the University of Brescia with the same title (Dipartimento di Scienze Economiche Discussion Paper no. 0103).

Chapter 1.

NEW INSIGHTS INTO COALITION PARTNERS' CONFLICT OVER FISCAL POLICY.

1. INTRODUCTION.

Some recent empirical works (Roubini and Sachs (1989a, 1989b), Grilli Masciandaro and Tabellini (1991), Alesina and Perotti (1995) among others[1]) have pointed out that a factor playing a major role in determining the accumulation of large public debts may be a high degree of fractionalisation of governments. Running large budget deficits is likely to be the consequence of the difficulty that a coalition government may find in taking decisions, which is related to its divided nature. Since in the last decades only some countries have run large budget deficits over several years, the explanation must indeed lie in some country-specific factor, and political institutions and contexts have rightly been considered as good candidates in this respect within the literature[2]. However, there have been just a couple of attempts so far to build a rigorous model on the subject of coalition governments. One is to be found in the pioneering work by Alesina and Drazen (1991)[3]. I briefly summarise this model here, as it is the main source of my work.

In the Alesina and Drazen model, the economy is made up by two agents; there is a polarisation on an economic subject, namely the distribution of the costs of a public good to be produced in a given amount. The institutional context is such that it allows agents to form a coalition and rule together as an alternative to alternating in office, and a coalition is assumed to be in power. Both agents would like their coalition partner to pay for the larger amount of public spending, so no decision about the amount of tax revenues to be raised from each of them can be taken co-operatively. The use of debt and seignorage to cover the budget deficit is a consequence of this. But inflation is distortionary, and each coalition partner suffers from it. How much inflation affects each agent's utility is private information. This makes it

[1] A survey of this literature is in Chapter 2, par. 2.
[2] Alesina and Perotti (1994) is an excellent survey of all contributions of the Political Economy literature to the debate.
[3] The other one is in Velasco (1997).

possible to identify the strategic interaction between the coalition partners with an incomplete information game that is well-known in game theory: the War of Attrition. Delays in stabilisation happen because only time can work as a revelation mechanism here. At each point in time both players declare to be either ready or not to be burdened with the greater part of the fiscal deficit from then onwards. Potentially, there is an incentive to be a free rider, but delaying the stabilisation is costly, while the expected marginal gain from waiting is decreasing with time, because time gradually reveals the true "type" of the opponent. In fact, the player with the higher sensitivity to the distortions associated with seignorage is eventually the first one to "concede", because seeing that the partner has not conceded, yet, makes him realise he is actually the one who most "dislikes" inflation, hence it is not convenient for him to wait longer (which would imply marginal costs greater than expected marginal gains).

My aim is here to consider two unexplored aspects of this story:

- one is the possibility to identify a coalition governments' strategic interaction with a game of complete information with finite horizon;
- the other is to justify the presence of a coalition between parties with conflicting fiscal goals.

Clearly, the assumption about the players' information set plays a crucial role in the Alesina and Drazen model: if the coalition partners had complete information there would not be any delay in the adoption of non-distortionary taxes to finance public spending. This would be true in most cases also with a finite horizon, as Bilodeau and Slivinski (1996) show[4]. There are, however, some cases in the finite horizon set-up in which a delayed stabilization may take place.

This may seem as just a sterile game theory excercise, but in my view it is not. Sometimes the partners of a coalition do know each other's payoffs, and anyway, their strategic interaction may have more to do with their inability to create binding commitments between each other, as suggestively pointed out in Roubini and Sachs (1989a). This is likely to be due to special

[4] The incomplete information regards the value of the parameter measuring the dislike for inflation in the utility function, but the very fact that the distortions caused by seignorage enter the consumer's problem not through the budget constraint, but because utility has a "dislike for inflation" component is a somewhat strange feature of this model. Choosing to identify the relationship between coalition partners with a game of complete information makes it unnecessary to keep it.

aspects of the institutional set-up. A typical example is a procedure for approving a financial bill entailing non-contemporaneous votes, because this makes vote-trading easy to renege on[5]. My analysis of the strategic interaction between coalition partners in a complete information setting also highlights the dependence of those policies on the amount of distortions inflation brings about and the implications as far as welfare is concerned. I also reconsider the role played by exogenous shocks.

As for the reasons why coalition governments likely to start wars of attrition are formed, if they are not investigated only half of the story is told. A favourable institutional context (parliamentary democracies with proportional representation) is a necessary but not sufficient condition. My answer is that a strong polarisation of the electoral body on some extra-economic issue can play a major role, and ends up being the real cause for inefficient fiscal conducts[6]. My contribution may then also be read as an investigation into the relation between extra-economic polarisation and fiscal policy.

The question is relevant also for the formulation of a thesis to test empirically. Not all parliamentary democracies with proportional representation have a story of coalition governments, and not all coalition governments are debt- and inflation-prone. These theses are not the direct consequence of the Alesina and Drazen model, but they have often, wrongly, been seen as such. Identifying the true determinant of the accumulation of large public debts with the presence of a polarisation on some extra-economic issue highlights the fact that the coalition governments likely to determine a deterioration of the fiscal stance are only those whose unique cohesive element is extra-economic, formed by parties with conflicting views on fiscal policy. Too often has this been forgotten in the empirical works on the subject. As Chapter 2 will show, considering it allows to capture the relationship between degree of fractionalisation of governments and fiscal irresponsibility in all its strength.

This chapter is organised in two parts. In Part 1, a model is presented in which the interaction between coalition partners is modelled as a symmetric game of complete and imperfect information. Nothing is said about the political scenario, i.e. the presence of a coalition government with conflicting fiscal goals is given, not explained. In Part 2, some assumptions about the economy are modified and some about the political context are added to present a non-symmetric version of the same game. An electoral equilibrium is then investigated

[5] See Weingast and Marshall (1988).

[6] Mulè (1993) suggests that in Italy, for instance, party's economic agenda is not the main item in the determination of voters' choice.

leading to the formation of a fiscally irresponsible coalition government, which had been taken for granted. The importance of the presence of an extra-economic issue in rational voters' utility is stressed.

Part 1.

COALITION PARTNERS' CONFLICT OVER FISCAL POLICY AS A GAME OF COMPLETE INFORMATION.

2.1. Model's assumptions.

There are two social groups: workers and rentiers. Workers only earn from their labour, rentiers from the rent of their land. Per capita income is exogenously given, constant and corresponds to the actual income each individual earns.

There is a public good to be produced, the optimal amount of which, g, is constant and exogenously given. There are two non distortionary taxes available: a lump sum to be paid by workers and a lump sum on land. The polarisation on the subject of the allocation of the fiscal burden is extreme: if rentiers were in power, they would set the tax on land to 0 and charge workers with the whole of it, while if workers were in charge they would do the opposite.

If a government runs a budget deficit, they can issue public debt to cover it and, up to a certain extent, use seignorage. It is assumed that when public spending is financed through seignorage and public debt, this is done in fixed proportions: γ and $1-\gamma$ [7] respectively.

Public bonds are sold abroad[8]. We are in a discrete time set-up: the life of public debt bonds is one year, and on the first day of each year, the day the government presents their financial bill, it can either be renewed or paid back. At the beginning of the game (T=0[9]) public debt is equal to 0.

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[7] γ may be thought of as the ceiling to the monetisation of budget deficits imposed by the law or by central bank's independence.

[8] Public debt pays an exogenously given world interest rate, r, to the holder; for simplicity, however, we will set r to 0.

[9] T is the first day of the t+1 year.

Seignorage may be distortionary. The incidence on each agent's consumption of these distortions, K, is proportional to the amount of taxes raised as seignorage:

$$K_t(\theta) = \theta\pi_t$$

$\theta \geq 0$ is a parameter measuring how distortionary inflation[10] is in terms of individual consumption. When it is greater than 0, inflation has two effects on utility: a real balance effect (which is always present) and an indirect effect via the distortions it generates. Both are the same for everyone.

Just like in the Alesina and Drazen model the utility function is the following[11]:

$$U^i = \sum_{t=0}^{\infty} u_{t+1}^i$$

$$u_t^i = c_t - y$$

where:

c is consumption of private goods[12];

y is yearly per capita income, and by subtracting it I am just normalising.

Since agents' utility is linear in consumption, all consumption paths satisfying the budget constraint with equality give the same (maximum) utility. One of those paths is the following: at every time every agent consumes all disposable income. I assume then that this is the path our economy chooses, so this a world with no saving[13].

There is a maximum length of time by which public spending can be financed by issuing debt bonds. I assume that from T=2 on such a practice is forbidden[14]. This may be seen as the requirement imposed by an international agreement our economy has signed up for. A coin is tossed to decide which of the two lump sum taxes to use to finance public spending. What we

[10] For simplicity, inflation is assumed to be equal to seignorage. I will therefore use the two terms interchangeably.

[11] We have set the rate of discount equal to 0 for simplicity. All it takes for my results to obtain is that the rate of interest be equal to the rate of discount.

[12] Utility may also be dependent on the consumption of the public good, but since the level of public spending is given it plays no role in the game and is therefore omitted.

[13] This obviously means that Ricardian Equivalence does not hold here. However, public debt is still neutral in itself, because different intertemporal allocations of any given amount of consumption give the same utility. This is due to the special form the utility function takes: it is linear in consumption and characterised by time separability. It is only when inflation is introduced alongside with debt, and it is distortionary, that there is a reduction in welfare.

need is a time the game will end at, while what happens afterwards may be specified in different ways. I have chosen the random draw just mentioned because it makes the game symmetric.

As for the political context, the setting is a parliamentary democracy with proportional representation[15], with the presence of more than two parties. Political parties' representatives are not "office motivated", and therefore have the same utility function as any other agent in the economy. Elections take place every second year, precisely at T=0 and T=2. The winner must immediately produce a financial bill. The number of voters, the same as the number of agents of the economy for simplicity, is 2n, n of which are rentiers and n of which are workers.

I take for granted that the actual political scenario is such that the elections at T=0 gave no absolute majority to any party, and that by forming a coalition R, a party representing rentiers, and W, a workers' party, produce a government with sufficient parliamentary support. Generally speaking, R and W may have an interest in forming a coalition because they share the same extra-economic Weltanschauung, which will then be represented in power. However, they have conflicting goals as far as fiscal policy is concerned.

2.2. The game: general framework.

The very moment of their election (T=0) a government must take a decision about the allocation of the fiscal burden and produce a financial bill. Since the government is a coalition with conflicting fiscal goals using either of the available lump sum taxes is impossible, and fiscal policy is then the outcome of the coalition partners' strategic interaction.

The rules of the game are peculiar. The coalition partners must simultaneously choose an action: whether to concede, that is, declaring oneself ready to be burdened with the whole of the fiscal deficit for the rest of the mandate, or whether not to concede. If both parties concede, a coin is tossed at T=0 to choose between raising a lump sum tax from rentiers and raising a lump sum tax from workers in both years of the term. If only one concedes, the social group it represents will be the one financing public spending for the whole length of the mandate. Finally, if both parties do not concede, neither lump sum tax can be used, and public spending at t=1 (the first year of the term) is financed through debt and seignorage. This is a

[14] My results would not change qualitatively if we considered a longer term (i.e. end of the game at T=3,4 etc.). Changing the set-up in this respect only complicates calculus.

viable option because inflation is a tax affecting everyone's utility in the same way. At T=1 debt must be either repaid or renewed, hence a new stage of the game takes place, with both players having to declare again "concession" or "no concession".

Unlike in Alesina and Drazen (1991), the actions are not statements about the players' nature: we are in a context of complete information. Rather, no concession is something like reneging one's word (by proposing amendments to the financial bill in Parliament, for instance). The co-operative solution by which both coalition partners concede is never reachable, since because of the existence of the option not to concede commitments are not binding, and therefore not credible.

We can summarise all this by saying that the game is one of complete but imperfect information (simultaneous moves), where a second stage is reached only if there was a certain outcome, namely "no concession, no concession", at stage one. It is also a symmetric game.

2.3. The game: normal form.

To write down the game in normal form and find its equilibrium we need to know both players' payoffs. First of all, let us consider how debt and inflation evolve if neither player concedes at any time:

$$b_1 = (1-\gamma)g$$

$$\pi_1 = \gamma g$$

$$b_2 = (1-\gamma)[1+(1-\gamma)]g$$

$$\pi_2 = \gamma[1+(1-\gamma)]g$$

Note that the incidence of seignorage at an individual level (τ_i^d) is equal to seignorage revenues divided by the number of agents/taxpayers[16]:

[15] The end of the game may also be interpreted as a major political reform such as a switch to a voting system like the first-past-the-post one.

[16] Alesina and Drazen (1991) assume that each of the two groups pays one-half of taxes before a stabilisation; if I normalised n to 1 I would obtain exactly the same.

$$\tau_t^d = \frac{1}{2n}\pi_t$$

(the superscript "d" stands for distortionary). Correspondingly, the incidence of a lump sum tax (τ^{nd}) on one rentier is equal to its revenue divided by n, and the same for a lump sum tax to be paid by any worker.

Since there is no saving, expected consumption is equal to expected disposable income:

$$E(c_t^{bc}) = y - \tau_t^d - K_t$$

$$E(c_t^w) = y$$

$$E(c_t^l) = y - \tau_t^{nd}$$

$$E(c_t^{bil}) = y - \frac{1}{2}\tau_t^{nd}$$

where the superscript "bc" means "before anyone plays concession", "w" means "winner" (the one who has not conceded in an outcome with unilateral concession), "l" stands for loser (the one who has played concession in an outcome with unilateral concession) and "bil" for bilateral concession, associated with the tossing of a coin.

Let us then turn to utility. By substituting out for consumption and considering the distortionary effects of inflation, expected utility at time t before anyone has conceded may be written as:

$$E(u_t^{bc}) = -\left(\frac{1}{2n} + \theta\right)\pi_t$$

while the expected utility at a time after someone has conceded is equal to 0 for the winner, minus the non-distortionary tax for the loser and minus the non distortionary tax multiplied by the probability 0.5 for both players in case of a bilateral concession.

However the game evolves, there is by assumption a stabilisation at T=2 by which all debt is repaid. The effects of the strategic interaction between the coalition parties cannot stretch out beyond t=3, that is, the first year of the next mandate. Therefore, while writing down the payoffs of the game I must only consider the utility of the players at t=1, t=2 and t=3. I cannot

neglect t=3 utility, because according to how the game evolves there will or will not be a transmission of debt from this mandate to the next. If there is transmission of debt, the stabilisation that must take place will obviously be stronger, as extra tax revenues must be obtained to pay back the debt to foreign investors.

Given the game structure, the payoffs of the game can be easily evaluated. The normal form of the game is shown in Table 1. Notice that what makes the game symmetric is both the fact that there is a number of rentiers equal to the number of workers and the assumption of an equal expected share of the fiscal burden at t=3.

The players use backward induction. They can anticipate the Nash equilibrium of the second stage of the game; they insert the corresponding payoffs in the first stage and finally choose their strategies. The result is a subgame-perfect equilibrium.

It is easy to see that, as anticipated, "concession, concession" is never an equilibrium. At every stage, if the opponent concedes, any player will play "no concession", because by so doing he avoids being fiscally burdened altogether (he will only expect to pay the fiscal burden of t=3 times the probability 0.5, as required by the international agreement). The comparison between the payoffs associated with conceding and not conceding, given that the opponent does not concede, is less clear-cut instead. Both options imply costs in terms of utility, and whether not conceding is more or less costly depends on how distortionary inflation is, that is, on the value of the parameter θ.

In what follows I will use short names for the payoffs in Table 1:

A is any player's payoff when he is the winner at T=0;
B is his payoff when he is the loser at T=0;
C is his payoff when there is bilateral concession at T=0;
D is his payoff when he is the winner at T=1;
E is his payoff when he is the loser at T=1;
F is his payoff when there is bilateral concession at T=1;
G is his payoff when there is no concession before T=2.

2.4. Equilibria.

Depending on the value of the parameter θ, the interaction between coalition partners determines the implementation of different fiscal policies. Let us consider the three possible cases.

Proposition 1. *If the condition:*

$$\theta < \frac{1}{n\gamma(3-\gamma)}$$

is met, then the game has a unique Nash equilibrium implying the longest delay in stabilisation[17].

The proof is straightforward. At T=1 each player's payoff associated with "no concession", given that the opponent does not concede, is greater than the one associated with "concession", still given that the opponent does not concede, only if:

$$\theta < \frac{1}{2n\gamma}$$

which holds, given Proposition 1. The game at stage 2 is then a Prisoner's Dilemma.

The next step is to compare the parties' payoff associated with the unique NE at T=1, {G, G}, now seen as the outcome of playing "no concession, no concession" at T=0, with the payoffs associated with conceding at T=0, given that the opponent does not concede. We have just another Prisoner's Dilemma here if the condition stated in Proposition 1 is met; hence {G, G} is the outcome associated with the unique NE of the entire game.

Notice that quite obviously the condition in Proposition 1 is more stringent than the one that is required in order for {G, G} to be the outcome associated with the NE at T=1. Note also that in the condition in Proposition 1 the RHS is positive for all possible values of the parameters. This tells us that assuming that this condition holds does not contradict assuming that inflation affects utility negatively through the distortions it produces (i.e. $\theta > 0$). Finally, consider that the lower the value of γ, the more likely this condition is met. Since in the OECD countries the degree of monetisation of the budget deficit is usually not so high the case here analysed is therefore particularly interesting.

Let us now consider the economic meaning of what is going on here. By playing "no concession" instead of "concession", given that the opponent does not concede, any player is

[17] The value of the upper bound for θ is dependent on the choice about the duration of the electoral term. If the term were longer than 2 years, the condition to be met in order for the game to have a unique NE with both players play "no concession" at every stage would be even more stringent. However, for any finite time of duration there always exists a positive upper bound for θ under which the game evolves in the way here considered.

better off, because the fiscal burden of the two years of the mandate is shared. In fact, the amount of it that is transmitted to t=3 through public debt is shared in expectation, because a coin is tossed, while the rest is paid during the mandate as seignorage, and the real balance effect of inflation is the same for everyone by assumption. There is also an additional distortionary effect attached to inflation, but it is small enough to be offset by the benefit of paying just half, not the whole of the fiscal burden of the two years of the term (as it would be the case by playing "concession", given that the opponent does not concede).

It may seem that much depends on the fact that the assumption about the end of the game is a favourable one for both players, in comparison with what happens to them if they play "concession", given that their partner plays "no concession". But that is not the case: the result is far more general.

Consider for example a different assumption about the end of the game: one of the players (say, W) pays nothing and the other (R) is burdened with the whole cost of the stabilisation. Imagine at first that $\theta = 0$. Whatever R plays, quite obviously W does not concede. But what happens to R? Whatever he does, he will have to pay for the whole public spending of t=3. But by playing "concession", given that W does not concede, the outcome will be such that R will have to pay also for the whole of public spending of year 1 and 2, while by playing "no concession" at both stages of the game he will only have to pay part of that, namely the repayment of public debt at T=2 and *his share* of seignorage during the mandate. In other words, by playing "no concession" at T=0 and T=1 R benefits from the fact that the consequent use of debt and inflation for the whole of the mandate will make W pay, through seignorage, part of the cost of public spending of t=1 and t=2, which he would pay entirely if he played "concession". Let us now remove the assumption $\theta = 0$. The result still holds if the costs of inflation (linked to its distortionary nature) R has to pay are smaller than the benefits (in terms of a redistribution of the costs of public spending at t=1 and t=2 that is favourable to him). A range of low but positive values for θ may still be found by which this happens[18].

Some conclusions may be drawn as far as the welfare analysis is concerned. Two different cases are here comprised: $\theta = 0$ and θ positive but small. In the first case, no inefficiency is introduced, in spite of the long delay in stabilisation. As for the second case, since seignorage is here used for the whole length of the electoral term with certainty, the maximum amount of inefficiency is introduced in the economy. However, the condition on the value for θ that is necessary for the game to be played this way takes the form of an upper bound, so that the welfare loss cannot be so great, because the distortions caused by inflation are small.

[18] The condition on θ referred to this version of the game is available upon request.

Notice also that the partial derivatives of G in θ, γ and g are all negative, so that a small increase in any of these parameters makes the inefficiency introduced by the strategic interaction between the coalition partners greater.

Proposition 2. *If the condition:*

$$\theta > \frac{1}{2n\gamma}$$

is met, then the game has a mixed strategies equilibrium implying the possibility for debt and inflation to rise in the first or in both years of the mandate.

The condition in Proposition 2 implies E > G, so now both players find it convenient to concede at T=1, given that the opponent plays "no concession". This is then a Chicken game. There are therefore two pure strategies Nash equilibria, at {D, E} and at {E, D}. In any game with two equilibria in pure strategies there is also an equilibrium in mixed strategies. As it is usual in case of multiple equilibria, the question arises of what criterion to use to single out the most plausible one. Some authors have suggested symmetry is a reasonable choice rule: an asymmetric equilibrium is in fact an improbable "focal point"[19]. The two pure strategies equilibria are extremely asymmetric. This is a symmetric game and therefore the mixed strategies equilibrium is also symmetric (both players play "concession" and "no concession" with the same probability). I am therefore interested in identifying the mixed strategies equilibrium[20]. I can then single it out and insert the associated payoffs into the first stage of the game, thus presumably following the players' backward induction.
In the mixed strategies equilibrium at T=1 let us call $\overline{p}$ the probability with which any player plays "concession"; this probability has been calculated to be:

$$\overline{p} = 1 - \frac{1}{2n\theta\gamma}$$

[19] See Rasmusen (1989).
[20] As pointed out by Harsanyi (1973) mixed strategies equilibria of complete information games may be thought of as "limits" to pure strategy equilibria in games with players having a small amount of private information, which highlights the correspondence between the equilibrium here selected and the one analysed by Alesina and Drazen.

If I call $MIX1$ the expected payoff associated with the mixed strategies equilibrium at T=1, I can then write it as:

$$MIX1 = -\frac{2-\gamma+6n\theta\gamma+4n^2\theta^2\gamma^2}{4n^2\theta\gamma}g$$

After replacing "next stage" with $\{MIX1, MIX1\}$ (see Table 1) I can analyse what happens at T=0. Once again there are two NE in pure strategies, namely: "no concession, concession" and "concession, no concession", because:

$$B > MIX1$$

so every player concedes, given that the opponent does not concede (Chicken again). Following the same reasoning as in the second stage of the game, let us select again the mixed strategies equilibrium. Through simple calculations the probability with which any player will play "concession" at T=0, which I will call $\bar{z}$, can be found:

$$\bar{z} = 1+\frac{1}{\frac{3}{2}+\frac{n}{g}MIX1} = 1-\frac{4n\theta\gamma}{2-\gamma+4n^2\theta^2\gamma^2}$$

With some further calculus the expected payoffs characterising the mixed strategies equilibrium at T=0 (called $MIX2$) can also be found, which can be thought of as the expected utility of any player at the beginning of the game. Its value is the following:

$$MIX2 = -\frac{6-3\gamma+8n\theta\gamma+12n^2\theta^2\gamma^2}{2n(2-\gamma+4n^2\theta^2\gamma^2)}g$$

Let us finally consider what happens to public debt and inflation in this context, and the implications as far as welfare is concerned.

The first thing to point out is that the mixed strategies equilibrium of the game implies the possibility of a delay in the adoption of non-distortionary taxes (and a contemporary rise in debt and inflation), and that this possibility is present only if the mixed strategies equilibrium is selected. In fact, it can easily be shown that if at stage two either of the pure strategies equilibria (at {D, E} and at {E, D}) were singled out, the equilibrium at stage one would be in

pure strategies, too (at {A, B} in the first case and at {B, A} in the second). This means that there would be a winner and a loser at T=0, thus making the use of debt and inflation unnecessary. However, I have motivated why the mixed strategies equilibrium is to be considered as the best candidate for selection in this context of multiple equilibria.

The second point I want to emphasise is that in this mixed strategies equilibrium rises in debt and inflation of different duration are possible. In fact, the game may reach its second stage (because neither player has conceded at T=0) and either end there, because a uni- or bilateral concession takes place then[21], or go on (when "no concession, no concession" is the draw at T=1), which implies no stabilisation before the end of the term.

As far as welfare is concerned, it is interesting to notice that the condition on θ characterising this set-up takes the form of a lower bound. This means that the distortions seignorage brings about may now be great. All outcomes of the game save for those implying immediate concession are therefore bound to cause a great deal of inefficiency. Ex ante, both players would be better off if co-operation were possible.

In terms of comparative statics, it is interesting to notice that a greater θ does not necessarily mean a smaller expected utility. This is because an increase in the amount of distortions caused by inflation affects the probabilities of playing "concession" at both stages (see Appendix A).

Proposition 3. *If the condition:*

$$\frac{1}{n\gamma(3-\gamma)} < \theta < \frac{1}{2n\gamma}$$

is met, then the game has a mixed strategies equilibrium by which either there is immediate stabilisation, or a delay lasting for the whole of the term.

Since θ is not so high here, if the second stage of the game is reached both players find it convenient not to concede, given that the opponent plays "no concession". {G, G}, the expected payoffs of the equilibrium at T=1, are then inserted in the first stage of the game, just like in the case sub Proposition 1. Here, however, θ is not so small, either; its value is not as low as to have both R and W play "no concession" at T=0, given that the opponent does not

[21] We do not agree with Alesina and Drazen (1991) when they identify concession by either side (or both) with giving up being part of the government. Declaring to be ready to be burdened with the whole of the fiscal deficit

concede. On the contrary, both players choose to concede at T=0, given that the opponent does not concede, and there are therefore two NE at that stage of the game, leading to the outcomes {A, B} and {B, A}. Both of these are in pure strategies, and just like in the case sub Proposition 2 a third equilibrium, the mixed strategies one, will be the one I focus on.
Let us therefore analyse the mixed strategies equilibrium of this game. The value of the probability with which each coalition party plays "concession" at T=0, called $\tilde{z}$, is:

$$\tilde{z} = 1 - \frac{1}{n\theta\gamma(3-\gamma)}$$

Given the value of $\tilde{z}$, the expected payoff of both players at T=0, called EP, is easily found:

$$EP = -\frac{2+3n\theta\gamma(3-\gamma)}{2n^2\theta\gamma(3-\gamma)}g$$

What does all this imply from the point of view of the dynamics of public debt and inflation? How much inefficiency does a coalition government introduce in such a context? The peculiar aspect of this mixed strategies equilibrium is that if the second stage of the game is reached, both players play pure strategies ("no concession"). So depending on the actions taken by the players at T=0, either there is immediate adoption of non-distortionary taxes to cover public spending (immediate uni- or bilateral concession), or the government issues debt bonds and creates inflation, in which case a stabilisation is excluded before T=2, i.e. the time of the enforcement of the international agreement. Public debt may or may not rise during the mandate; if it does, it rises for the whole length of it and is transmitted to the next government. When this is the case, inefficiency is introduced because debt is always matched by inflation, and inflation determines a reduction in expected utility because of its distortionary effects. The value of θ is here intermediate with respect to the ranges considered in Proposition 1 and Proposition 2.
It is interesting to notice that here, too, an increase in θ influences the probabilities with which the coalition members play "concession" at T=0. The comparative statics is done in Appendix B.

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while remaining part of the ruling coalition is not an incoherent behaviour if the coalition parties are strongly motivated by extra-economic issues, for instance.

2.5. Appendix A.

In the context of the mixed strategies equilibrium of Proposition 2 a small increase in θ may increase the probability with which both players play "concession" at T=0, thus making the expected payoffs greater (because waiting is costly). To see the point, consider first of all that a small increase in θ increases the probability with which both players play "concession" at T=1, if that stage of the game is reached:

$$\frac{\partial \bar{p}}{\partial \theta} = \frac{1}{2n\theta^2\gamma} > 0$$

Notice the above derivative is decreasing in θ. The next step is to look at the effect on $MIX1$. This payoff may be thought of as a weighted average of the payoffs associated with the four possible outcomes of the game at T=1, where the weights depend on the value of $\bar{p}$. There are therefore two effects of a small increase of the distortions caused by inflation on $MIX1$: one is indirect, as it affects it via effect on $\bar{p}$, and is positive; the other one is direct, as it concerns the values of the payoffs $MIX1$ is a linear combination of, and is negative. As the derivative of $\bar{p}$ in θ is decreasing, the smaller the starting value of θ, the greater the indirect effect, which turns then out to prevail over the direct one. Precisely, for starting values of θ lower than:

$$\theta = \frac{\sqrt{2-\gamma}}{2n\gamma}$$

a small increase in this parameter makes $MIX1$ increase, while the contrary is true when the starting value of θ is higher than that.

Consider now that an increase in $MIX1$ makes the probability with which both players play "concession" at T=0, $\bar{z}$, smaller. This is also intuitively clear, because $MIX1$ is the payoff associated with the outcome "no concession, no concession" at T=0 and if its value is not so small, the probability with which both players concede at that time is not so great.

I then finally come to the effect of a small increase in θ on $MIX2$. This payoff is a weighted average of A, B, C and $MIX1$, the weights depending on the value of $\bar{z}$. Again, there are two antagonist effects: θ enters the $MIX2$ function via $MIX1$ and via $\bar{z}$, and when an increase in θ makes the former greater (which is the case when the starting value of that parameter is

small), it makes the latter smaller, and vice versa. It is the effect working through $\bar{z}$ that turns out always to be the dominant one here. The conclusion is that when the starting value of θ is small a small increase makes the value of $MIX2$ decrease, but if the starting value of θ is sufficiently high its increase determines an *increase* of $MIX2$. The latter result is not so distant from what Drazen and Grilli (1993) describe as "the benefit of crises".

It may be shown that the comparative statics involving the γ parameter is totally analogous, so that for small starting values of the rate of monetisation of public deficit a small increase makes the value of $MIX2$ decrease, while the contrary effect is found when the starting value is conveniently high.

On the contrary, the partial derivative in g of the expected payoff associated with the mixed strategies equilibrium is always negative. In fact, the cost of public expenditure does not affect the probabilities with which the players play "concession" at any stage.

2.6. Appendix B.

Also in the equilibrium synthesised in Proposition 3 the value of θ influences the probability with which the coalition members play "concession" at T=0, as well as the payoff associated to the outcome {G, G}. A small increase makes this probability greater, as it is possible to infer from the positive sign of its partial derivative in θ:

$$\frac{\partial \bar{z}}{\partial \theta} = \frac{1}{n\theta^2\gamma(3-\gamma)}$$

This is the reason why the value of EP also increases as a consequence of a small increase in θ, as shows the positive sign of its partial derivative:

$$\frac{\partial EP}{\partial \theta} = \frac{1}{n^2\theta^2\gamma(3-\gamma)}$$

In fact, the game is now more likely to end with uni- or bilateral concession at T=0, and this makes expected utility increase, as delays in stabilisation are costly. It is true that if "no concession, no concession" is the outcome at T=0, the expected utility is smaller as a consequence of an increase in θ, but the first, positive effect *always* prevails here.

The comparative statics involving the γ parameter is totally analogous, and in fact the partial derivative of EP in the rate of monetisation of the public deficit is positive:

$$\frac{\partial EP}{\partial \gamma} = \frac{3-2\gamma}{n^2\theta\gamma^2(3-y)^2}$$

The partial derivative in g is negative instead, as the value of public spending does not affect the value of $\tilde{z}$.

Part 2.

WHY DO PARTIES WITH CONFLICTING FISCAL GOALS FORM COALITIONS?

3.1. Modification of Part 1 model's assumptions about the economic context.

As far as the economic context is concerned, the only modifications I make to Part 1 model's assumptions regard the utility function and the size of the social groups. I assume now there are two types of agents. For the first type, some extra-economic issue is of paramount importance. Let us suppose this issue is something related to morality (abortion, for instance)[22]. These agents have lexicographic preferences with the moral issue on top of the ranking, and if the government adopts a policy which is contrary to their moral position their utility is minus infinite. When a government is in line with their moral creed, instead, their utility is linearly dependent on consumption, just like in Part 1, and therefore which attribution of the fiscal burden is implemented is relevant. The introduction of agents with lexicographic preferences is functional to a strong simplification of the political context. In fact, I will describe in the next paragraph a possible political scenario in which this type of agents plays an important role.

[22] Another interesting example is some kind of ethnic division.

The rest of the electoral body is made up by agents for whom the moral issue enters the utility function just like consumption. These are defined as unattached voters, and their utility function is the following:

$$U^i = \sum_{t=0}^{\infty} u_{t+1}^i$$

$$u_t^i = c_t - y_t + \delta q_t^i$$

The new element here is the last term. δ is a dummy with value 1 if a conservative government is in office, -1 if a liberal one is on power, where I use conservative and liberal as referred to the polarisation on the moral issue. q is a parameter measuring the bias for the conservative view and may take values from $\breve{q}$ (negative) to $\hat{q}$ (positive)[23]. I assume that q is a random walk:

$$q_t^i = q_{t-1}^i + \varepsilon_t \qquad \varepsilon_t \text{ W.N.}$$

Quite realistically, the bias has a strong autocorrelation, but it also depends on cultural shocks. Agents tend to be coherent, but new information may modify their views.
The number of agents in the economy, the same as the number of voters for simplicity, is now N=2n+a, n of which are rentiers and n+a of which are workers (a is an odd number).

3.2. More assumptions about the political context.

If there were no moral bias only two parties would compete at the elections: one would have workers finance public spending by paying a lump sum tax, the other would pay for it by imposing a lump sum tax on rentiers. The latter would always win, since workers are more numerous than rentiers. However, this is not the case. Some moral issue matters. It is because of this that the political scene may be characterised in such a way that no single party gets the absolute majority of votes in an election, and following that a coalition based only on

[23] This way of modelling the utility agents derive from the presence of a government with either position on the extra-economic issue is similar to the one suggested in Milesi-Ferretti and Spolaore (1994).

common moral views is formed. A restricted and not too unrealistic set of assumptions determining this result is the following[24]:

1) the number of voters with lexicographic preferences is equal or greater than the majority of the electoral body ((2n+a+1)/2). All rentiers are part of this group, so unattached voters are all workers. Some workers, however, have lexicographic preferences;

2) rentiers are all conservative[25];

3) there are three "moral constituencies": one is conservative on the moral issue and prefers imposing a lump sum on workers, one is conservative but it would tax rentiers if on power and one is liberal and has a preference for the adoption of a lump sum tax on land[26]. The votes of agents with lexicographic preferences are not swinging: they stick to the political party that gives voice to the moral constituency they belong to;

4) no moral constituency reaches the majority of votes, and the same is true both for the coalition of the two conservative constituencies and for the sum of the votes of workers' conservative constituency and of unattached voters;

5) all voters are rational and forward-looking. They are informed about the presence and the size of the three constituencies.

If these assumptions are met, those with lexicographic preferences may only vote for someone who is part of their own constituency, because this is the only way they can be sure that in case the elections will not give absolute majority to any party, those they have voted for will set up alliances/coalitions giving priority to the moral issue. The following three parties/candidates therefore exist:

CR: all members are ultra-conservative rentiers[27];
CW: all members are ultra-conservative workers;

[24] What follows qualifies as sufficient but not necessary conditions.
[25] What is needed is that they all share the same moral views, no matter which, while workers do not.
[26] The characterisation of "moral constituencies" by a preference regarding fiscal policy is not in contrast to the very definition of such groups. In fact, the utility of agents with lexicographic preferences does depend on consumption, although on the moral position of government first.
[27] I use the adjectives ultra-conservative/liberal to define agents with lexicographic preferences with the extra-economic issue on top of the ranking.

LW: all members are ultra-liberal workers.

C/L stands for conservative/liberal; R/W stands for rentiers/workers and correspondingly to the preference on the fiscal policy to implement (R= lump sum on workers, W= lump sum on rentiers).

Are there likely to be other parties competing in the elections? There may be, as unattached voters may have their own candidates. However, it can be shown that this is not relevant to our model: given these assumptions, considering any richer political scenario is the same as considering just the three parties above[28]. We will then stick to the simpler set-up and say that the only candidates are those expressed by CR, CW, LW. Therefore also unattached voters must cast their vote for either of them. Given the above assumptions, voting is a non-strategic action for them, in the sense that what is optimal for a voter does not depend on other voters' choice.

The most relevant peculiarity of the political scenario I have just described is the presence of a group of workers who share the same moral position as that of rentiers. In other words, the extra-economic issue and the fiscal agenda split the electoral body differently. If it were not so a two-party scenario would still be the result, but this is just what it takes to make coalition governments unlikely if not impossible.

The crucial vote in the elections is that of the median voter in voters' distribution according to the degree of conservatism on the moral issue. Since I have assumed workers are more numerous than rentiers and all rentiers are ultra-conservative the median voter is a worker, and given the second part of assumption 4) he is an unattached voter. He will vote for either CW or LW.

The given set of assumptions is such that the electoral result is either absolute majority for LW or no party reaching absolute majority. In the latter case CW forms a coalition government with CR and this government is supported by a majority in Parliament. It is in this case that a war of attrition is likely to start. Just like in Part 1, in fact, I exclude that some commitment technology making coalition partners' promises to each other credible is

[28] The very presence of agents with lexicographic preferences is functional to this simplification of the political scenario, as well as to the requirement that in case of no party reaching absolute majority the coalition that will be formed will be based on moral affinity, which is what it takes to have coalitions with conflicting fiscal purposes.

available. Eventual electoral promises made by the future coalition partners to potential voters about their will to co-operate in the process of allocation of the fiscal burden are also not binding, hence not credible. Besides, T=2 elections have no disciplinary role on their behaviour.

Being forward-looking, unattached voters know all this. Nevertheless, the median voter's conservative bias may be as strong as to have him vote for CW, in spite of the fact that if the next government is CW+CR he will have two disadvantages: his favourite fiscal policy will not be implemented, as would be the case otherwise, and he will suffer, like any other agent in the economy, from the inefficiency introduced by the coalition.

3.3. The model: an overview.

I will first analyse what fiscal policy measures unattached voters (workers by assumption) expect if LW wins the elections and, alternatively, if no party gets the majority of votes. In the latter case CR and CW form a coalition on the basis of their common moral views, and they start a war of attrition. I will analyse this game, an asymmetric version of the one in Part 1, and find the expected payoffs associated with every equilibrium. Given the assumptions about the utility functions of agents, CW's payoffs correspond to the values of the utility that an unattached voter, hence also the median voter, gets from consumption in correspondence to the attributions of the fiscal burden the equilibria entail.

The next step is to consider how conservative the median voter must be in order for him to prefer to vote for CW instead of casting his vote for LW. This consists in finding the minimum value for his q allowing for his utility in case of a CR+CW government to be higher than his utility if CW is in office. This value is ultimately the sufficient condition for a coalition government without a fiscal agenda they agree upon to be elected. Being the median voter's conservative bias stochastic, it is not known before the elections. However, if its density function is known, the probability for the conservative coalition to form the next government may be calculated.

3.4. Fiscal policy as the product of coalition partners' strategic interaction.

If LW wins the elections, they will finance the production of g with a lump sum to be paid by rentiers only[29].

If a government is formed by CR and CW, instead, fiscal policy will be the product of their strategic interaction. The game is similar to the one in Part 1, the only difference lying in the fact that now, being workers n+a>n, it is not symmetric. Table 2 illustrates the normal form of this game. I will use the same short names for each payoff as in Part 1, only they refer to Table 2 here and have the name of the player they refer to in brackets (ex. G(CR), D(CW)).

Let us analyse the equilibria of this game. A first, pure strategies equilibrium, equivalent to the one of Proposition 1 in Part 1, is the only one available if the following condition holds:

Condition 1: $$\theta < -\frac{1}{N} + \frac{2+3\gamma-\gamma^2}{2\gamma(n+a)(3-\gamma)}$$

The game is a Prisoners' Dilemma at both stages of the game. In fact, concession is a dominated strategy at T=1 for CR if:

$$\theta < \frac{1}{N} + \frac{1}{n}\left(\frac{1+\gamma}{2\gamma}\right)$$

and for CW if:

$$\theta < -\frac{1}{N} + \frac{1}{n+a}\left(\frac{1+\gamma}{2\gamma}\right)$$

Both these conditions are met if Condition 1 holds. {G(CR), G(CW)} is therefore the outcome of playing "no concession, no concession" at T=0. And if Condition 1 holds, even at T=0

[29] LW may also partially finance it by issuing public debt. However, they will not cover the rest by recurring to seignorage, as this would imply part of the expense is paid by workers (real balance effect) and workers, as well as rentiers, would also suffer from the distortions inflation causes. Public goods of t=2 are all financed by taxes on land, and if LW has issued debt at T=0, they will now repay for it in the same way. In terms workers' utility, this fiscal policy is exactly equivalent to a balanced budget (with g financed by taxes on land) in every year. The alternative to recur to debt at T=1 and/or renew T=0 debt is not convenient for workers, because it would

concession is a dominated strategy for both players. In fact, Condition 1 is found by imposing that conceding gives a higher payoff to CW than not conceding, given that the opponent does not concede. Doing the same for CR gives a less stringent condition, namely:

$$\theta < -\frac{1}{N} + \frac{2+3\gamma-\gamma^2}{2n\gamma(3-\gamma)}$$

The equilibrium is therefore given by both players playing no concession at both stages of the game, and the associated outcome is {G(CR), G(CW)}. All considerations about the equilibrium of Proposition 1 in Part 1 apply.

A second, mixed strategy equilibrium, corresponding to the one of Proposition 2 in Part 1 is found if Condition 2 holds:

Condition 2: $$\theta > -\frac{1}{N} + \frac{1}{n}\left(\frac{1+\gamma}{2\gamma}\right)$$

Just like in Part 1 there are here two pure strategies equilibria implying unilateral concession at T=0, hence no use of public debt, but they are highly asymmetric. The mixed strategies one, a Chicken game at both stages, is here not perfectly symmetric, either, but it is, at least, less asymmetric[30]. The probabilities with which CR and CW play concession at T=1, $\bar{p}$ and $\bar{b}$ respectively, have the following values:

$$\bar{p} = 1 - \frac{1}{\gamma\left(\frac{a}{N} + 2\theta(a+n)\right)}$$

$$\bar{b} = 1 - \frac{1}{\gamma\left(2n\theta - \frac{a}{N}\right)}$$

imply running the risk of paying for part of the public spending of this mandate in the next, when a coin is tossed to determine the terms of the stabilisation.

[30] The source of asymmetry is the different size of the social groups CW and CL represent, i.e. a>0. Payoffs are individual utilities, so they depend on individual fiscal burdens. The more numerous the agents belonging to a social group (workers/rentiers), the smaller their individual fiscal burden if the party representing the economic interests of that group turns out to be the loser of the war of attrition.

with $\bar{p}>\bar{b}$ for all a>0 and for all θ respecting Condition 2. If CR and CW play concession with the above probabilities at T=1, their payoffs, called MIX1CR and MIX1CW are the following:

$$MIX1CR = (-2a^2 - 8an - 8n^2 + 4a^2\gamma + 10an\gamma + 4n^2\gamma - 6a^2n\theta\gamma - 24an^2\theta\gamma - 24n^3\theta\gamma +$$

$$- a^2\gamma^2 + 4a^2n\theta\gamma^2 + 8an^2\theta\gamma^2 - 4a^2n^2\theta^2\gamma^2 - 16an^3\theta^2\gamma^2 - 16n^4\theta^2\gamma^2)g$$

$$\left[2n\gamma(2n+a)(-a+2an\theta+4n^2\theta)\right]^{-1}$$

$$MIX1CW = (-2a^2 - 8an - 8n^2 - 2a^2\gamma - 2an\gamma + 4n^2\gamma - 6a^3\theta\gamma - 30a^2n\theta\gamma - 48an^2\theta\gamma +$$

$$- 24n^3\theta\gamma - a^2\gamma^2 - 4a^3\theta\gamma^2 - 12a^2n\theta\gamma^2 - 8an^2\theta\gamma^2 - 4a^4\theta^2\gamma^2 - 24a^3n\theta^2\gamma^2 +$$

$$- 52a^2n^2\theta^2\gamma^2 - 48an^3\theta^2\gamma^2 - 16n^4\theta^2\gamma^2)g$$

$$\left[2\gamma(n+a)(2n+a)(a+2a^2\theta+6an\theta+4n^2\theta)\right]^{-1}$$

where MIX1CW>MIX1CR. Even in the equilibrium of Condition 1 CW's expected payoff at T=1 was greater than CR's, but here the fact that rentiers are less numerous has two effects: a direct one, just like for G(CW)>G(CR), and an indirect one via $\bar{p}>\bar{b}$. By inserting {MIX1CR, MIX1CW} as the outcome of both players' not conceding at T=0 the first stage of the game may be analysed. Here again two pure strategies equilibria, "concession; no concession" and "no concession; concession" are present, and again the mixed strategies one is of more interest. The probabilities with which CR and CW play concession, called $\bar{s}$ and $\bar{z}$ respectively, have the following values:

$$\bar{s} = 1 + \frac{1}{\frac{3}{2} + \frac{n+a}{g} MIX1CW}$$

$$\bar{z} = 1 + \frac{1}{\frac{3}{2} + \frac{n}{g} MIX1CR}$$

As in the second stage of the game, CR plays concession with a higher probability than CW. Given the values for $\bar{s}$ and $\bar{z}$, the values for the expected payoffs associated to the mixed strategies equilibrium at T=0, called MIX2CR and MIX2CW, can be calculated:

$$MIX2CR = (-6a^2 - 24an - 24n^2 + 7a^2\gamma + 20an\gamma + 12n^2\gamma - 8a^2n\theta\gamma - 32an^2\theta\gamma +$$

$$-32n^3\theta\gamma - 3a^2\gamma^2 + 12a^2n\theta\gamma^2 + 24an^2\theta\gamma^2 - 12a^2n^2\theta^2\gamma^2 - 48an^3\theta^2\gamma^2 - 48n^4\theta^2\gamma^2)g$$

$$(2n(2a^2 + 8an + 8n^2 - a^2\gamma - 4an\gamma - 4n^2\gamma + a^2\gamma^2 - 4a^2n\theta\gamma^2 - 8an^2\theta\gamma^2 + 4a^2n^2\theta^2\gamma^2 +$$

$$16an^3\theta^2\gamma^2 + 16n^4\theta^2\gamma^2))^{-1}$$

$$MIX2CW = (-6a^2 - 24n^2 - 24an - a^2\gamma + 4an\gamma + 12n^2\gamma - 8a^3\theta\gamma - 40a^2n\theta\gamma - 64an^2\theta\gamma +$$

$$-32n^3\theta\gamma - 3a^2\gamma^2 - 12a^3\theta\gamma^2 - 36a^2n\theta\gamma^2 - 24an^2\theta\gamma^2 - 12a^4\theta^2\gamma^2 - 72a^3n\theta^2\gamma^2$$

$$-156a^2n^2\theta^2\gamma^2 - 144an^3\theta^2\gamma^2 - 48n^4\theta^2\gamma^2)g(2(a+n)(2a^2 + 8an + 8n^2 - a^2\gamma - 4an\gamma +$$

$$4n^2\gamma + a^2\gamma^2 + 4a^3\theta\gamma^2 + 12a^2n\theta\gamma^2 + 8an^2\theta\gamma^2 + 4a^4\theta^2\gamma^2 + 24a^3n\theta^2\gamma^2 + 52a^2n^2\theta^2\gamma^2 +$$

$$48an^3\theta^2\gamma^2 + 16n^4\theta^2\gamma^2))^{-1}$$

where again, MIX2CW>MIX2CR. {MIX2CR, MIX2CW} is therefore the outcome associated with the mixed strategies equilibrium sub Condition 2. All considerations about the mixed strategies equilibrium of Proposition 2 in Part 1 are applicable.

What happens if the value of θ is not so high nor so low, that is, it lies in the following range:

$$-\frac{1}{N} + \frac{1}{n+a}\frac{2+3\gamma-\gamma^2}{2\gamma(3-\gamma)} < \theta < -\frac{1}{N} + \frac{1}{n}\left(\frac{1+\gamma}{2\gamma}\right)$$

depends on the value for a. If:

$$a > \frac{n(1-\gamma)}{2+3\gamma-\gamma^2}$$

then for all the values of θ within the range the equilibrium implies immediate unilateral concession of CW, and there is no delay in stabilisation. This is a new feature of the game with respect to the symmetric version. Workers are much more numerous than rentiers here, a realistic feature of the model, and this makes CW's expected utility in case of unilateral concession much higher than CR's when it is the latter to concede unilaterally. No surprise, then, if in the choice between conceding or not, given that the opponent does not concede, CW finds it convenient to concede, CR not to concede[31].
Instead, if:

$$a < \frac{n(1-\gamma)}{2+3\gamma-\gamma^2}$$

then:

$$-\frac{1}{N}+\frac{1}{n+a}\left(\frac{1+\gamma}{2\gamma}\right) > -\frac{1}{N}+\frac{2+3\gamma-\gamma^2}{2\gamma n(3-\gamma)}$$

and three cases are possible, depending on the value of θ. Figure 1 illustrates this.

Case (a): for values of θ between:

$$\frac{1}{N}+\frac{1}{n}\left(\frac{1+\gamma}{2\gamma}\right)$$

and:

$$\frac{1}{N}+\frac{1}{n+a}\left(\frac{1+\gamma}{2\gamma}\right)$$

given that the opponent does not concede at T=1, CR does not concede while CW does. Via backward induction the best strategies at T=0 are found: again, CR does not concede while

[31] Under the given condition on the value of a and within the given range for θ there are various equilibria, because depending on the value of the latter parameter the players' strategies at T=1 are different. However, all these equilibria are such that at T=0 it is optimal for CW to concede and for CR not to concede. Since when

CW does. The game has a unique equilibrium in pure strategies implying unilateral concession on CW's part and therefore no recurrence to debt and inflation.

Case (b): if θ satisfies the following condition:

$$-\frac{1}{N}+\frac{2+3\gamma-\gamma^2}{2\gamma(n+a)(3-\gamma)}<\theta<-\frac{1}{N}+\frac{2+3\gamma-\gamma^2}{2\gamma n(3-\gamma)}$$

both players find it optimal not to concede at T=1, but then in equilibrium CR does not concede at T=0 while CW does, so there are no delays in stabilisation and the fiscal burden is attributed to workers, just like in case (a).

Case (c): this case is totally similar to the one of Proposition 3 in Part 1. If the following condition holds:

Condition 3:
$$-\frac{1}{N}+\frac{2+3\gamma-\gamma^2}{2\gamma n(3-\gamma)}<\theta<-\frac{1}{N}+\frac{1}{n+a}\left(\frac{1+\gamma}{2\gamma}\right)$$

and
$$a<\frac{n(1-\gamma)}{2+3\gamma-\gamma^2}$$

then there are three equilibria, two pure strategies and one mixed strategies, the latter such that T=1 subgame is a Prisoner's Dilemma and the game at T=0 is Chicken. The consequence on fiscal policy of the mixed strategies equilibrium is that either there is immediate stabilisation, or a delay lasting for the whole of the term. The probabilities with which CR and CW play concession at T=0, called $\tilde{s}$ e $\tilde{z}$ respectively, have the following values:

$$\tilde{s}=1-\frac{\frac{1}{n+a}}{\gamma(3-\gamma)\left(\frac{1}{N}+\theta-\frac{1}{2(n+a)}\right)}$$

anyone concedes at T=0 the players are not called to play again at T=1, these equilibria are not different in the way they manifest themselves and in the consequences on fiscal policy.

$$\tilde{z} = 1 - \frac{\frac{1}{n}}{\gamma(3-\gamma)\left(\frac{1}{N} + \theta - \frac{1}{2n}\right)}$$

where for all $a > 0$, $\tilde{s} > \tilde{z}$. Starting from these probabilities the values of CR's and CW's expected payoffs associated with this equilibrium, called EPCR and EPCW respectively, are easily calculated:

$$EPCR = \frac{4a + 8n - 9a\gamma + 18an\theta\gamma + 36n^2\theta\gamma + 3a\gamma^2 - 6an\theta\gamma^2 - 12n^2\theta\gamma^2}{2n\gamma(3-\gamma)(a - 2an\theta - 4n^2\theta)} g$$

$$EPCW = \frac{4a + 8n - 9a\gamma + 18a^2\theta\gamma + 54an\theta\gamma + 36n^2\theta\gamma - 3a\gamma^2 - 6a^2\theta\gamma^2 - 18an\theta\gamma^2 - 12n^2\theta\gamma^2}{2\gamma(3-\gamma)(a+n)(a + 2a^2\theta + 6an\theta + 4n^2\theta)} g$$

where EPCW>EPCR. All considerations about the equilibrium of Proposition 3 in Part 1 are applicable.

3.5. The median voter's choice and the probability a the debt- and inflation-prone coalition government to come into existence.

Let us now consider the median voter's choice between CW and LW. Being interested in the case of delayed stabilisations, let us suppose that the values of a and θ are such that in case of CR+CW on power an equilibrium implying unilateral concession with certainty at T=0 is excluded. This means that having the conservative coalition in office entails a strategic inefficiency. Being, like any other voter, rational and forward-looking, the median voter knows this. He also knows that if LW wins, his preferred policy will be implemented as far as the attribution of the fiscal burden is concerned. However, if his conservative bias is strong enough, the benefit from having is moral Weltanschauung represented on power will be greater than the costs in terms of smaller consumption.

Consider also that q^m, the median voter's conservative bias, is stochastic. It is therefore impossible to know ex-ante the median voter's choice. However, if the density function of q^m is known it is possible to calculate the probability with which the conservative coalition will

win the elections. In fact, this probability is the complement to 1 of the cumulative density function at the value for q making the median voter indifferent between CW and LW.

Before considering the median voter's choice analytically, let us reflect on the meaning of having a quite conservative median voter. It is the same as saying that the majority of the electoral body is strongly conservative as far as the moral issue is concerned. Notice there also exists a majority of voters, the n+a workers, who is in favour of g financed by a lump sum tax to be paid by rentiers, i.e. the policy LW would adopt. However, this is not relevant, because the extra-economic motivation of voters is greater than the economic one. There are conservative workers: some are ultra-conservative those who are not still care for the moral issue a great deal. This is all it takes to determine that a coalition between parties with conflicting fiscal goals finds sufficient support in Parliament to form a government.

Now to calculus. The median voter's expected utility if LW wins the elections at T=0 is:

$$-\frac{1}{2}\frac{1}{n+a}g-3q_0^m$$

because δ is –1, $E(q_t^m)=q_0^m$ for T=1,2, LW will attribute the whole of the fiscal burden of the legislature to rentiers and at t=3 a coin is tossed to decide who should pay for g.

The median voter's expected utility if the conservative coalition is in office depends on the equilibrium of the game, which in turn depends on the values of θ and a. Since I exclude those values implying immediate stabilisation, there are three cases.

Case (1): the equilibrium is the one considered sub Condition 1. {G(CR), G(CW)} is the outcome associated with this equilibrium, and the median voter's expected utility is therefore:

$$-\gamma\left(\frac{1}{N}+\theta\right)(3-\gamma)g-\frac{1}{2}\frac{1}{n+a}g\sum_{t=0}^{2}(1-\gamma)^t+3q_0^m$$

i.e. G(CW) plus the element quantifying his moral affinity with CW in terms of utility. In order to have that the median voter chooses CW it is therefore necessary that:

$$-\gamma\left(\frac{1}{N}+\theta\right)(3-\gamma)g-\frac{1}{2}\frac{1}{n+a}g\sum_{t=0}^{2}(1-\gamma)^t+3q_0^m>-\frac{1}{2}\frac{1}{n+a}g-3q_0^m$$

a condition which is verified if his conservative bias is greater than the value $\hat{q}$, obtained by solving the above inequality as an equality:

$$\hat{q}=\frac{1}{6}g\left[\gamma(3-\gamma)\left(\frac{1}{N}+\theta\right)+\frac{(1-\gamma)(2-\gamma)}{2(n+a)}\right]$$

Notice that $\hat{q}>0$. This means that even if the median voter is morally neutral or even mildly conservative, he will vote for LW, who will win the elections. In fact, it is the fact that LW's victory guarantees a greater consumption that dominates. If $q_0^m>\hat{q}$, instead, the median voter will choose CW in spite of the fact that this will imply an economic cost. This cost is in terms of smaller consumption, a consequence of the fiscal policy the conservative coalition's strategic interaction entails. The median voter is ready to bear this cost because the extra utility he gets from having his Weltanschauung represented on power is greater than the economic cost.

It is interesting to see how $\hat{q}$ changes as the values of the parameters of the model vary:

$$\frac{\partial\hat{q}}{\partial\theta}=\frac{1}{2}\gamma(3-\gamma)g>0$$

$$\frac{\partial\hat{q}}{\partial\gamma}=\frac{1}{2}g(3-2\gamma)\left(\theta+\frac{a}{2(2n+a)(n+a)}\right)>0$$

$$\frac{\partial\hat{q}}{\partial g}=\frac{1}{2}\left[\gamma(3-\gamma)\left(\frac{1}{N}+\theta^{n2}\right)+\frac{(1-\gamma)(2-\gamma)}{2(n+a)}\right]>0$$

It follows that:

1) the greater the disutility determined by the distortions caused by inflation, ceteris paribus;
2) the greater the proportion of deficit that coalition governments finance through seignorage, ceteris paribus;
3) the higher the value of the public good to be produced, ceteris paribus;

the greater the bias for the conservative view the median voter must have in order for him to find it convenient to vote for CW. This sounds sensible, because increases in those parameters imply a smaller payoff for CW in the game, and a smaller G(CW) must be compensated by a greater utility the median voter derives from the fact that he shares the same moral position as the government in office.

If I call F(q_0^m) the cumulative density function of the median voter's conservative bias on the $\breve{q}$ to $\hat{q}$ support, $1-F(\hat{q})$ is interpretable as the probability that the next government will be a conservative coalition. What makes $\hat{q}$ high makes this probability small, so the conclusion is that the greater the strategic inefficiencies the coalition is expected to bring about, the smaller the chance that it will be elected.

Case (2): the mixed strategies equilibrium of Condition (2) is anticipated by unattached voters. The median voter's expected utility if the conservative coalition wins the election is therefore:

$$MIX2CW + 3q_0^m$$

And from the following inequality:

$$MIX2CW + 3q_0^m > -\frac{1}{2(n+a)}g - 3q_0^m$$

the value $\bar{q}$ is obtained:

$$\bar{q} = \frac{1}{6}\left(-MIX2CW - \frac{1}{2(n+a)}g\right)$$

This is again a minimum value the median voter's conservative bias must take in order for him to find it convenient to vote for CW. Just like in Case (1), and for the same reasons, this value is positive. Its partial derivative in g is positive, while the sign of the partial derivatives in θ and γ depends from the starting values of those parameters. In fact:

$$\frac{\partial \bar{q}}{\partial \theta} = -\frac{\partial MIX2CW}{\partial \theta}$$

$$\frac{\partial \bar{q}}{\partial \gamma} = -\frac{\partial MIX2CW}{\partial \gamma}$$

and:

$$sign\left(\frac{\partial MIX2CW}{\partial \theta}\right) = sign\left(\frac{\partial MIX2}{\partial \theta}\right)$$

$$sign\left(\frac{\partial MIX2CW}{\partial \gamma}\right) = sign\left(\frac{\partial MIX2}{\partial \gamma}\right)$$

because the only difference here between LHS and RHS is a>0. From Appendix A we know that if the starting values of θ and γ are small, a small increase makes MIX2 decrease, while if their starting values are high a small increase makes it increase. As a consequence, $\bar{q}$ increases in the first case, decreases in the second one. The latter case may sound counterintuitive: the greater the potential inefficiencies associated with the presence in office of a conservative coalition government, the smaller the conservative bias the median voter may have allowing CR+CW to win the elections. The fact is that these inefficiencies are only potential, because when the proportion of deficit financed through seignorage and/or the distortions caused by inflation are high, CW and CR will play concession with a higher probability, hence the delay in stabilisation will probably shorter and expected consumption higher.

The probability for the conservative coalition to win the elections may be written as:

$$1-F(\bar{q})$$

and it gets higher the smaller the value of $\bar{q}$. Unlike in Case (1), however, and for the reasons just mentioned, if θ and γ increase $\bar{q}$ may here decrease, which makes the ex-ante probability with which CR+CW win the elections higher.

Case (3): the values of a and θ are such that voters anticipate that if the elections have no winner, CW and CR will form a coalition and the mixed strategies equilibrium of Condition

(3) will be the consequence of their strategic interaction. In order for the median voter to vote for CW and for this scenario to obtain q_o^m must be higher than $\tilde{q}$, the value of which is the following:

$$\tilde{q} = \frac{1}{6}\left(- EPCW - \frac{1}{2(n+a)} g \right)$$

This is a positive number. Here again, the main finding is that 1-F($\tilde{q}$) is positive. This probability, which is the probability that the next government will be a conservative coalition, is decreasing as $\tilde{q}$ increases, and this happens if g increases and if θ or γ decrease. In fact, in analogy with Case (2):

$$\frac{\partial \tilde{q}}{\partial \theta} = -\frac{\partial EPCW}{\partial \theta}$$

$$sign\left(\frac{\partial EPCW}{\partial \theta} \right) = sign\left(\frac{\partial EP}{\partial \theta} \right)$$

and from Appendix B we know the RHS is always positive (the case of the derivative in γ is totally similar).

4. CONCLUDING REMARKS.

By proposing in Part 1 a war of attrition model with complete information and finite horizon, I think I have highlighted that sometimes the problem with coalition governments' decision-making process may be the lack of credibility affecting their members' commitments. With respect to Alesina and Drazen (1991), which my model owes a lot to, there is also some new insight into the meaning of the equilibrium under the assumption of an economy where the distortions caused by inflation are not so great and its welfare analysis.

There is one aspect in which my analysis differs from the general opinion about the relationship between coalition governments and delays in stabilisation. In my model I do not need an exogenous shock on the value of public expenditure to start a strategic interaction between coalition partners. It is my opinion that the need for an exogenous shock has been so

far particularly stressed as an answer to the question why the data show that not all coalition governments seem to be debt- and inflation prone. In my view, however, this evidence is more the consequence of a difference in the *nature* of coalition governments (that is, whether they are "homogenous" or not) than anything else. Some suggestive empirical evidence using cluster analysis seems to support my opinion in this respect (Dalle Nogare (2000) and Chapter 2).

In Part 2 I have suggested a possible political scenario likely to cause that parties with opposite views on the allocation of the fiscal burden form a coalition government. A strong polarisation on some extra-economic issue which is important in voters' and candidates' motivation has been highlighted. The extra-economic issue and the fiscal agenda must split the electoral body differently. It is this scenario, and not the presence of coalition governments per se, that ends up being the real cause for inefficient fiscal policies. This points to the importance of a nation's cohesion around a common Weltanschauung. In countries such as Germany an electoral system favouring the presence of coalition governments has more often than not produced excellent examples of virtuous fiscal conducts.

The normative side of the analysis of coalition governments' decision-making process is still at its early stages. The advantage of seeing this problem as the consequence of a lack of commitment lies also in the fact that the theoretical framework now points more clearly in the direction of considering forms of precommitment as a possible solution. Reforming the procedure by which a financial bill is voted in Parliament (i.e. no sequential voting) is a possible way of tying one's hands, but it might mean merely shifting the problem backwards from the time of the approval of the bill by Parliament to the time of its elaboration by the government[32]. A reform of the electoral system (from a proportional to a majoritarian rule, for instance), or more generally, in the words of Alesina and Perotti (1996), the passage from a collegial to a hierarchical institutional context may be seen as a better alternative.

It has been pointed out (Alesina and Perotti (1994, 1996)) that such a change might introduce excessive policy variability. In this theoretical context alternation in office would only affect the allocation of the fiscal burden, and therefore variability would not affect welfare. If we allow for realistic extensions of the model allowing for differences in parties' preferences over the level of public expenditure (Velasco (1997)) however, it would no longer be so, and

[32] A law modifying structure, elaboration process and approval of the financial bill has recently been introduced in Italy (law no. 94, 1997), but it is not so easy to assess whether is has been effective in mitigating strategic inefficiencies, as many other circumstances, such as joining the EMU, have modified fiscal policy determination in Italy meanwhile.

institutional design is said to face a trade-off between delays in stabilisation and excessive variability of fiscal policy.

In my opinion, this point has been overemphasised. This line of reasoning neglects the fact that if one considers a more realistic setting with the presence of more than two social groups and more than three parties, a proportional electoral system may produce coalition governments that are *both debt- and inflation prone and partisan*. Italy before the recent changes in the electoral system was a good example of this. More hierarchical institutions do determine welfare improvements more often than not.

But the very first problem when we come to talk about reforms to the institutional context has to do with the fact that generally they need qualified majorities to pass. It may be difficult to introduce them there where the polarised political scenario is also fragmented, i.e. characterised by the presence of a number of small parties; but polarisation and fragmentation often go together.

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Table 1: normal form of the symmetric game.
stage 1 (T = 0)

		CW	
		concession	no concession
CR	concession	$3\left(-\frac{1}{2n}g\right);\ 3\left(-\frac{1}{2n}g\right)$	$2\left(-\frac{1}{n}g\right)-\frac{1}{2n}g;\ -\frac{1}{2n}g$
	no concession	$-\frac{1}{2n}g;\ 2\left(-\frac{1}{n}g\right)-\frac{1}{2n}g$	next stage

stage 2 (T =1)

		CW	
		concession	no concession
CR	concession	$-\gamma\left(\frac{1}{2n}+\theta\right)g-\frac{1}{2}(2-\gamma)\frac{1}{n}g-\frac{1}{2n}g;$	$-\gamma\left(\frac{1}{2n}+\theta\right)g-(2-\gamma)\frac{1}{n}g-\frac{1}{2n}g;$
		$-\gamma\left(\frac{1}{2n}+\theta\right)g-\frac{1}{2}(2-\gamma)\frac{1}{n}g-\frac{1}{2n}g$	$-\gamma\left(\frac{1}{2n}+\theta\right)g-\frac{1}{2n}g$
	no concession	$-\gamma\left(\frac{1}{2n}+\theta\right)g-\frac{1}{2n}g;$	$-\gamma\left(\frac{1}{2n}+\theta\right)(3-\gamma)g-\frac{1}{2n}g\sum_{t=0}^{2}(1-\gamma)^t;$
		$-\gamma\left(\frac{1}{2n}+\theta\right)g-(2-\gamma)\frac{1}{n}g-\frac{1}{2n}g;$	$-\gamma\left(\frac{1}{2n}+\theta\right)(3-\gamma)g-\frac{1}{2n}g\sum_{t=0}^{2}(1-\gamma)^t$

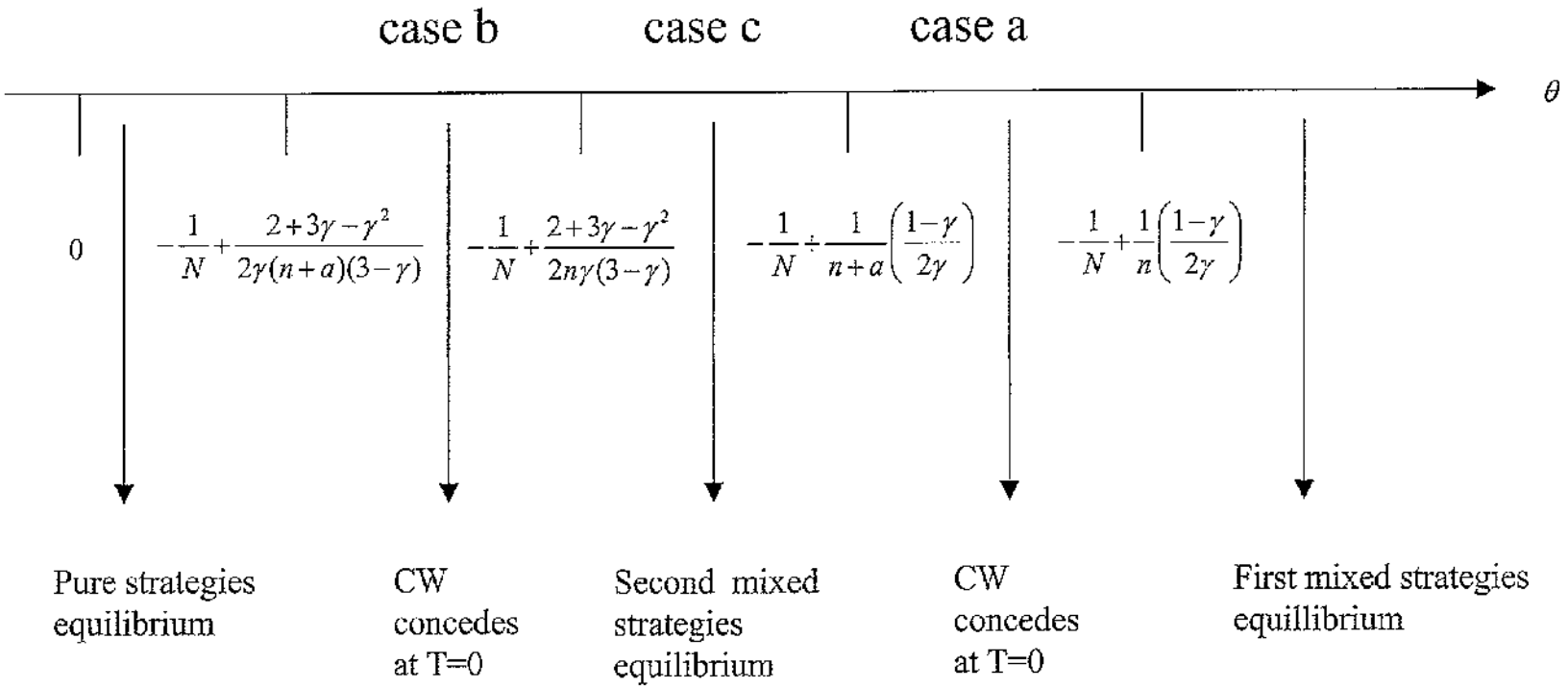
Table 2: normal form of the asymmetric game.
stage 1 (T = 0)

		CW	
		concession	no concession
CR	concession	$3\left(-\frac{1}{2n}g\right);\ 3\left(-\frac{1}{2(n+a)}g\right)$	$2\left(-\frac{1}{n}g\right)-\frac{1}{2n}g;\quad -\frac{1}{2(n+a)}g$
	no concession	$-\frac{1}{2n}g;\ 2\left(-\frac{1}{n+a}g\right)-\frac{1}{2(n+a)}g$	next stage

stage 2 (T =1)

		CW	
		concession	no concession
CR	concession	$-\gamma\left(\frac{1}{N}+\theta\right)g-\frac{1}{2}(2-\gamma)\frac{1}{n}g-\frac{1}{2n}g;$	$-\gamma\left(\frac{1}{N}+\theta\right)g-(2-\gamma)\frac{1}{n}g-\frac{1}{2n}g;$
		$-\gamma\left(\frac{1}{N}+\theta\right)g-\frac{1}{2}(2-\gamma)\frac{1}{n+a}g-\frac{1}{2(n+a)}g$	$-\gamma\left(\frac{1}{N}+\theta\right)g-\frac{1}{2(n+a)}g$
	no concession	$-\gamma\left(\frac{1}{N}+\theta\right)g-\frac{1}{2n}g;$	$-\gamma\left(\frac{1}{N}+\theta\right)(3-\gamma)g-\frac{1}{2n}g\sum_{t=0}^{2}(1-\gamma)^t;$
		$-\gamma\left(\frac{1}{N}+\theta\right)g-(2-\gamma)\frac{1}{n+a}g-\frac{1}{2(n+a)}g;$	$-\gamma\left(\frac{1}{N}+\theta\right)(3-\gamma)g-\frac{1}{2(n+a)}g\sum_{t=0}^{2}(1-\gamma)^t$

Figure 1: asymmetric game with $a < \frac{n(1-\gamma)}{2+3\gamma-\gamma^2}$: dependence of the equilibrium on the value of theta.



Chapter 2.

AN EMPIRICAL INVESTIGATION OF COALITION GOVERNMENTS' FISCAL PERFORMANCE USING CLUSTER ANALYSIS.

1. Introduction.

There is by now a vast empirical literature investigating the relationship between a government's degree of fractionalisation and its fiscal policy. This literature started at the end of the Eighties and was influenced by the contemporary observation of a strong differentiation in the fiscal performances of industrialised countries. In fact, that phenomenon suggested that also country-specific elements might play a role in determining fiscal policy, and what is more country-specific than a nation's politico-institutional framework?
The empirical evidence generally confirms the existence of a relationship between the degree of fractionalisation of governments and their fiscal conducts, but some recent works show less clear-cut results. Some issues still seem controversial, among which the following:

- are coalition governments totally unable to be fiscally responsible?
- are stabilisations performed by single party governments only?
- as far as fiscal policy is concerned, do different types of governments behave differently only after a negative shock?

The first issue is the most important one. In all works so far published coalition governments have been implicitly identified with those cabinets in which there is no agreement on fiscal matters. In my view, this is misleading and may have biased results towards an underestimation of the strength of the relationship under scrutiny. History, and especially recent history, has often produced coalitions between parties sharing a common view on fiscal policy, some of which were even formed in order to bring about a stabilisation. No surprise then if the empirical works based on samples comprising the last decade do not produce strong evidence in favour of the thesis by which single party governments are more fiscally responsible than coalitions.

A recent classification of governments (Woldendorp, Keman and Budge (1993)) according to various qualitative and quantitative items allows to distinguish between governments whose members share a common view in matters of economic policy and governments which are not so "homogeneous" in that respect. Here I use this classification in order to distinguish homogeneous and non-homogeneous coalition governments. I expect that only the latter, whose existence is probably due to some affinity between party members only on extra-economic matters, are likely to be fiscally irresponsible. Homogeneous coalitions, in fact, are not so different in nature from single party governments.

The second issue is partly related to the first one. Given a non negligible presence of homogenous coalitions, it follows that possibly not all stabilisations are performed by single party governments. When a country has a proportional representation electoral system, following a fiscally irresponsible coalition it is more likely that a virtuous coalition is elected than a single party government. But this is not all. In my opinion, which is different to the common view, the end of a war of attrition does not necessarily imply a change in government. Models such as Alesina and Drazen (1991) identify one coalition member's concession with its retirement from government. Stabilisations are then attributed to the following cabinet, possibly a single party government. But if a war of attrition takes place, it means a non-homogeneous coalition was in office. As I have made clear in chapter 1, there must have been some extra-economic issue the coalition members shared, or they would have not come together. If the importance attributed to that issue by the coalised parties is strong enough, when either of them concedes it may still want to be part of the executive in order to represent the extra-economic views of their voters, if no longer their economic interests. This implies that not only homogeneous, but also non-homogeneous coalitions are able to take measures such as tax rises in order to reduce public debt. The only difference lies in the fact that non-homogeneous coalitions are likely to stabilise with some delay, since a war of attrition must take place to identify the party to be burdened with the biggest part of the fiscal bill. And since stabilisations are delayed, they are likely to be stronger.

Alesina and Perotti (1995) adopt the so-called Blachard Measure to qualify a fiscal impulse as very loose, loose, tight and very tight. Here I define as "extreme" fiscal policies both "very loose" and "very tight" fiscal conducts, and I will verify whether non-homogeneous coalitions are more often associated with them[1]. Unlike Alesina and Perotti, however, I consider not

[1] As Alesina and Perotti (1995) have pointed out, it is not always correct to associate prolonged recurrence to public debt and inflation with a high frequence of very loose fiscal policies defined as strong positive deficit impulses. In theory, in fact, there may be cases of gradual deterioration of public finances, especially when the

only deficit impulses, but also expenditure impulses. In my view, in fact, war of attrition models are not so realistic in their assuming that public spending does not tend to grow when a coalition government formed by parties with conflicting views on fiscal policy is in office. Every party in a coalition is likely to be willing to favour their constituency, as Weinghast, Shepsle and Johnsen (1981) and Velasco (1997) have demonstrated.

Also the third issue has a lot to do with the first one. Since the pioneering works of Roubini and Sachs (1989a, 1989b) authors have highlighted that not all coalition governments show the same degree of fiscal irresponsibility, but they have tended to say that the reason for this is that only some of them were in office at times of strong negative economic shocks. Only under such circumstances would coalitions, intrinsically prone to fiscal irresponsibility, behave differently from single party governments. I object here that this may not be true. An alternative explanation is that there are coalitions of different kinds. Homogeneous ones always tend to follow some fiscal discipline, non-homogeneous ones are always likely to start wars of attrition.
I consider a sample of 11 industrialised countries covering the 1960-1990 period and I then divide it into three subsamples corresponding to the Sixties, the Seventies and the Eighties to see if only at the time of the oil shocks the fiscal response of single party, homogenous and non-homogenous coalition governments was markedly different.

My investigation tool is cluster analysis. If one has "cases" which are differently characterised under many observable aspects ("variables"), one can use cluster analysis, a number of procedures of automatic classification, to see which cases are more similar to one another. Similarity measures are metrics and the criteria by which cases are clustered are algorithms, so cluster analysis is a tool for grouping cases in an objective way in the sense that the only subjective intervention is the choice of metrics and algorithm. To my knowledge, it has never been used to investigate the relationship between type of government and fiscal policy. My idea here is to consider as cases country-year units, such as Australia 1970 and Belgium 1980. I take deficit and expenditure impulses as variables and consider how the clusters I obtain relate to the classification of cases according to two political indexes, a traditional one distinguishing only between single party and coalition governments and a second one taking account of the difference between homogenous and non-homogeneous coalitions. I expect

value of public expenditure is constant and not so high and so deficit impulses are not so strong but public debt rises constantly. However, non-homogeneous coalitions favour the rise of public spending, so it seems plausible that when they are in office public debt rises and strong positive deficit impulses go together.

that the clusters of cases with highest/lowest values of the fiscal variables have a higher proportion of non-homogenous coalition governments. I also expect that the standard thesis by which coalition governments are unable to stabilise will be denied. Finally, I apply cluster analysis to the subsamples to verify how the fiscal performance of the various types of governments has evolved in time.

This chapter is therefore thus organised: par. 2 is a critical survey of the empirical literature on the relationship between type of government and fiscal discipline; par. 3 is a presentation of the preliminary work on data in order to make them suitable to my goals and of the reasons behind the sample choice; par. 4 deals with the choice of the appropriate clustering techniques; par. 5 shows the results and par. 6 concludes.

2. Survey of the empirical literature about the relationship between the degree of government fractionalisation and fiscal policy.

This analysis is a contribution to the rich empirical literature on the influence of the presence of coalition governments on fiscal policy determination. This literature has been characterised by different approaches and results.

The first article presenting a "type of government" variable is Roubini and Sachs (1989a). The authors construct a dummy variable to distinguish between single party governments, small coalitions, large coalitions and minority governments. They introduce this dummy as a regressor into an equation where the dependent variable is the change of net public debt over GDP and the other independent variables are:

- the very dependent variable, lagged once;
- the change in the unemployment rate;
- the change in the GDP growth rate;
- the product of the change in the difference between the interest rate and the growth rate and the change in lagged net public debt over GDP.

This equation is estimated using data referring to 15 industrialised countries over the period 1960-1985. The introduction of a "type of government" regressor is justified by the necessity of adding an extra explanation, with respect to the simple tax-smoothing hypothesis, in order to explain the observed differentiation of fiscal policies among these countries in the period in question. The regression results are reassuring. The parameters associated with the above economic variables are significant and have signs and values in accordance to economic

theory. As for the political dummy, the conclusion is that the presence of a fragmented government does imply a stronger debt growth.

Roubini and Sachs (1989b) repeat the same analysis on a different sample, and all results are confirmed. Here they also consider seignorage, and they find its estimated parameter is negative, implying that it is justified to see debt and inflation as alternative methods of deficit financing (all other parameters remain significant and have the right sign). But this article mainly concentrates on the determinants of the level public spending. The authors find that the desired level of public expenditure has to do with the type of government on power, and that the effective level of spending is positively related to the desired one. So the expenditures actually incurred are, ceteris paribus, higher when a coalition government is in office than in the case of a single party government. Roubini and Sachs suggest this is the consequence of the fact that coalition governments generally include different interest groups.

Edin and Ohlsson (1991) replicate the estimates in Roubini and Sachs (1989a), but instead of using a single "type of government" dummy they try with different dummies, one for each type of government. They find that only the one associated with the minority government category is (positive and) significant, so just minority governments, and not also coalition governments, tend to produce higher budget deficits.

De Haan and Sturm (1994) re-estimate Roubini and Sachs' specification using data referring to EU members only over the period 1981-1989. The political dummy is not significant, and considering more than one dummy, as in Edin and Ohlsson (1991), does not modify this result. As an alternative to previous suggestions on how to include the political context within the given model, the authors next introduce a variable measuring the frequency of government change[2]. The fact that its parameter turns out to be significantly positive does pose a problem in that it is coalition governments that tend to be short-lived, so that the final message is inconclusive. As for the level of public spending, neither the presence of fragmented governments nor the frequency of government change seem to play a role.

Grilli, Masciandaro and Tabellini (1991) have a slightly different goal with respect to Roubini and Sachs. Their aim is to discriminate between different Political Economy models of public debt, i.e. to assess if the data confirm the conclusions of war of attrition models more than those of models based on Stackelberg games (Persson and Svennson (1988), Tabellini and Alesina (1989)).

[2] They also introduce a variable accounting for the different institutional contexts underlying the budget law elaboration and approval, a topic more deeply investigated by Hallemberg and von Hagen (1997) some years later. The estimate for the associated parameter is significant and has the right sign.

They consider 16 countries and classify them according to the type of constitutional regime, fractionalisation of the political scenario and polarisation on the left/right economic dimensions[3]. The countries exhibiting fast growing public debts are shown to be all parliamentary republics and have all, save Ireland, proportional representation as their electoral system. They are generally characterised by high fractionalisation and polarisation.

Then the authors construct three indexes related to the history of the countries in the sample:

- majority, or the percentage of years over the entire period 1970-1989 in which a single party government was in office;
- durability, i.e. the average duration of governments (also assumed to be connected to the prevailing type of government in office)
- stability, that is the average number of years between two *significant* changes of the cabinet in office (change of the Prime Minister in presidential republics; change of the premier in parliamentary systems, save for the case of coalition governments, for which both change of a the premier and of at least some of the parties involved is required).

The relevance of the stability index is connected to the importance of the role played by the uncertainty about the next electoral results in those models interpreting public debt rises as the effect of an incumbent's desire to condition his successor's fiscal policy. In fact, the presence of both polarisation and electoral uncertainty may be tested only if some variable is available measuring the frequency of alternation on power of the parties representing the opposing poles.

Finally Alesina et al. estimate a model where the average change of net debt over GDP for each country over the period 1970-1989 is regressed on the above indexes. What they obtain is an ambiguous result[4]. The stability index is not significant; "durability" is and has the expected negative sign, but majority is not. The authors conclude that there is some weak evidence in favour of those models associating rises in public debt with the presence of coalition cabinets[5].

Alesina and Perotti (1995) stress the necessity of a public deficit measure allowing to filter the effects of the business cycle, so as to be a truer measure of a government's will: what they call a measure of the fiscal impulse. They opt for the so-called Blanchard Measure (of which more in par. 3.2). They calculate such index for 20 OECD countries for each year between 1960

[3] Fractionalisation and polarisation are found to be fairly stable characteristics of the political scenario in the countries the authors consider.

[4] The low number of degrees of freedom puts the validity of this result in question.

[5] Also Edwards and Tabellini (1992) find scarce if no evidence at all in favour of the conclusions of those models interpreting public debt rises as the consequence of a strategic interaction between an incumbent and a successor. Their tests are based on data referring to developing countries.

and 1989, and by comparing those values with the values of various political indexes they find that coalition governments are more often associated with strong fiscal impulses, *both positive and negative*[6].

Strong negative fiscal impulses are then classified according to their success. The authors define a stabilisation as successful if, in the third year after it has taken place, the debt over GDP ratio has decreased of at least 5% with respect to the stabilisation year, and as a failure otherwise. Going through all stabilisations in the sample, they conclude that success is not dependent on how strong a negative fiscal impulse is, but it is more a qualitative matter. In fact, a stabilisation can be implemented by either cutting expenses or by raising tax rates. Only in the former case the probability of success is proved to be high, especially if the cutting measures affect transfers and public employees' wages.

Alesina and Perotti find that an extremely large number of stabilisations implemented by coalition governments have turned out to be failures. They suggest this is due to their inability to cut spending. Coalition cabinets try to be fiscally responsible, but they tend to choose the wrong means to obtain their goal, i.e. they raise tax rates.

However, notice that the authors consider coalition and minority governments as two distinct categories. This is not so relevant for their first conclusion, namely that coalition governments are often characterised by strong fiscal impulses of both signs, but it plays a major role in reaching their second one, the one referring to the success of a stabilisation. In fact, the probability of success of a stabilisation implemented by a minority government is even higher than the one of a stabilisation implemented by a single party cabinet[7]. Considering coalition and minority governments as one category would therefore make things look different, also because minority cabinets are not infrequent in the sample. Nor do the authors explain why coalition and minority governments should be regarded as two distinct types of government, which Edin and Ohlsson had also failed to do. It is doubtful that the strategic interaction between the political forces within a coalition government is essentially different from the one between the party in office and the political forces supporting it in Parliament within the context of a minority cabinet arrangement.

In recent years the empirical literature about the relationship between the degree of fractionalisation of government and fiscal policy has extended in two distinct directions:

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[6] Alesina and Perotti define a positive fiscal impulse as strong if BM>1.5, while a negative one is strong if BM<-1.5.

[7] This result is not dependent on the fact that within the minority government category also "caretaker" governments have been included. In fact, these are very few in the sample in question. Notice that Edin and Ohlsson (1991) and Alesina and Perotti (1995) end up having opposite views on the quality of the fiscal performance of minority governments. This difference in judgement is probably due to the fact that they consider different samples (particularly, Alesina and Perotti also include the 1986-1989 years).

- on one hand, researchers have been investigating the possible connection between type of government and budget rules
- on the other some similarities have been highlighted between coalition governments and "cohabitation contexts" within presidential systems (divided governments).

As far as the first stream of literature is concerned, Alesina and Perotti (1996) suggest an analogy between the choice between a proportional and a majority electoral system (the former favours the formation of coalition cabinets) and the choice between collegial and hierarchical institutions underlying the process of budget formation and approval. The former are more respectful of minority rights, while the latter include various contexts such as balanced budgets laws and procedures making it difficult for Parliament to amend a government's bills.

Instead, Hallemberg and von Hagen (1997) suggest that the thesis by which it is the type of government to influence a country's fiscal performance is antagonist to the one by which it is budget rules to determine the level of expenditure and the size of the deficit. In their view, the proportionality of the electoral system is only relevant in that it is linked to the probability to have a coalition government. The latter in turn constitutes a problem only because ministers belong to different political parties, and so it is difficult to build that hierarchical relationship between the Finance Minister and portfolio ministers allowing to squeeze the size of public expenditure in the budget formation process. However, if a law prescribed such a hierarchy having a coalition government in office would not make any difference. The empirical evidence reported, based on data referring to EU members over the 1981-1994 period, seems to confirm their thesis.

Stein, Talvi and Grisanti (1998) test the same hypothesis using data referring to Latin American countries over the 1990-1995 period, and, contrary to Hallemberg and von Hagen's conclusions, they find they must reject it. The size of budget deficits seem to depend both on an index capturing the characteristics of the institutional context and on the proportionality of the electoral system, while the level of public spending is positively correlated to the electoral variable but not to the institutional one..

Poterba (1994) and Alt and Lowry (1994) are two contributions worth mentioning among those belonging to the second line of research[8]. They both refer to the budget policies of the

[8] Alesina and Rosenthal (1995) also focus on divided government. They define it as a device through which voters try to protect themselves from the effects of the Rational Partisan Cycle (Alesina (1988)). According to them, there is a trade-off in the choice between a single party and a coalition/divided government. The former tends to implement fiscal measures reflecting too closely their preferences, or favouring too much their constituency, but it is quick in responding to shocks, while the latter is likely to implement middle of the road policies, but tends to delay stabilisations. Everyone else seems to share the view that, as far as fiscal policy is

US States. Poterba uses data covering the 1988-1992 period for all 27 States producing a budget law every year[9], most of which have balanced budget laws. His aim is to investigate the response to shocks in expenditures and in tax receipts. When the governor and the legislature belong to opposing parties such response tends to be not so quick and strong. Moreover, a paradox is evident: in the States where the antideficit law is less stringent the distinction between single party and divided governments is not so evident, as both tend to take rather mild measures to reduce spending.

Alt and Lowry work on a sample of 48 States with observations from 1960 to 1980, which they then cut into different subsamples according to the presence/absence of divided government and/or antideficit laws. They find that the total response (change in expenditure and tax rates) to a deficit is stronger when a single party is in control than with a divided government, although the latter category appears to be able to operate strong expenditure cuts. This is true regardless of the institutional context, i.e. whether or not balanced budget laws are in force. These laws are therefore effective only where and when the political context produces single party governments, as if the enforcement were the very reputation of the ruling party vis-à-vis the electoral body. What happens with divided governments, instead, is that each party can put the blame on the other. Political factors are therefore more important than the determinants related to the institutional context, which is exactly the opposite view with respect to Hallemberg and von Hagen (1997).

3. Construction of political and fiscal variables and choice of sample.

3.1. Classifications according to political variables.

The political variables have been constructed starting from the classifications in Woldendorp, Keman and Budge (1993). Alesina and Perotti (1995) already use this interesting source covering most Western democracies in the period 1950-1990[10], but just for the index of government fractionalisation. My purpose is here both to use a similar index and to create a variable measuring the degree of cohesion of governments on economic policy matters from a

concerned, the negative implications of having a coalition/divided government are much greater than the positive ones.

[9] All other States produce a budget law every second year.

[10] Woldendorp et al. (1993) also provide data for 1991 or 1991-1992 for some countries, which I have taken account of.

combination of different classifications. My aim is in fact to distinguish between homogeneous and non-homogeneous coalition governments.

As far as the index of government fractionalisation is concerned, Woldendorp et al. differentiate between single party, coalition (among which they further distinguish between minimal winning and surplus coalition) minority (single party and multi-party) and caretaker governments.

A second, more qualitative classification regards the so-called complexion of Parliament and government (CPG):

1) right-wing dominance (share of seats of right-wing parties in government and Parliament larger than 66.6 %);

2) right-centre complexion (share of seats of right-wing and centre parties in government and their supporting parties in Parliament between 33.3 and 66.6 % each[11]);

3) balanced situation (share of Centre larger than 50 % in government and Parliament, or Left and Right in a coalition government not dominated by either side);

4) left-centre complexion;

5) left-wing dominance.

Finally, my source classifies governments according to the reason for their termination (RFT):

a) elections, including any election stipulated by law as well as anticipated elections;

b) voluntary resignation of the Prime Minister due to health reasons;

c) dissension within government;

d) lack of parliamentary support;

e) intervention by the Head of State.

As far as the CPG classification is concerned, one has to consider that unfortunately the authors do not define Left and Right, so the question arises whether they intend those dimensions in an economic or extra-economic sense. On the basis of personal information regarding some of the governments in the given sample[12] I have come to the conclusion that Woldendorp et al. have mainly looked at the economic programmes of governments in constructing this classification.

[11] Right-wing minority governments with a parliamentary support comprising also parties of the Centre are included, as well as centre minority governments with a parliamentary support comprising the Right.

[12] In particular, the Italian governments formed by Christian Democracy and the Socialist Party (plus some minor political entities) in the Eighties have been classified sub 2), not sub 3), and it is common knowledge that the Socialists had in fact rather conservative views in economic policy, in spite of their name.

As for the RFT index, the reasons for termination sub c) and d) are clearly of great interest here, but as far as the other reasons are concerned, there is some ambiguity. a) and b) are defined as non-political reasons, but b) in particular may well be a cover-up sometimes. In the impossibility to determine whether it is so by analysing every single episode of government termination, there is nothing left but accepting the authors' thesis. Moreover, are the anticipated elections sub a) just those a government decides to call in order to win a larger majority in Parliament? e), too, is not totally unambiguous, but, as explained in par. 3.3, my choice is here to exclude presidential democracies from the sample, so the number of governments in this class is very small.

Starting from the above classifications I have created two new political variables: TOG (= type of government) and TOGNOG (= type+nature of government).

As far as TOG is concerned, it is a simple index of government fractionalisation. Coalition and minority governments of any sort have been considered as one group, because the strategic interaction Alesina and Drazen (1991) and Chapter 1 deal with may be interpreted both as a problem concerning the executive and as a conflict between a minority government and Parliament. In fact, contrary to Edhin and Olson (1991), my view is that there is no big difference between choosing to be part of a coalition or of the group of political forces supporting a minority government for a party who wants their view on economic policy to influence the process of policy determination[13]. TOG therefore classifies governments into three groups, assigning each of them a numerical value:

"caretakers": TOG = -1
single party governments: TOG = 0
coalition and minority governments: TOG = 1

Caretakers are not very frequent, and my choice is always to keep them separated from the rest[14].

[13] In trying to explain the fact that Scandinavian countries have a tradition of minority governments Woldendorp et al. state that it is the institutional framework to determine whether a proportional electoral system, coupled with a fragmented electoral body, tends to produce coalition a minority governments.
[14] The reason is that it is difficult to understand what lies behind this definition. Are caretaker governments transitory governments, by definition not entitled to propose their own measures of economic policy, or are they on the contrary emergency governments formed to overcome a political impasse and impose a badly needed stabilisation?

As a political variable, TOGNOG aims at considering not only the degree of fractionalisation, but also the degree of cohesion on economic matters. An intermediate step in its creation is the elaboration of another classification, NOG (= nature of government), catching the degree of homogeneity of governments. The CPG index may be interpreted as a rough index of the degree of cohesion of a government on the economic (hence fiscal) agenda with 1 and 5 as peaks and 2, 3 and 4 as bottoms[15]. In order to make this indicator a little less dependent on my interpretation of the CPG index, however, I have decided to take into consideration the information coming from RFT classification. All cases with CPG =1 or 5 and with RFT = c or d have been considered as part of the same group as those with CPG = 2, 3 or 4, that is, the group of non-homogenous governments. Finally, caretaker governments are still considered separately. NOG is therefore thus defined:

caretakers: NOG = -1
governments with CPG = 1 or 5 *and* RFT= a or b or c: NOG = 0
governments with CPG = 2, 3 or 4 and governments with CPG = 1 or 5 *and* RFT= c or d: NOG = 1

Here, too, the relevant distinction is the one between the values 0 and 1.
Using TOG and NOG to classify the cases of the sample here considered highlights that all cases with TOG = 0, 110 in all, have also NOG = 0, because none of them has CPG = 2, 3 or 4 or RFT = c or d. This means that single party governments are usually characterised by a high degree of cohesion on a well-defined economic (hence also fiscal) agenda[16]. It also implies that the only cases in the sample that are differently classified by the two indexes are those coalitions for which TOG = 1 and NOG = 0, because CPG = 1 or 5 and RFT is different from c and d. These are homogeneous coalitions.
TOGNOG is a synthesis of TOG and NOG:

TOGNOG = -1 if TOG = NOG = -1
TOGNOG = 0 if TOG = NOG =0

[15] If right/left is to be intended as referred to the economic dimension, 3 (and to some extent also 2 and 4) means a low degree of cohesion. When 3 means share of centre larger than 50% one can think of an infra-party non-homogenous coalition. Also 2 and 4 are problematic, because they include one or more party of the centre, which again is in itself a substitute for a non-homogeneous coalition.
[16] In theory, just like there are virtuous coalitions, there may be single party governments starting wars of attrition. The fact that the large sample here considered does not contain a single case with TOG = 0 and NOG = 1 is however a sign that this is not so common. Single party governments are usually the expression either of a

TOGNOG = 1 if TOG = 1 and NOG = 0

TOGNOG = 2 if TOG = NOG = 1

TOGNOG = 0 therefore characterises single party governments; TOGNOG = 1 homogenous coalitions and TOGNOG = 2 non-homogenous coalitions.

As anticipated, the cases involved in my cluster analyses are country-year units. The economic policy effective in a given year in any country is the decision of the authority in office there some months before. The choice of a criterion in the attribution of the effects of a budget law to a government is not trivial, because there are many countries in which more than a government was on power in a given year. I have decided to assign to each case the value of the political variables characterising the government in charge in that country six months earlier, i.e. in the month of July of the previous year[17]. It is of course an arbitrary choice, and one may argue that a budget law is a much quicker matter in some politico-institutional contexts. There is however a lack of country-specific information and this has led me to decide for this approximation[18].

3.2. The creation of indexes of budget deficit and expenditure impulses.

For the construction of the Blanchard Measures and the expenditure impulse indexes I have used two OECD sources: National Accounts, vol. II, various years, for all data referring to public finance[19] and GDP, and Main Macroeconomic Indicators for the unemployment rate. The data were available from 1960 onwards, which has limited my analysis to the 1960-1990 period[20].

The Blanchard Measure (hereafter BM) is defined as follows:

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majority electoral system, in which case the fiscal conflict is resolved by the very electoral competition, or of a very homogeneous electoral body, which implies the fiscal issue is not the reason for a conflict.

[17] The only exception is Australia, for which I have taken account of the fact that the fiscal year starts in July.

[18] Von Hagen and Harden (1994) describe in detail the timing of the elaboration and approval of the budget law in all countries of the EU. I do not know of any source doing the same for the extra-EU countries in the sample.

[19] I have considered general government instead of central government because general government data are more standardised, hence comparable at an international level. Moreover, central government data were not complete over the sample for some of the countries here considered, so there was no choice. However, if quality central government data had been available for all countries I would have used them instead of general government ones, as the former measure with greater precision the fiscal measures actually implemented by a national government.

[20] For all countries the first case of the sample refers to 1962. This is due to the fact that BM and EXPIMP are constructed as differences, and the first term in these differences includes some data which have been reconstructed using the unemployment rate referring to the previous year. The last case is generally relative to 1990, but in the case of those countries for which the political data were available till 1991 or 1992 also the cases referring to those years have been included.

$$BM_t = PRIMDEF(U_{t-1}) - PRIMDEF_{t-1}$$

where $PRIMDEF$ is primary deficit over GDP and $PRIMDEF(U)$ is a measure of primary deficit over GDP in which the effect of the business cycle has been eliminated. This is constructed as follows: one regresses revenues and transfers over GDP, the two components of $PRIMDEF$ that are most sensitive to an economy's fluctuations, on the rate of unemployment. Estimates and residuals are then used to create two new series, defined as the residuals plus the unemployment parameter estimates times the unemployment rate in the previous year. By so doing one obtains the revenues and transfers that would have been registered if the unemployment rate had not changed. All other components of primary deficit, still divided by GDP, are then added/subtracted.

In regressing total revenues and transfers over GDP on the unemployment rate, I have also introduced two deterministic time trends to account for the problem of the stationarity of the series. Just like in Alesina and Perotti (1995), and following Blanchard (1993), the first trend covers the 1960-1975 period, while the second goes from 1976 to the last year. Calling total revenues (direct and indirect taxes plus social contributions) $TOTREV$, transfers $TRANSF$, and unemployment U, I have therefore estimated (using OLS) the parameters of the following equations for each country:

$$TOTREV_t = \alpha_0 + \alpha_1 TREND1 + \alpha_2 TREND2 + \alpha_3 U_t + \varepsilon_t$$

$$TRANSF_t = \beta_0 + \beta_1 TREND1 + \beta_2 TREND2 + \beta_3 U_t + \upsilon_t$$

I have then constructed $TOTREV_t(U_{t-1})$ and $TRANSF_t(U_{t-1})$:

$$TOTREV_t(U_{t-1}) = \hat{\alpha}_0 + \hat{\alpha}_1 TREND1 + \hat{\alpha}_2 TREND2 + \hat{\alpha}_3 U_{t-1} + \hat{\varepsilon}_t$$

$$TRANSF_t(U_{t-1}) = \hat{\beta}_0 + \hat{\beta}_1 TREND1 + \hat{\beta}_2 TREND2 + \hat{\beta}_3 U_{t-1} + \hat{\upsilon}_t$$

Finally, I have constructed BM for each case (that is, for each country-year unit):

$$BM_t = (IG_t + CG_t + SUB_t + TRANSF_t(U_{t-1}) - TOTREV_t(U_{t-1}) - CFKG_t - KTRRG_t$$

$$+YPEPG_t - INTPG_t - YPERG_t + INTRG_t) - (TOTEXP_{t-1} - TOTREV_{t-1} - CFKG_{t-1} +$$

$$-KTRRG_{t-1} + YPEPG_{t-1} - INTPG_{t-1} - YPERG_{t-1} + INTRG_{t-1})$$

where:

- IG is gross fixed capital formation over GDP
- CG is expenditure in goods and services over GDP
- SUB is subsidies to private industries and public corporations over GDP
- $CFKG$ is consumption of fixed capital over GDP
- $KTRRG$ is net capital transfers received by government over GDP
- $YPEPG - INTPG$ is property income (net land and royalties) paid by government over GDP
- $YPERG - INTRG$ property income (withdrawals from public quasi-corporate enterprises, dividends, net land rent and royalties) received by government over GDP.

The logic behind the construction of the expenditure impulse index (hereafter EXPIMP) is the same as that underlying the construction of BM. EXPIMP is thus defined:

$$EXPIM_t = \{CG_t + SUB_t + TRANSF_t(U_{t-1})\} - \{CG_{t-1} + SUB_{t-1} + TRANSF_{t-1}\}$$

Of all expenses, we have considered only transfers, subsidies and public consumption, because they are intrinsically more likely to be the object of a bargaining game between coalition partners, due both to their being current expenses (hence more at a government's discretion) and to their redistributive nature[21].

In the construction of BM and EXPIMP for the cases in my sample I have encountered some non-negligible problems. First of all, in some of the regressions of $TOTREV$ and $TRANSF$ on the unemployment rate the estimated parameters for the deterministic trends have turned out to be not statistically different from 0, which has made some doubts rise about the de-trending procedure[22]. In few cases also the estimates of the coefficient for the unemployment rate are

[21] Not just transfers, but also subsidies and public consumption may be targeted to specific interest groups or constituencies.

[22] If unit root tests proved total revenues and transfers to be I(1) the trend would be stochastic, and it would not be appropriate to regress on deterministic trends, but to work with first differences.

not significant, and some of these are positive in the *TOTREV* regression, contrary to what one should expect. As these problems involved only a small number of countries, I have decided not to do anything about them and go on.

A second problem has to do with the fact that for a few countries some of the series involved in the construction of BM, namely (YPERG -INTRG), IG and KTRRG, have big jumps in some years. These jumps are in most cases due to the fact that these data were collected only from a certain within-sample year onwards. They constitute a problem in that they deeply affect the value of the BM referred to that year and the following one.

Since the use of cluster analysis does not require complete time series for each country, I have eliminated the problem by eliminating the cases affected by it[23]. In other words, we have decided to privilege the quality of my sample cases with respect to using all of them[24].

3.3. Choice of countries to be included in the sample.

The choice of the countries to be included in the sample was conditioned by the availability of both political and fiscal data. My sources in fact do not consider the same number of countries, and for some countries considered by both fiscal data were not available for the whole 1960-1990 period.

I have chosen to consider only parliamentary democracies. The reason for this lies in the observation that the effect on fiscal policy of the presence in office of a coalition government is likely to be mitigated by the existence of an institution they have to share the executive power with, such as a president in presidential democracies. Different institutional contexts and praxis determine the relative importance of the role of the president vis-à-vis the government in presidential democracies, but the mere presence of a president must be of some relevance in decision-making, and more often than not the president is in a stronger position than the government. By concentrating on parliamentary democracies my hope was to find clearer results on the existence of a relation between the degree of cohesion on economic and fiscal matters within a government and fiscal policy[25].

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[23] In all, the elimination involved 10 cases: Australia 71-72, Austria 62-64, Belgium 77-78 (here a change in the accounting system is the origin of the problem), Ireland 76 and the Netherlands 77-78.

[24] Following the same criterion I have decided not to include in the sample two countries, Norway and Denmark, which had originally been considered. In fact, what I observed was that their BM values were very different from simple primary deficit differences also in years which were not characterised by peculiar shocks. This fact has been interpreted as a sign of dubious reliability of their unemployment data.

[25] As for the analogy between divided governments within a presidential democracy context and coalition governments recently suggested by the literature, probably the best thing to do is not to take it for granted, but to test it. This means analysing the two phenomena separately and then make a comparison of the results obtained.

Finally, I have eliminated three parliamentary democracies for which both fiscal and political data were available: Norway, Denmark and Switzerland[26]. Therefore the sample consists of 11 countries: Australia, Austria, Belgium, Canada, Germany, Ireland, Japan, Italy, the Netherlands, Sweden and U.K., for a total number of 315 cases.

4. Choice of appropriate clustering procedures.

There are two fundamental choices one is confronted with before any cluster analysis: the metrics by which case similarity is measured and the clustering method and algorithm. In fact, there are several clustering methods (hierarchical agglomerative, hierarchical divisive, partitioning, etc.) and within each method one can choose among a number of clustering algorithms.

I have chosen clustering methods and algorithms having the peculiar objectives of my research in mind. Those performed by the available software (SPSS 7.0) were the hierarchical agglomerative method, with a number of clustering algorithms to choose among, and a specific algorithm within the iterative partitioning method, the K-means cluster. I have considered the hierarchical agglomerative method associated with the Ward algorithm (also known as intra-group least squares) and the K-means cluster.

The purpose of a hierarchical agglomerative method is to join together cases into successively larger clusters, using some measure of similarity. One begins with each case in a class by itself and then "relaxes" the criterion as to what is and is not unique, which is the same as saying that the threshold regarding the decision when to declare two cases to be members of the same cluster is lowered. At the first step, when each case represents its own cluster, the distances between cases are defined by the chosen metrics. However, once several cases have been linked together, how are the distances between those new clusters determined? There are various possibilities. One can link two clusters together when *any* two cases in the two clusters are closer together than the respective linkage distance (the "nearest neighbours" or single linkage option). Or the distances between clusters are determined by the greatest distance between any two cases in the different clusters (i.e., by the "furthest neighbours"): this option is called complete linkage. Ward's algorithm is distinct from all other methods

[26] As far as Norway and Denmark are concerned, see note n. 24. Switzerland has been excluded because it

because it uses an analysis of variance approach to evaluate the distances between clusters. In short, this method attempts to minimize the Sum of Squares (SS) of any two (hypothetical) clusters that can be formed at each step.

In the K-means clustering procedure the number of clusters is user-specified. The program will start with *k* random clusters, and then move objects between those clusters with the goal to minimize variability within clusters and maximize variability between clusters. This is done through an iterative routine involving the calculation of the clusters'centroids, of the Euclidean distances between all cases and the centroids and the re-assignment of cases to the nearest centroid.

My aim was to obtain clusters that were not long, but spherical, and composed by a similar number of cases. With respect to other hierarchical agglomerative methods, the Ward algorithm actually tends to form new clusters at every step of aggregation instead of having single-case clusters being included in an already formed bigger cluster. This determines that at the highest steps of aggregation it is more common to have distinct clusters with similar dimension than to find a very big cluster and some small or single-case clusters.

As for the K-means cluster, the performance with respect to cluster dimensions is similar to the one of the hierarchical agglomerative method plus Ward algorithm option, but there is an advantage with respect to all hierarchical agglomerative methods which lies in the revision in the cluster assignment of every case at each step of aggregation. In fact, in hierarchical agglomerative clustering once two cases are united in one cluster they will not be divided at further steps of aggregation[27]. However, the K-means clustering also suffers from a limitation which is typical of all partitioning methods, namely the computational impossibility to consider all possible case partitions given a number of clusters one wishes to impose. This means one risks to obtain a sub-optimal division of cases in clusters, a sort of local maximum instead of an absolute one (this risk is linked to the choice of the initial partitioning, later to be automatically revised by iteration).

When using the hierarchical agglomerative method with the Ward algorithm SPSS requires to choose among a number of metrics, and my choice has been for the City Block (or Manhattan

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presents extremely peculiar characteristics from the political point of view (Woldendorp et al. (1993)).

[27] Hierarchical agglomerative methods have been so far the most widely used (Bartolaminelli and Daveri (1996) is an example), in spite of the fact that they are devised to respond to very peculiar clustering objectives. It is in fact a clustering method which was invented by evolutionary biologists. My choice to make use also of the K-means cluster option is to be interpreted as a way by which I try to see if these specific aspects of the hierarchical agglomerative methods interfere with my own classifying aims.

block). This metrics does not use squares, but absolute values to measure the distance of cases in terms of the different variables characterising them. I did so because one of the two variables (EXPIMP) had a slightly wider range of values. I wanted to avoid the possibility that this fact influenced the clustering results in the sense that these reflected too great a weight given to EXPIMP in the calculation of case similarity[28]. Instead, the Euclidean distance is the default option when one uses the K-means cluster.

For both clustering methods several steps of aggregation have been considered: from 6 to 2 clusters. I show here the results, both for the analysis of the whole sample and for that of the subsamples, the economic interpretation of which is most convenient.

5. Results.

5.1. A preliminary data analysis.

TOG classifies the 315 cases of my sample in the following way:

number of cases with TOG = -1: 5
number of cases with TOG = 0: 110
number of cases with TOG = 1: 200

The coalition governments with a high degree of cohesion (TOGNOG = 1) are 88[29], a number big enough to give my analysis of their fiscal performance some statistical significance. Non-homogeneous coalitions (TOGNOG = 2) are therefore 200-88=112.

As far as the BM values are concerned, the sample mean is 0.054 and the standard deviation 1.306. In fact, most cases are concentrated in the (+1,-1) range of this variable.

[28] It is generally legitimate that the variable with the greatest range be "heavier" in the calculation of case similarities when the range comparison is not conditioned by the use of different measure units. I chose the City Block metrics because the thesis I wanted to verify was that non-homogeneous coalitions tend to have strong (positive and negative) fiscal impulses in terms of deficit; possibly also in terms of expenditure, but I wanted the BM variable to remain central in my analysis, being the literature of reference centred on the growth of public debt.
Sometimes it is suggested that the question of the different weights attributed to variables in the calculation of case similarity can be solved by transforming the very variables into their standardised values, also called z-scores. This is however recommended when the variable relative values are conditioned by the use of different measure units, and this is not the case here.

[29] Most of these cases are relative to Sweden, Australia, the Netherlands and Germany.

A cross analysis of the BM and the political variables is shown in Table 1. Notice how the TOG classification hides the similarity, in terms of deficit impulse, between single party governments and homogeneous coalitions.

In order to shed more light on the characteristics of the sample from the point of view of the highest and lowest values for BM I have reproduced the analysis in Alesina and Perotti (1995). I have also added a couple of extra lines distinguishing coalition governments according to their degree of cohesion. The result is shown in Table 2.

The most interesting considerations can be drawn from the joint consideration of the first and second part of the table[30]. Here, too, taking coalition governments as a whole group is misleading, because it tends to show that single party and coalition governments are very similar from the point of view of their tendency towards extreme deficit impulses. If homogeneous and non-homogeneous coalitions are kept separate, instead, one can see that the latter are characterised by strong positive and negative deficit impulses more frequently, while the former are even more moderate than single party governments. However, these considerations are not uncontroversial, because they may be subject to the criticism according to which it is not legitimate to rely on an a priori definition of an "extreme value" for BM.

Let us now examine the sample from the point of view of the EXPIMP variable. The sample mean is 0.47 and the standard deviation 1.226. With respect to the BM variable, the expenditure impulses are included in a slightly wider range and the biggest concentration of cases is in the (0,2) interval.

Table 3 considers the EXPIMP averages in the subsamples with uniform value for the TOG and TOGNOG variables. All values are quite similar: apparently, there is no evidence of a strong influence of the political context on the determination of the expenditure impulse.

The fact that the subsample with TOGNOG = 1 has a greater mean for EXPIMP than the whole sample is not due to a concentration of strong positive expenditure impulses in it. This is demonstrated in Table 4, where I have defined an expenditure impulse as "very loose" if EXPIMP is greater than 1.8 and as "very tight" if it is smaller than –0.9[31].

Finally, let us consider how BM and EXPIMP relate to each other by looking at Figure A. The sample is scattered in all four quadrants, and the highest concentration of cases is in the first one, close to the origin. The second quadrant is not so crowded, containing only 35 cases.

[30] The comparison between the results in the first part of Table 2 and those in Alesina and Perotti (1995) shows only one difference. In Table 2 a case with TOG = 0 has a grater probability of being characterised by a very strong negative deficit impulse than a case with TOG = 1, while the reverse is true in Alesina and Perotti. This difference is due to the fact that two different samples are investigated.

[31] These values have been obtained as rough approximations by excess of the mean plus/minus the standard deviation. This seems to be the same criterion used by Alesina and Perotti (1995) to find the +1.5; -1.5 values as boundaries for the extreme values for the BM variable.

This means that contemporary cuts in expenses and taxes, with the latter reductions greater than the former, are not so common. The fourth one contains 87 cases, instead, and they are not all close to the origin.

Given a value for EXPIMP, the cases characterised by it may have very different values for BM. However, it is evident that in most cases what is extreme from the point of view of one variable it is also extreme from the point of view of the other. This is a good sign, as it may anticipate that the automatic classification procedures determine a readable result. By this I mean that I can hope to find clusters including very loose fiscal impulses, clusters including very tight fiscal impulses and a central cluster of cases characterised by moderate fiscal policies.

Particularly, it would be good if the cases in the fourth quadrant with BM close to 0 were included in the central cluster. Loose or very loose expenditure policies in a balanced budget context are not, in fact, typical of any of the types of government I am considering, according to the theoretical literature. What I am testing is the thesis by which non-homogeneous coalition governments, being characterised by a conflict on how to allocate the fiscal burden, tend first to create deficits (positive BM), a tendency that may be made stronger by an inclination to increase spending, and then to implement strong stabilisations.

5.2. Cluster analysis results over the 1960-1990 sample.

The first cluster analysis results over the whole sample I present are those relative to the partitioning of cases into three clusters. No matter which of the two preferred clustering procedures is followed, the three resulting clusters show the following features:

1) the first cluster[32] is made up by few cases, most of which characterised by high values both for BM and for EXPIMP and therefore identifiable as cases associated with strong positive deficit and expenditure impulses. Some other cases, a small minority, have either BM or EXPIMP with value close to 0, in which case the other economic variable is very high;
2) the second cluster contains the vast majority of cases. The expenditure and deficit policies characterising them are definable as moderate, in the sense that they do not belong to the tails of the distributions of the BM and EXPIMP variables;

[32] I follow the convention to number clusters starting from the highest one in the first quadrant to the lowest one in the third quadrant.

3) the third cluster is a kind of counterpart of the first in the sense that its cases are characterised by low values of BM and/or EXPIMP. However, with respect to the first cluster, it contains more cases and it is not so distanced from the second cluster.

Using the hierarchical agglomerative method plus Ward algorithm and City Block metrics option the resulting third cluster is more numerous (compare Table 6a with 5a). It also includes a greater number of cases with BM < 0 and EXPIMP > 0 (31), many of which with both variables close to 0. Moreover, the first cluster is placed higher up on the right. All in all, it is not that the two clustering procedures give extremely different results: most cases (266) are assigned to the same clusters[33]. However, the result obtained by using the agglomerative method is more difficult to read, as the third cluster is less easily identifiable as a cluster of cases associated with very tight deficit and expenditure impulses.

Let us therefore consider more closely the result obtained by use of the K-means cluster[34]. Tables 5a and 5b and Figure 5 illustrate its features[35].

Let us look at Table 5b. The sense of this analysis is the same as the one in Alesina and Perotti (1995) and Tables 2 and 4, but here case partitioning is not arbitrary, through the use of automatic clustering techniques I have "let cases speak for themselves". Moreover, unlike in Alesina and Perotti but just like in Tables 2 and 4, I have added the consideration of the distinction of coalition governments according to their degree of cohesion.

What does Table 5b say? The probability of a case characterised by TOG = 1 to belong to the first cluster is higher than the same probability for a case with TOG = 0, while the probability for the former to belong to the third cluster is lower than the same probability for the latter. It seems the traditional thesis is confirmed by which coalition governments are more often associated with very loose fiscal policies, while single party cabinets are more likely to implement very tight ones (however, notice it is not confirmed that coalitions are totally unable to stabilise).

The second part of Table 5b highlights that the degree of cohesion among the partners of a coalition government does make a difference in terms of fiscal policy performance. Non-

[33] This is comforting, as it probably means the iterative-partitioning method has not produced a "local maximum" as a result.

[34] The boundary between the first and the second cluster does not appear problematic here (there is only one case included in the first cluster, Ireland 70, with BM close to 0). However, the number of cases in the third cluster, though smaller than the one in the result of Table 5a, is not so small here, either, and 13 of its cases have negative BM and positive EXPIMP. However, all of them but one (Sweden 71) have EXPIMP < 1 and BM < -1. This is much more similar to a relatively strong stabilisation than many cases characterised by –1 < BM <0 and EXPIMP > 0 included in the second cluster.

[35] In all tables marked with letter a, as well as reporting the main features of the clusters from the point of view of the economic variables used to obtain them, I also include the cluster average for the political variable TOG. The comparison between these values and the TOG sample average gives a first indication of the relative

homogeneous coalitions are more likely to be fiscally irresponsible, while homogeneous ones have a probability to be associated with moderate fiscal policies that is even higher than the one characterising single party governments. This is mostly due to the fact that these coalitions are not very likely to implement very tight fiscal policies. The probability for a case with TOGNOG = 1 to belong to the first cluster is in fact only slightly lower than the one showed by a case with TOGNOG = 0.

A third result I report here (Tables 7a and 7band Figure 7) refers to what is obtained by use of the hierarchical agglomerative method and Ward algorithm, where I have imposed that the aggregating process stops at 5 clusters. Three clusters are here central, and two are extreme[36]. The third cluster is here better interpretable as the group cases associated with very tight fiscal policies (only two of them have EXPIMP > 0, and both have also BM < -1).

The probability to belong to each extreme cluster is here higher for a case with TOG = 1 than for a case with TOG = 0. Notice that the result in Table 5b by which the probability for the former to belong to the third cluster is lower than the same probability for the latter is not preserved here. As for the second part of Table 7b, a strong difference in the fiscal performance of homogeneous and non-homogeneous coalitions is confirmed. A case with TOGNOG = 2 is here not just more likely, but much more likely to belong to each extreme cluster than a case with TOGNOG = 0, while coalition governments characterised by a high degree of cohesion appear to be rather similar to single party cabinets from the point of view of their fiscal conduct. Unlike in Table 5b, a case with TOGNOG = 1 is somewhat more likely to belong to the third cluster, and since here the latter better identifies with the group of cases associated with very tight fiscal policies I am inclined to prefer this result to the previous one.

All this suggests that if one's aim is to verify the existence of a relationship between the degree of fractionalisation of government and a country's fiscal performance it is better to make a distinction between different kinds of coalition governments. It is only by allowing the coalitions with a low degree of cohesion to be a group on their own that the relevance of the political context over a country's fiscal conduct appears in all its strength. The great difference in fiscal performance is not between single party governments and coalitions, but between single party and homogeneous coalition governments on one side and non-homogeneous coalitions on the other.

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concentration of cases with TOG = 0 and TOG = 1 in the clusters. I do not report the TOGNOG cluster averages because they are not very informative, as TOGNOG is not a binary variable.

[36] The choice to consider a cluster as central or extreme is somewhat arbitrary when there are more than three clusters. I have (almost) always chosen to consider as extreme only two clusters: the top-right one and the bottom-left one.

It is interesting to notice that the cases politically characterised as homogeneous and non-homogeneous coalitions show greater differences in the probability to belong to the first cluster than in the probability to belong to the third one. This is mainly due, as next paragraph will show, to the contribution of the cases with TOGNOG = 1 belonging to the 80s.

5.3. Cluster analysis results over the 1962-1971, 1972-1981 and 1982-1990 subsamples.

As anticipated, a debated issue in the literature about the influence of the political context over a country's fiscal performance is whether the presence of a divided government is relevant *only* if it happens to be in office when a negative economic shock takes place. A softer version of the same thesis states that coalition governments tend to be *more* fiscally irresponsible under such circumstances.

In order to test these opinions I have divided my case set temporally into three subsamples: the period before the oil shocks, the 1972-1981 period in which those shocks took place and the 80s[37].

As far as the 1962-1971 period is concerned, the average value for BM is 0.066, it is 0.616 for EXPIMP and 0.6887 for TOGNOG.

The use of the hierarchical agglomerative method with Ward algorithm and City Block metrics allows to obtain groups of cases roughly identifiable as those characterised by loose fiscal policies, those associated with tight fiscal policies and those having moderate fiscal conducts. However, it is not the best of results.

In fact, just like in the case of the clustering operated on the whole of the sample, there is a problem here with the cases in the fourth quadrant. The best thing would be that these cases, characterised by BM < 0 and EXPIMP > 0, were assigned to the central cluster if close to the origin and to the cluster of cases with strong negative fiscal impulses if showing a low value for BM and a value close to 0 for EXPIMP. I could find an optimal solution over the entire sample, but here the relative number of these cases is higher and this makes things more difficult.

I will show two results, both imperfect but somehow complementary. The 5 clusters partition (Table 9a and Figure 9) presents the cases characterised by a low BM divided into two groups: one is made up by cases with EXPIMP < 0 (cluster 5) and one by cases with EXPIMP > 0 (cluster 4). The next aggregation step determines that these two clusters become one

[37] The third subsample also contains some cases referring to the years 1991 and 1992. These country-year units are part of the data set because Woldendorp et al. (1993) offer a political characterisation of their governments, so I could construct their political variables.

(Table 8a). The resulting group may not be defined as a group of cases associated with strong negative fiscal impulses, because many cases with both BM and EXPIMP close to 0 are included. But if I consider as "extreme" only the fifth cluster in the first result I risk not considering the information about those cases with a very low BM and a value for EXPIMP close to 0 that are there included in cluster 4[38].

Why considering both results? Since neither is satisfactory, considering both allows at least to judge if a different definition for the cluster of cases characterised by very tight fiscal policies makes a difference. Fortunately, this is not the case. No matter how restrictive the definition for the group of cases with strong negative fiscal impulses, the data send a qualitatively similar message, as it is possible to see in Tables 8b and 9b.

The main message coming out of Tables 8b and 9b is that the degree of fractionalisation of government is likely to affect a country's fiscal performance even in times of not so big economic shocks. This result is in contrast to Roubini and Sachs (1989a) and the common view. Coalition governments were more inclined to implement loose fiscal policies than single party governments even in the "quiet" 60s, and this is particularly true for coalitions with a low degree of cohesion, while homogenous coalitions were only moderately more fiscally irresponsible with respect to single party governments.

As for the probability to belong to the cluster of cases with very strong negative fiscal impulses, things are not so clear if we look at the distinction between cases with TOG = 0 and cases with TOG = 1, but they become clearer after classifying coalition governments according to their degree of cohesion. In fact, both if we consider the partition in 4 clusters and if we consider the partition in 5 clusters, a case characterised by TOGNOG = 2 has a greater probability to implement strong stabilisations. This is not in contrast, as I have already pointed out, with war of attrition models. As for homogenous coalitions, they are much less likely to be associated with very tight fiscal policies than single party governments if we consider Table 8b, while they are only moderately so if we consider Table 9b. Anyway, in both tables the difference in likely fiscal conduct between homogeneous and non-homogeneous coalitions is greater than the one between homogeneous coalitions and single party governments.

[38] A second problem is the presence of a case with a value for BM close to 0 but negative in the first cluster (which is the same in the two partitions). It is not a negligible problem considering that this cluster only contains eight cases. The case in question is Ireland 70 and politically it is characterised as having TOG = TOGNOG = 0.

Let us now consider the 1972-1981 subsample. The BM average, 0.41, is higher than the one in the previous decade, and the same is true for the EXPIMP average (0.79). The TOG average is 0.5577.

The most interesting results are obtained when the case set is partitioned into three clusters using both clustering procedures illustrated in par. 4. The cases located in the fourth quadrant do not seem to cause any problem here. The use of the hierarchical agglometrative method with Ward algorithm and City Block metrics produces extreme clusters that are slightly less numerous, but, all in all, the two results are very similar: 96 out of 104 cases are assigned to the same clusters.

There is something important to bear in mind when interpreting these results. In the 1972-1981 period the cases with very low values for both BM and EXPIMP are not so many, and this determines that the third cluster contains many cases with both variables close to 0, which makes it difficult to define it as the group of cases associated with *very strong* negative fiscal impulses. This cluster is therefore extreme only in the sense that at a time when fiscal impulses are on average positive and strong, even mild stabilisations are to be considered as exceptional. The probabilities to belong to the third cluster must therefore be interpreted with caution, having in mind that the cases included in it are often included in the central cluster in the results obtained applying cluster analysis over the whole 1960-1990 sample.

Tables 10a and 10b and Figure 10 are relative to the solution obtained by use of the K-means cluster method. The first thing one notices is that the concentration of cases characterised by very loose fiscal policies is greater here, i.e. more cases belong to the first cluster, and this in spite of the fact that its BM and EXPIMP averages are higher than those of the first cluster of the results obtained for the 1960-1971 period. This is also reflected in the fact that the probability to belong to the first cluster is higher for all types of cases, that is, no matter their political characterisation. But with respect to the 60s it is also evident that the difference in fiscal performance of the distinct types of government is much more remarkable. In particular, the difference in the probability to belong to the first cluster between a case with TOG = 0 and a case with TOG = 1 is striking.

All this is confirmed by a scrutiny of Tables 11a-11b, referring to the result obtained by use of the hierarchical agglomerative method with Ward algorithm. From the point of view of the interpretation of the extreme clusters, and of the third cluster in particular, this second result is better than the first (see also Figure 11)[39].

[39] In the partition obtained by use of the K-means cluster method the third cluster also includes a couple of cases with both BM and EXPIMP close to 0, but BM positive and EXPIMP negative (second quadrant). As for the

Notice that here, too, the difference in the probability to belong to the first cluster between a case with TOG = 0 and a case with TOG = 1 is very big. As for the probability to belong to the third one, if one looks at the distinction between single party and coalition governments it seems that the traditional view is verified by which it is the former type that is likely to take the responsibility of a stabilisation.

However, things look different if the distinction between homogeneous and non-homogeneous coalitions is taken account of. The coalitions with a high degree of cohesion were even less inclined to implement extreme fiscal policies than single party governments! The difference in the probability to belong to the first cluster between a case with TOGNOG = 0 and a case with TOGNOG = 2 is consequently greater than the one between a case with TOG = 0 and one with TOG = 1. As for the probability to belong to the third cluster, the consideration of homogeneous coalitions as a group on their own highlights that they were not very likely to implement very tight fiscal policies, while the probability to do so of the cases politically characterised as both single party and non-homogeneous coalitions is double.

How should one understand the peculiar behaviour of homogeneous coalitions in the 70s? It appears as definitely different from the conduct of non-homogeneous coalitions, but it is not similar to the one of single party governments, either: in fact, it is even more disciplined than the latter.

The fact is that during this decade even single party governments were not so inclined to implement moderate fiscal policies. In many cases they tried to cope with the real effects of the oil shocks by boosting aggregate demand. Given that keynesian teaching was the commonly accepted paradigm, it remains unclear why it did not influence so frequently the conduct of those coalitions characterised by a high degree of cohesion. As for the low probability to implement strong negative fiscal impulses, it is better to remind that the results relative to the third cluster are to be taken with caution, since, as I have anticipated, this cluster is rather peculiar here[40].

Finally, I turn to the third subsample, the 80s. The BM average is negative (-0.31) and the EXPIMP average is close to 0 (0.016); the TOG average is 0.6095.

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first cluster, the result in Table 11a includes only cases with very high values for both BM and EXPIMP, with the only exception of UK 74, characterised by BM close to 0 and extremely high EXPIMP.

[40] One should also notice that the cases with TOGNOG=1 are quite few in the 1962-1971 period. They are 19 (they are 41 in the 1962-1971 period and 28 in the 80s). Maybe this subsample is too small for the relative frequencies referring to it to make their comparison with those referring to the groups of cases with TOGNOG = 0 and TOGNOG = 2 significant.

By stopping the aggregation at the 3 clusters step, using the Ward method with City Block metrics, I could obtain a quite interesting result. Clusters one and three are well defined, as one can see from Figure 12, and in particular all cases with BM close to 0 belong to the central cluster, not to them. The only inconvenience is given by the fact that the cluster of cases with loose fiscal policies is a little too close to the one of cases with moderate fiscal conduct; in other words, the boundary between them is a little low. This is due to the fact that there are not so many cases with very high values of BM and EXPIMP in this sublasmple. Tables 12a and 12b illustrate this result. A case with TOG = 1 has a greater probability to belong to both the first and the third cluster than a case with TOG = 0. However, this reassuring finding conceals strange facts that are evident if the distinction between homogeneous and non-homogeneous coalitions is made. In the second part of Table 12b everything looks upside down. It is homogeneous coalitions, not non-homogenous ones, that are characterised by a high frequency of very loose and very tight fiscal policies in this decade!

Let us consider a second clustering solution, which one can obtain by use of the K-means method and fixing the number of clusters at six. Here one cluster, cluster 6, has only one case, the outlier Ireland 89. I will therefore consider the cases both in cluster 6 and in cluster 5 as those characterised by strong negative fiscal impulses. Figure 13 and Tables 13a and 13b show this result.

The first part of Table 13b is in some aspects similar to the first part of Table 12b. The probability for a case with TOG = 0 to belong to the third cluster is lower than the one for a case with TOG = 1 (and the difference in probability is even greater here). But the first cluster is here better defined, and contains a smaller number of cases. This affects the comparison between the probabilities to belong to it for a case politically characterised as a single party government and a case qualified as a coalition government. In fact, contrary to expectations, the former is here more likely to implement a very loose fiscal policy. The second part of Table 13b is not so different from the second part of Table 12b. What is particularly strange is the low probability to belong to the first cluster characterising a case with TOGNOG = 2 and the high probability to belong to the third one for a case with TOGNOG = 1, which were never encountered in the analysis of the earlier subsamples. Single party governments, homogeneous coalitions and non-homogeneous ones have had a tendency to implement different fiscal policies in the years in question, and one cannot even say one type of government was more similar to either of the other two in their fiscal conduct. Homogeneous

coalitions seem to be more inclined to extreme fiscal impulses, which is the result one would expect for non-homogeneous ones.

So the consideration of this second clustering result is not sufficient to reverse the conclusions drawn starting from the first one, which might have been flawed by the fact that the first cluster was located a little too low in the first quadrant. The next step is then to analyse in detail the cases belonging to this subsample and politically characterised as homogeneous coalitions. Two of those of them belonging to the first cluster, Germany 1990 and Germany 1991, are quite peculiar, as they catch the fiscal effects of German reunification, an exceptional event. What happens if we remove from the sample these two cases? The answer is: not much. Table 14 is the counterpart of Table 13b obtained by use of the K-means cluster method on the reduced sample, still fixing the number of clusters at six.

Looking at Table 14b, the only new result worth mentioning is the fact that the probability to belong to the first cluster for a case with TOGNOG = 2 is now low, but not extremely low. Still, it remains lower than the same probability for a case with TOGNOG = 0 and slightly lower than the one for a case with TOGNOG = 1.

Summing up, the application of cluster analysis techniques to the third subsample produces evidence of the fact that none of the theses here suggested are confirmed:

- nor the thesis by which coalition governments are *always*, i.e. also in times of no recession, more likely to determine strong *positive* deficit and expenditure impulses;
- nor the one by which non-homogeneous coalitions are *always* more inclined to implement strong fiscal impulses, *both positive and negative*.

The two phenomena making the 80s peculiar are non-homogeneous coalitions' relatively low inclination towards very loose fiscal policies and an important tendency to implement strong negative fiscal impulses on homogeneous coalitions' part.

The first one is probably the consequence of the fact that many of the countries with proportional representation in the sample had joined the ERM, and this started being a commitment towards a monetary union. It may have favoured a higher awareness of the fact that a prolonged tendency to implement fiscal expansions was not sustainable, because in the new monetary regime deficit monetisation was no longer a feasible option. Joining the EMU project was, for many of these countries, a binding commitment, causing a structural break in the way fiscal policy was determined.

As for the peculiar behaviour of homogeneous coalitions, it may be the effect of the fact that in some countries with proportional representation there was a shift of power from fiscally irresponsible non-homogeneous coalitions to homogeneous ones, with the consequence that

the latter were forced to implement strong stabilisations to avoid further deterioration of the fiscal stance. This shift of power may have been due to the fact that the electoral body became more concerned with the fiscal agenda of candidates than with their extra-economic positions[41], so influential in determining the existence of coalitions with conflicting fiscal goals before[42]. It is interesting to notice that not less than 4 cases politically characterised as homogeneous coalitions and belonging to the clusters of cases with strong negative fiscal impulses refer to just one country: Sweden.

Considering the whole of the clustering solutions here considered, I must conclude that the answer to the question whether the presence of a coalition government is relevant *only* if it is in office when a negative economic shock takes place is neither a definite yes nor an absolute no. This hard version of the differentiation thesis seems to be denied by the results relative to the 1962-1971 subsample, but the 80s neither confirm nor deny. In the 80s it looks as if a differentiation in fiscal conduct between different types of governments exists, but it is not of the kind usually assumed. However, a historical perspective, taking also account of the fact that public debt is a state variable and the countries in the sample reached the 80s with different levels of it, sheds some light on those years. What this analysis does confirm is the softer version of the differentiation thesis, by which coalition governments tend to be *more* fiscally irresponsible than single party ones in times of recession. This, however, is much more evident if a distinction is made between homogeneous and non-homogenous coalitions. In fact, the clustering solutions relative to the 1972-1981 period show a very big difference in the values of the probability to belong to the cluster of strong positive fiscal impulses for cases politically characterised as single party and non-homogeneous coalitions, and these differences are in accordance to what one expects. As for the cluster of cases associated with very tight fiscal policies, the difference is not so big.

6. Concluding remarks.

When applied on a sample of 11 OECD countries covering the 1962-1990 period, cluster analysis techniques offer interesting insights on the relationship between a country's politico-institutional context and its fiscal performance.

[41] This is an explanation in line with the model in Chapter 1.
[42] An alternative explanation is the declining fortune of keynesianism.

The results obtained using the whole sample highlight that not all coalition governments (and not all minority governments, here grouped with the former) tend to have an irresponsible fiscal conduct. There exist coalitions with a high degree of cohesion among their members who behave more like single party governments than like coalitions in which a war of attrition takes place.

When considered as a group on their own, coalitions with a low degree of cohesion on fiscal matters are revealed to have an important tendency to determine strong positive fiscal impulses. But non-homogeneous coalitions are also the type of government associated with the highest probability to implement very tight fiscal policies, which contradicts the view by which coalition governments (and especially those reflecting conflicting fiscal goals) are unable to stabilise. This is easily explained by the very fact that they tend to stabilise with delay: by the time they do so, they must be vigorous in their action.

As for the cluster analyses performed on the three subsamples 1960-1971, 1972-1981 and 1981-1992, their main finding is that there has been an evolution in time in the relationship between degree of fractionalisation of government and fiscal conduct.

The clustering solutions relative to the 1962-1971 subsample reject the thesis by which the presence of a coalition government is relevant *only* if it happens to be in office when a negative economic shock takes place. However, recessions definitely tend to make differences in fiscal performance greater. Finally, the results obtained working on the 80s' are not so clear-cut.

Up to the beginning of the 80s homogeneous coalitions were more similar to single party governments than to non-homogeneous coalitions, because they were generally characterised by a prudent behaviour when they were to determine how much to spend and how to finance those expenditures. The last decade of the sample is characterised by a new situation by which homogeneous coalitions, non-homogeneous ones and single party governments all tend to adopt their own fiscal policy. The problem lies in the fact that the fiscal conduct associated with each type of government is not in line with any of the predictions suggested by the theory. Non-homogeneous coalitions do tend to implement more often very tight fiscal policies in the 80s as well as in the previous decades, but the same is not true for very loose fiscal policies. The gradual process towards a European Monetary Unions may be an explanation, as many proportional representation democracies in the sample may have started to perceive this implied a binding commitment on fiscal as well as on monetary policy. As for homogenous coalitions, they often implemented strong stabilisations in the 80s. This may just

be a reflection of a shift of power from fiscally irresponsible non-homogenous coalitions to homogenous ones.

It is worth dedicating a few final words on a methodological issue. Some critics of cluster analysis point out that clustering solutions lack any sort of statistical validation. This is true, but in my opinion, it is not a serious problem here. In fact, I have replicated every result using two different clustering methods and by so doing I have always obtained rather similar sample "cuts". Even when applied to the three subsamples, cluster analysis has produced quite robust solutions, in spite of the smaller number of cases involved. I have not obtained very different partitions when I considered other three subsamples, 1962-1972, 1973-1982 and 1983-1992. This is in my view a further sign of the robustness of these results.

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Data Appendix.

Data referring to public finance of general government and GDP:

OECD, National Accounts, vol. II, 1964-1981, 1976-1988, 1977-1989, 1979-1991, 1980-1992

Unemployment rate:

OECD, Main Macroeconomic Indicators, 1960 to 1992

Political indexes:

J. Woldenorp, H. Keman, I. Budge, 1993, Party government in twenty democracies, *European Journal of Political Research*, 24: 1-120

See Par.3.1 and Par.3.2 for detailed description of how the political and economic variables here used have been constructed starting from the data in these sources.

TABLES.

Table 1: BM averages of groups of cases politically classified as identical

	BM average		BM average
TOG = 0	0.04	TOGNOG =0	0.04
TOG = 1	0.083	TOGNOG = 1	0.049
		TOGNOG = 2	0.1099

Table 2: cross analysis of cases according to political classifications and BM ranges

	Prob. of BM>1.5	Prob. of -1.5<BM< 1.5	Prob. of BM<-1.5
TOG = 0	9.09	80.01	10.9
TOG = 1	10	80	10
TOGNOG = 1	7.95	85.22	6.81
TOGNOG = 2	11.6	75.89	12.5

Note: the probability of a very loose (very tight) fiscal policy is given by the ratio between the number of cases characterised by such conduct with a value for the political variable as indicated on the left over the total number of cases with the same value of TOG or TOGNOG (= relative frequency multiplied by 100).

Table 3: EXPIMP averages of groups of cases politically classified as identical

	EXPIMP average		BM average
TOG = 0	0.4317	TOGNOG =0	0.4317
TOG = 1	0.4979	TOGNOG = 1	0.5112
		TOGNOG = 2	0.4875

Table 4: cross analysis of cases according to political classifications and EXPIMP ranges

	Prob. of EXPIMP>1.8	Prob. of -0.9<EXPIMP< 1.8	Prob. Of EXPIMP<-0.9
TOG = 0	10	82.72	7.27
TOG = 1	11	80	9
TOGNOG = 1	7.89	85.22	7.27
TOGNOG = 2	13.4	75.89	10.71

Table 5a: K-means clustering, 3 clusters.

Cluster	Number of cases	BM average	EXPIMP average	TOG average
1	43	2.24 (-0.04, 4.21)	2.2 (-0.14, 4.52)	0.6744
2	204	0.11 (-1.84, 1.81)	0.52 (-1.8, 2.99)	0.65
3	68	-1.51 (-3.96, 0.02)	-0.79 (-5.07, 1.57)	0.6119

Note: here and in the following tables:
- The numbers in brackets are the minimum and maximum values of the fiscal variable for the cases belonging to the given cluster;
- The TOG averages are calculated excluding the cases characterised by caretaker governments (TOG=-1).

Table 5b.

Value of the political variable	Prob. for a case to belong to cluster 1 (%)	Prob. for a case to belong to cluster 2 (%)	Prob. for a case to belong to cluster 3 (%)
TOG = 0	12.72	63.63	23.63
TOG = 1	14.5	65	20.5
TOGNOG = 0	12.72	63.63	23.63
TOGNOG = 1	11.36	70.45	18.18
TOGNOG = 2	16.96	60.71	22.32

Table 6a: hierarchical agglomerative, Ward, City Block, 3 clusters.

cluster	number of cases	BM average	EXPIMP average	TOG average
1	23	2.99 (2.09, 4.21)	2.59 (0.99, 4,52)	0.69
2	197	0.34 (-1.84, 2.6)	0.7 (-1.13, 3.96)	0.61
3	95	-1.25 (-3.96, 0.68)	-0.53 (-5.07, 1.57)	0.61

Table 6b.

Value of the political variable	Prob. for a case to belong to cluster 1 (%)	Prob. for a case to belong to cluster 2 (%)	Prob. for a case to belong to cluster 3 (%)
TOG = 0	6.36	63.63	30
TOG = 1	8	62	30
TOGNOG = 0	6.36	63.63	30
TOGNOG = 1	4.54	70.45	25
TOGNOG = 2	10.71	55.35	33.92

Table 7a: hierarchical agglomerative, Ward, City Block, 5 clusters.

Cluster	Number of cases	BM average	EXPIMP average	TOG average
1	23	2.99 (2.09, 4.21)	2.58 (0.99, 4.52)	0.6957
2	111	0.28 (-1.84, 1.82)	1.26 (0.51, 3.96)	0.713
3	86	0.41 (-0.29, 2.6)	-0.02 (-1.13, 0.64)	0.5465
4	64	-0.82 (-1.79, 0.68)	-0.42 (-2.23, 1.07)	0.619
5	31	-2.129 (-3.96, -1.2)	-1.11 (-5.07, 1.57)	0.7

Table 7b.

Value of the political variable	Prob. for a case to belong to cluster 1 (%)	Prob. for a case to belong to cluster 2+3+4 (%)	Prob. for a case to belong to cluster 5 (%)
TOG = 0	6.36	85.45	8.18
TOG = 1	8	81.15	10.5
TOGNOG = 0	6.36	85.45	8.18
TOGNOG = 1	4.54	86.36	9.09
TOGNOG = 2	10.71	77.67	11.6

Table 8a: 1962-1971, hierarchical agglomerative, Ward, City Block, 4.

Cluster	Number of cases	BM average	EXPIMP average	TOG average
1	8	2.1 (-0.04, 4.13)	2.33 (-0.14, 4.52)	0.75
2	34	0.47 (-0.52, 1.31)	1.13 (0.42, 2.17)	0.7647
3	36	0.19 (-0.4, 1.27)	0.09 (-0.71, 0.79)	0.6111
4	28	-1.16 (-3.47, -.39)	0.16 (-1.31, 1.57)	0.6786

Table 8b.

Value of the political variable	Prob. for a case to belong to cluster 1 (%)	Prob. for a case to belong to cluster 2+3 (%)	Prob. for a case to belong to cluster 4 (%)
TOG =0	6.06	66.66	27.27
TOG = 1	8.21	65.75	26.02
TOGNOG =0	6.06	66.66	27.27
TOGNOG = 1	7.32	70.73	21.95
TOGNOG = 2	9.37	59.37	31.25

Table 9a: 1962-1971, hierarchical agglomerative, Ward, City Block, 5.

Cluster	Number of cases	BM average	EXPIMP average	TOG average
1	8	2.1 (-0.04, 4.13)	2.33 (-0.14, 4.52)	0.75
2	34	0.47 (-0.52, 1.31)	1.13 (0.42, 2.17)	0.7647
3	36	0.19 (-0.4, 1.27)	0.09 (-0.71, 0.79)	0.6111
4	21	-1.09 (-3.47, -.39)	0.47 (0.13, 1.57)	0.6667
5	7	-1.38 (-2.24, -.79)	-0.76 (-1.31, -.48)	0.7143

Table 9b.

Value of the political variable	Prob. for a case to belong to cluster 1 (%)	Prob. for a case to belong to cluster 2+3+4 (%)	Prob. for a case to belong to cluster 5 (%)
TOG =0	6.06	87.87	6.06
TOG = 1	8.21	84.93	6.84
TOGNOG =0	6.06	87.87	6.06
TOGNOG = 1	7.31	87.8	4.88
TOGNOG = 2	9.37	81.25	9.37

Table 10a: 1972-1981, K-means, 3 clusters.

Cluster	Number of cases	BM average	EXPIMP average	TOG average
1	22	2.6 (0.23, 4.21)	2.65 (0.64, 4.49)	0.6818
2	59	0.12 (-0.84, 1.81)	0.73 (-0.79, 2.99)	0.5789
3	23	-0.95 (-2.28, 0.33)	-0.84 (-5.07, 0.14)	0.5217

Table 10b.

Value of the political variable	Prob. for a case to belong to cluster 1 (%)	Prob. for a case to belong to cluster 2 (%)	Prob. for a case to belong to cluster 3 (%)
TOG = 0	16.66	57.14	26.19
TOG = 1	25	55	20
TOGNOG = 0	16.66	57.14	26.19
TOGNOG = 1	15.79	73.68	10.53
TOGNOG = 2	29.26	46.34	24.39

Table 11a: 1972-1981, hierarchical agglomerative, Ward, City Block, 3.

Cluster	Number of cases	BM average	EXPIMP average	TOG average
1	19	2.8 (0.23, 4.21)	2.75 (0.64, 4.49)	0.6842
2	67	0.15 (-0.84, 1.81)	0.7 (-1.01, 2.99)	0.5692
3	18	-1.15 (-2.28, -.31)	-0.96 (-5.07, 0.14)	0.5556

Table 11b.

Value of the political variable	Prob. for a case to belong to cluster 1 (%)	Prob. for a case to belong to cluster 2 (%)	Prob. for a case to belong to cluster 3 (%)
TOG =0	14.28	66.66	19.05
TOG = 1	21.66	61.66	16.66
TOGNOG =0	14.28	66.66	19.05
TOGNOG = 1	10.53	78.95	10.53
TOGNOG = 2	26.83	53.65	19.51

Table 12a: the 80s, hierarchical agglomerative, Ward, City Block, 3.

Cluster	Number of cases	BM average	EXPIMP average	TOG average
1	20	1.41 (0.64, 2.91)	1.11 (-0.11, 1.9)	0.7
2	62	-0.22 (-1.5, 0.73)	0.08 (-2.16, 2.81)	0.6167
3	23	-2.04 (-3.96, -.77)	-1.18 (-5.04, -.21)	0.7273

Table 12b.

Value of the political variable	Prob. for a case to belong to cluster 1 (%)	Prob. for a case to belong to cluster 2 (%)	Prob. for a case to belong to cluster 3 (%)
TOG =0	17.14	65.57	17.14
TOG = 1	20.89	55.22	23.88
TOGNOG =0	17.14	65.71	17.14
TOGNOG = 1	32.14	39.28	28.57
TOGNOG = 2	12.82	66.66	20.51

Table 13a: the 80s, K-means, 6 clusters.

Cluster	Number of cases	BM average	EXPIMP average	TOG average
1	10	1.94 (1.35, 2.91)	1.06 (-0.11, 1.9)	0.6
2	24	0.4 (-0.37, 1.07)	1.09 (0.37, 2.81)	0.75
3	23	0.09 (-0.77, 0.73)	-0.62 (-2.16, 0.12)	0.6364
4	27	-0.69 (-1.5, - 0.3)	0.089 (-0.91, 0.95)	0.5385
5	20	-2.13 (-3.96, -1.3)	-0.98 (-1.94, -0.2)	0.7368
6	1	-2.56	-5.04	1

Table 13b.

Value of the political variable	Prob. for a case to belong to cluster 1 (%)	Prob. For a case to belong to cluster 2+3+4 (%)	Prob. for a case to belong to cluster 5+6 (%)
TOG =0	11.43	74.28	14.28
TOG = 1	8.95	68.65	22.38
TOGNOG =0	11.43	74.28	14.28
TOGNOG = 1	14.28	60.71	25
TOGNOG = 1	5.12	74.36	20.51

Table 14: the 80s without Germany 91 and 92, K-means, 6 clusters.

Value of the political variable	Prob. for a case to belong to cluster 1 (%)	Prob. for a case to belong to cluster 2+3+4 (%)	Prob. for a case to belong to cluster 5+6 (%)
TOG =0	13.51	74.28	14.28
TOG = 1	10.76	68.65	22.38
TOGNOG =0	13.51	71.42	14.28
TOGNOG = 1	11.53	61.53	26.92
TOGNOG = 1	10.25	69.23	20.51

FIGURES.

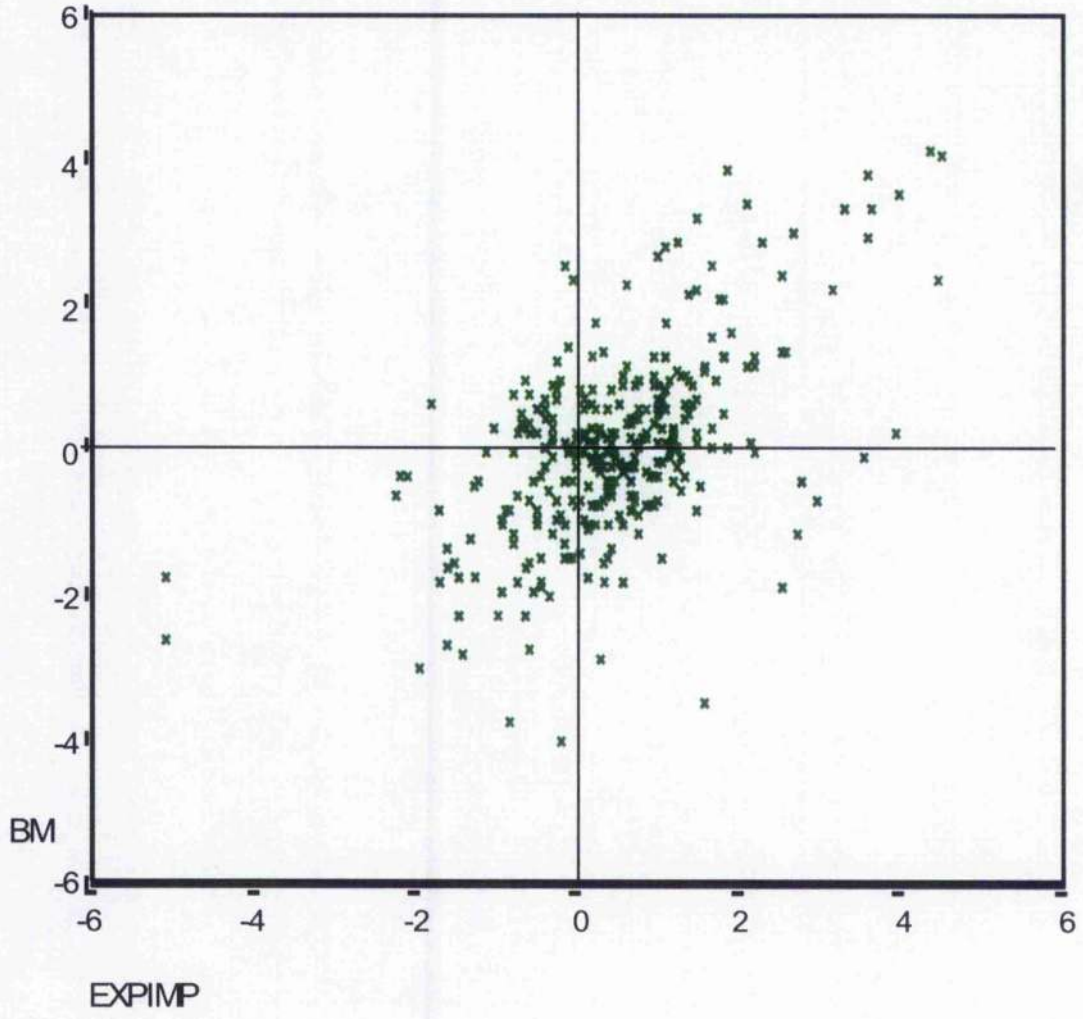

Figure A: sample cases in the EXPIMP-BM space.

Figura 5

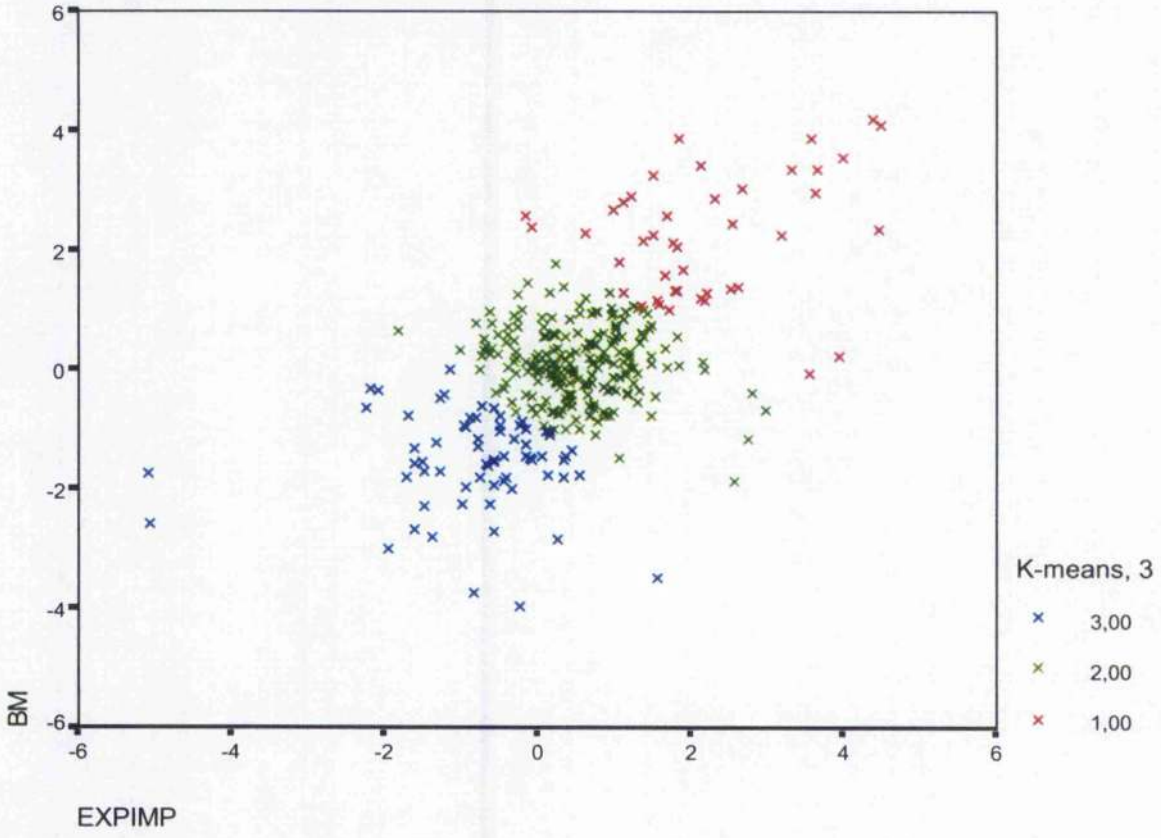

Figure 5: whole sample, K-means clustering, 3 clusters.

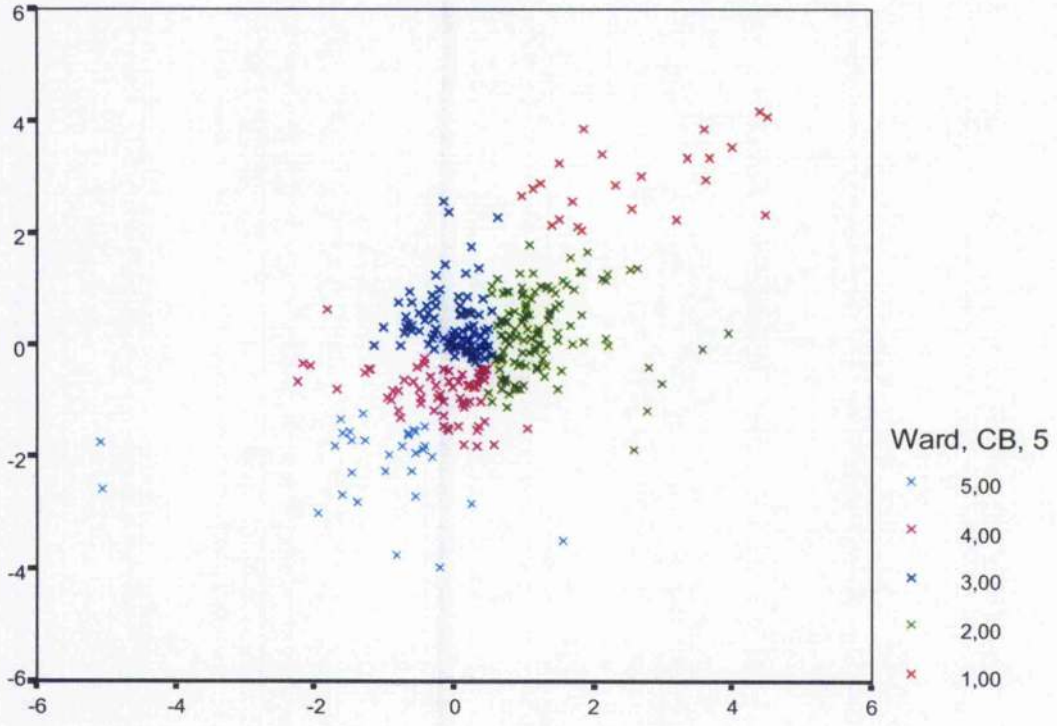

Figure 7: whole sample, hierarchical agglomerative, Ward, City Block, 5 clusters.

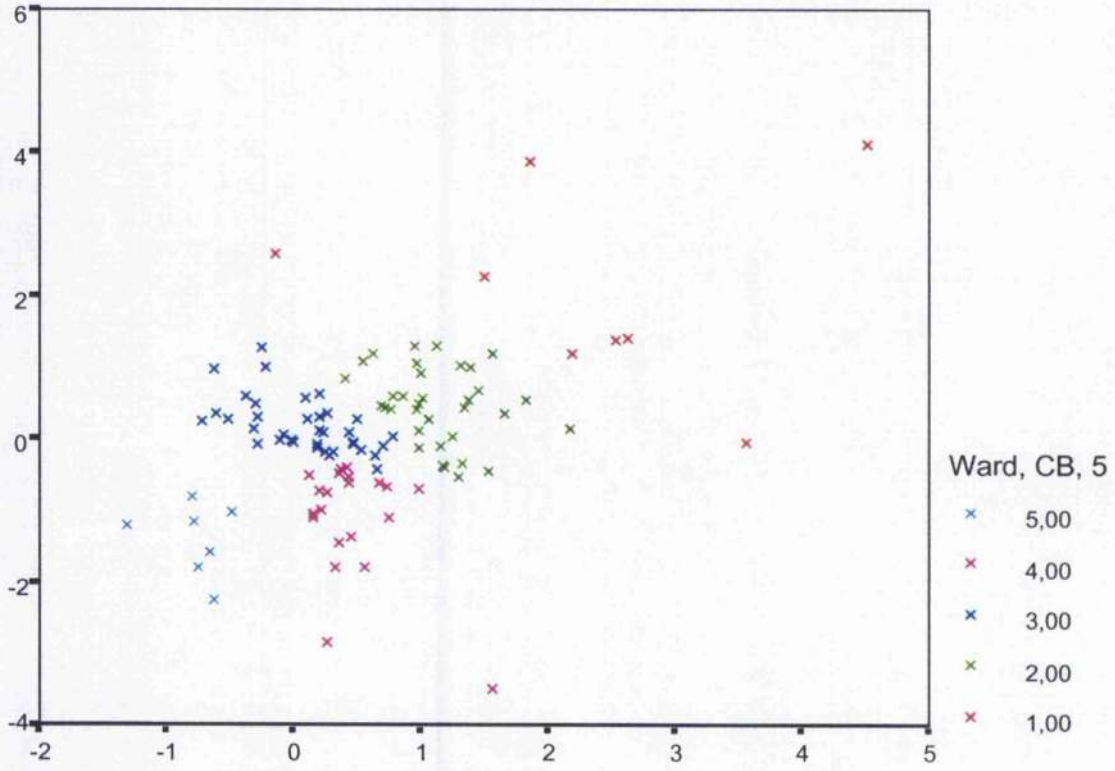

Figure 9: 1962-1971, hierarchical agglomerative, Ward, City Block, 5 clusters.

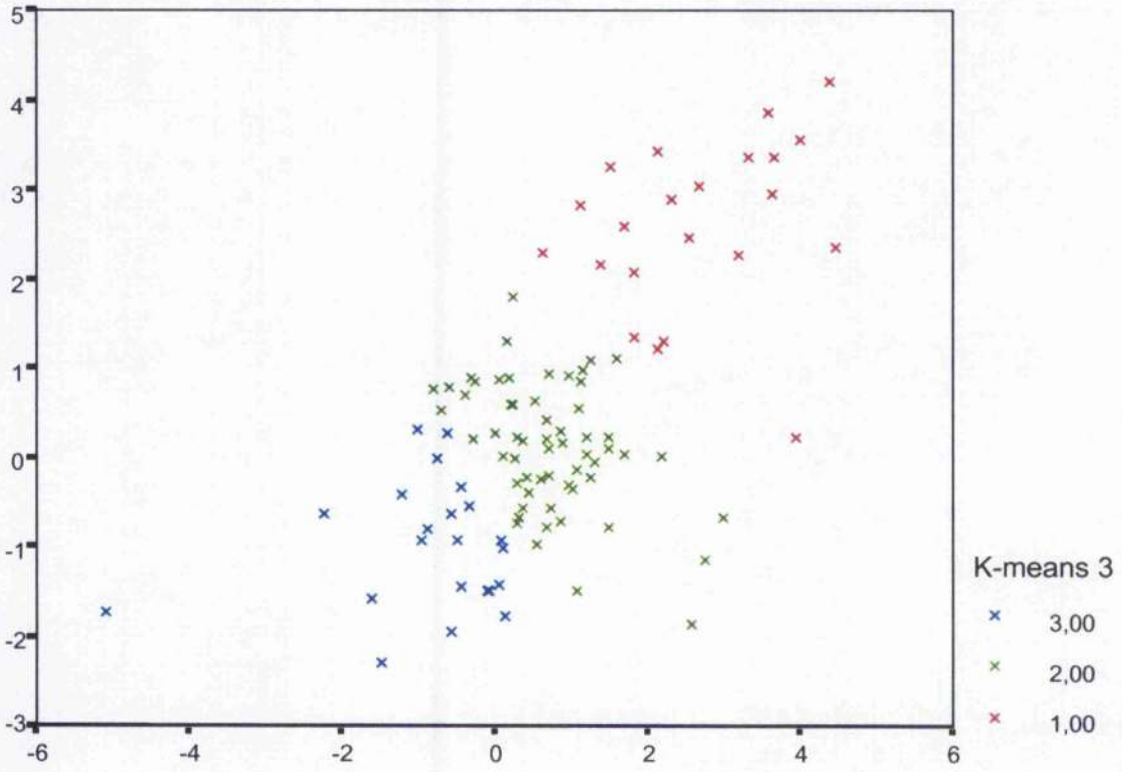

Figure 10: 1972-1981, K-means, 3 clusters.

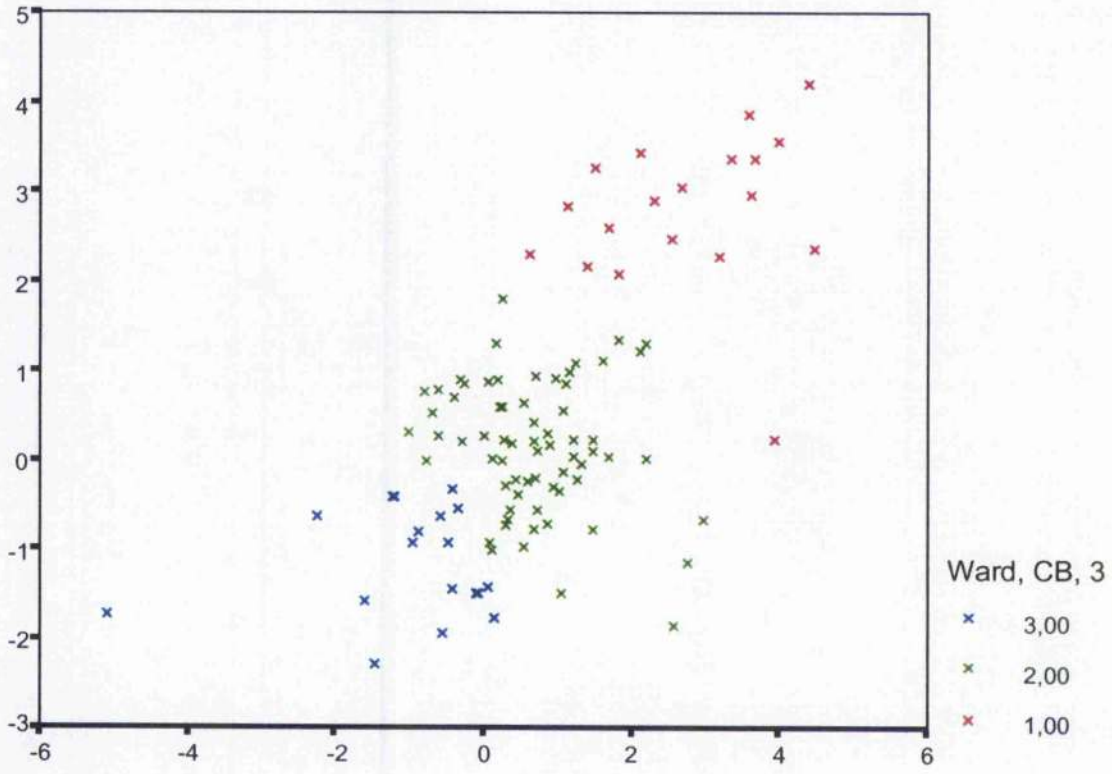

Figure 11: 1972-1981, hierarchical agglomerative, Ward, City Block, 3 clusters.

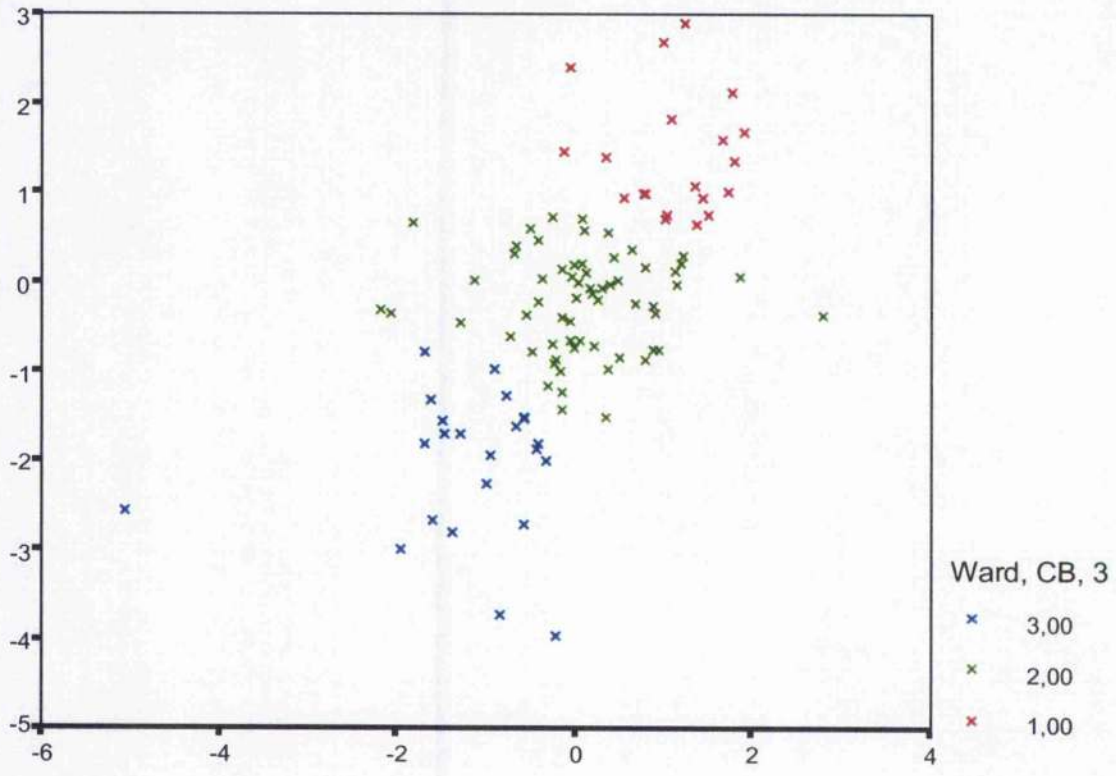

Figure 12: the 80s, hierarchical agglomerative, Ward, City Block, 3 clusters.

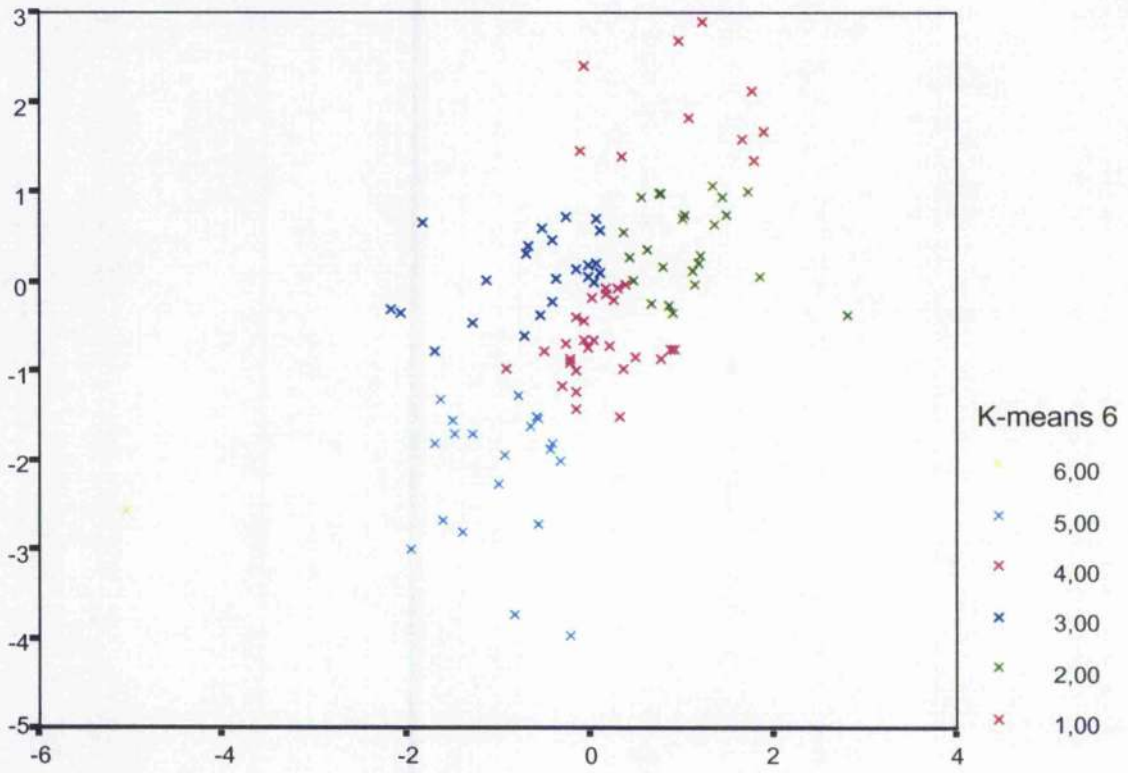

Figure 13: the 80s, K-means, 6 clusters.

Chapter 3.

THE DEGREE OF SUBSTITUTABILITY BETWEEN GOVERNMENT AND PRIVATE CONSUMPTION: AN EMPIRICAL ANALYSIS USING ITALIAN LONG TIME SERIES (1862-1996).

1. Introduction.

In recent years a number of empirical works have attempted to estimate the degree of substitutability between private and government consumption in different countries and for different periods of time.

The interest in the subject is clearly connected to the relevance of this parameter within the so-called neoclassical approach to fiscal policy. The textbook treatment of this approach implicitly does not consider G[1] as a substitute for C, but Barro (1981) among others has pointed out that some of the conclusions of the theory about the effects of fiscal policy are dependent on that assumption. In fact, if the degree of substitutability between private and government consumption were (close to) 1, there would be important implications:

1) unexpected temporary and permanent changes in public spending on goods and services would have the same (null) effect on aggregate demand;
2) there would be no difference in the timing of the effects of an announced and an unexpected change in the level of public spending.

This is because when private and public consumption are perfect substitutes, there is no permanent income effect at work, but always, i.e. in the temporary as well as in the permanent case, a substitution effect.

These effects work in the same direction in the case of a permanent change in the value of government spending in goods and services, that is, they both imply that a rise in public consumption causes a one-to-one decrease in private consumption[2]. When G perfectly substitutes for C, it is as if there were not any changes in households' permanent income, as

[1] G will stand for government consumption throughout the analysis.
[2] I make reference here to the model where labour supply is assumed to be inelastic. See par.7 for considerations on the extension where labour supply is elastic.

no resources are subtracted to the private sector by government, who simply takes and gives back the same amount. Households simply take into account that part of the goods they wish to consume are provided by government, hence they simply consume the amount of private goods determined by maximising their utility minus what they are given by the government. When one considers temporary changes, however, if G does not substitute for C the permanent income effect, though present, is negligible, so that private consumption stays the same and there is a one-to-one increase in aggregate demand. In the case of perfect substitutability, instead, households behave exactly as in the case of a permanent change[3].

As for the difference between the effects of an announced and an unexpected change in government expenditure on goods and services, when a permanent income effect is at work consumption is affected by any news about it as soon as they are available. But when it is not, which is the case when there is perfect substitutability between G and C, there is no reason why this should be. If government announces a cut in public consumption in next year's budget, households will respond by increasing their consumption next year, so that there is no announcement effect.

The above implications are relevant to both policy-makers and economists. The first one, in particular, points out that the type of goods a government decides to buy is crucial in determining the effects of fiscal policy, and this is not just with reference to the distinction between capital and consumption goods[4], but also to the *different types* of consumption goods. An unexpected and temporary increase in spending in defence is likely to cause a temporary increase in aggregate demand, while greater purchases in, say, education will probably have no effect at all, as private consumption will correspondingly decrease.

As for the second implication, it is worth remembering here the large number of empirical works on consumption aiming at testing one of the most peculiar results of the Permanent Income Hypothesis, namely the fact that changes in permanent income determine changes in consumption starting at the time the information about those changes is made available, not when they actually occur (Hall (1978), Flavin (1981), Hayashi (1982), Campbell and Mankiw

[3] The intermediate case of imperfect substitutability is marked by a less than one-to-one change in aggregate demand.

[4] Traditional keynesian analysis of the effects of government spending on the economy states that such effects are the same no matter the type of spending, hence the fact that no distinction is made between government consumption and government investment. This is related to two of the main features of this approach, i.e. consideration of the very short run and disregard towards the effects on aggregate supply, which is due to the assumption that economies are generally not at full employment. On the contrary, the neoclassical school assumes agents are rational and optimise over infinite horizons, and all markets, including the labour one, are in equilibrium, hence considering what type of spending a government does is of great importance. As far as the analysis of private consumption is concerned, while government investment does not produce any effect, a rise in government consumption affects agents' choice between consumption and saving via a permanent income and/or a substitution effect.

(1989)). Aschauer (1985), adopting the Euler Equation approach, points out that interpreting the significance of changes in t-1 variables on changes in consumption at t as excess sensitivity of consumption, hence failure of the PIH as a sensible explanation of consumption decisions, may be wrong if those variables contain news about future changes of government spending on goods and services and G substitutes for private consumption. In this case, in fact, there is a substitution effect that operates at the time of the implementation of the change in fiscal policy, whether or not it is a surprise change.

So far the attempts at estimating the degree of substitutability between government and private consumption have mainly used US quarterly data starting around 1950. The parameter has been estimated to be between 0.2 and 0.4, but most results have proved to be disappointing from the point of view of their robustness. To my knowledge, there are very few works in this research area using series referring to Italy. Here, too, estimates vary a great deal, which may be due only in part to the fact that the different authors consider partially different time periods. These never go further back than 1960. Although there exists some empirical literature on consumption in Italy using long time series (Modigliani and Jappelli (1987)) it does not consider the possibility that government spending may substitute for private consumption.

For both these reasons, therefore, I have come to conceive this work, the object of which is to try to estimate the degree of substitutability between public and private consumption using data for Italy covering the 1860-1996 period. I will make a distinction between different types of government spending: this is also quite new in the literature concerning the Italian case. In fact, only Levaggi (1999) decomposes government consumption, but this is in the context of a micro specification.

The article is organised as follows: par.2 reviews the literature on the subject; par.3 presents the derivation of the regression equation; par.4 justifies the choice of the Generalised Method of Moments as estimation technique; par.5 presents the time series used; par. 6 summarises the results; par.7 discusses some more issues related to the subject; par.8 concludes.

2. Survey of the literature on the substitutability between government and private consumption.

I will only report here about the contributions making reference to the macro literature on consumption and using aggregate data, as this is the context this work fits in[5]. This literature is closely connected to the empirical tests checking the validity of the Permanent Income Hypothesis plus Ricardian Equivalence (hereafter PIH+RE) that were so popular in the 80s. Curiously, the authors of these contributions were not always aware of the necessity to translate the advances in the consumption theoretical literature into their specifications, but adopted rather ad-hoc models with no role for future variables, no clear distinction between expected an unexpected changes in them and, as far as G is concerned, no distinction between permanent income and substitution effect. One of the most influential works of this kind is Kormendi (1983). He aims at verifying the effects in consumption of a change in fiscal policy, presumably unexpected and temporary. His model is the following:

$$\Delta C_t = a_0 + a_{11}\Delta Y_t + a_{12}\Delta Y_{t-1} + a_2\Delta G_t + a_3\Delta W_t + a_4\Delta TR_t + u_t$$

where C is private consumption of nondurables and services plus an imputed flow from the stock of durables, Y is NNP, W is private wealth (including human wealth), TR is transfers and G is government spending on goods and services. According to the author, ΔY_t, ΔY_{t-1} and ΔW_t enter the specification for their informational contents with respect to changes in permanent income, transfers to account for eventual redistributional effects of fiscal policy. As for ΔG_t, contrary to most contributions up to then, the author explicitly takes in consideration the possibility that there may be some degree of substitutability between public and private consumption, and sets his expectations about the sign of the parameter estimate accordingly: if G perfectly substituted for C, a_2 should capture exactly this substitution effect and should therefore be expected to be -1[6].

The result obtained by estimating the above model by OLS and using US data over the 1930-1976 period shows estimated coefficients for all variables that are significant and consistent

[5] The subject has been dealt with also by the micro literature, but the starting point, i.e. the utility function used there, is different, since much more emphasis is placed on non rivalry as a peculiar characteristic of publicly provided goods.

[6] Kormendi abstracts from the problem related to the fact that if current ΔG has informational content also about future values for the same variable, the relative parameter is a composite one and cannot be interpreted directly as the degree of substitutability.

with the neoclassical approach to fiscal policy. $\hat{a}_2$ is however rather small, -0.23, which does not speak in favour of the thesis of perfect substitutability[7]. How should we interpret such a finding? As it is impossible to say if the changes in G in the period in question were all perceived as *very* temporary, it is difficult to say if their permanent income effect was really negligible. If we could say that, perhaps we could still interpret a_2 as a measure of substitutability between C and G. Here, instead, it is a composite parameter summarising both permanent income and substitution effect. As these both go in the same direction, it means the degree of substitutability is even smaller than –0.23[8].

In a further investigation, Kormendi substitutes government spending on goods and services with three regressors: public spending in defence (possibly a proxy for government consumption in defence[9]), government investment and government spending in nondefence minus government investment as a proxy for government civil consumption. An OLS regression on the same sample as before gives, not surprisingly, an estimated coefficient for government investment that is not significantly different from 0; the parameter associated to public consumption in defence is –0.23 and the one for government nondefence consumption is –0.28. Their relative magnitude is correct, but they are not very different values, as one should expect[10]. Besides, this result is said to be not very robust to sample changes. This was to be the big problem of all later contributions: even those having a closer link between their model and theory, allowing for a clearer interpretation of the parameters, would show a marked instability in the value for the one measuring the substitutability between public and private consumption.

As anticipated, Aschauer (1985) adopts the Euler Equation approach to test for PIH+RE. Therefore, his approach to specification has a better theoretical foundation than Kormendi's.

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[7] The estimation of a second specification, nesting the predictions of both the neoclassical thesis and the standard model of keynesian origin confirms the validity of the former. The estimated parameter for ΔG does not change much. Graham (1995) re-estimates this second model using labour income and taxes as regressors, stating that if W is included net capital income is already accounted for. His results are less favourable to PIH+RE, but the standard model is not confirmed in its prediction of no role for ΔG, though its coefficient estimate is quite small. Kormendi and Meguire (1995) reply using: 1) a different way of separating labour and capital income; 2) revised data for the 1930-1976 sample; 3) addition of 16 more years. PIH+RE is confirmed again and the estimated parameter for ΔG is still –0.23.

[8] Note 6 highlights a second reason why a_2 should not be interpreted as a measure of the direct crowding out between current government and private consumption

[9] This is not, however, the interpretation Kormendi gives to this regressor. In his view, defence spending is "dissipation", not proper consumption.

[10] Notice however that if the coefficients in question are composite ones, including some permanent income effect, one should expect that the one associated with government spending in nondefence be much smaller only if the permanent income effect of changes in government consumption in defence is the same or smaller than the one associated with changes in government consumption in nondefence. This may not be so in the given sample.

He innovates Hall's (1978) model by starting from the generic utility function, first proposed by Barro (1981):

$$u(C_t^*) = u(C_t + \theta G_t)$$

where C^* is effective consumption of nondurables and services, C is private consumption, G is per capita public consumption and θ measures how much the latter substitutes for the former. This utility function was to be the starting point of almost all later works in the field[11]. Aschauer assumes quadratic utility, and therefore derives from the Euler Equation the following consumption function:

$$C_t = \alpha + \beta C_{t-1} + \beta\theta G_{t-1} - \theta E(G_t) + u_t$$

He then estimates this together with an auxiliary equation expressing how G_t is predicted by agents. Assuming this equation is:

$$G_t = \gamma + \varepsilon(L)G_{t-1} + \omega(L)D_{t-1} + v_t$$

where D stands for government deficit and L is the lag operator, substitution of the latter equation in the former originates the new specification:

$$C_t = \delta + \beta C_{t-1} + \eta(L)G_{t-1} + \mu(L)D_{t-1} + u_t$$

where:

$$\delta = \alpha - \theta\gamma$$

$$\eta_1 = \theta(\beta - \varepsilon_1)$$

$$\eta_i = -\theta\varepsilon_i \qquad i = 2,...n$$

$$\mu_j = -\theta\omega_j \qquad j = 1,2,...m$$

[11] An exception is Bean (1986), whose utility function also includes leisure. His estimate for θ, using US quarterly data over the 1949-1979 period, is 0.3.

What Aschauer actually does is to set n=m=2 and then to estimate the system by FIML, using US data from 1948:I to 1981:IV. He performs a log-likelihood ratio test to check the validity of the above restrictions. The data are incapable of rejecting the null hypothesis of their validity, so the constrained model estimates are good. As I have partly already anticipated, these support the PIH+RE hypothesis in that, apart from lagged private and government consumption, only the lagged variables able to predict G_t enter the Euler Equation significantly. My main interest in the whole story is however the fact that in the constrained model one of the estimated parameters is θ, the very substitutability parameter. Its value is estimated to be around 0.23: a small value, similar to the estimates in Kormendi (1983). Still, the result does not appear to be robust: $\hat{\theta}$ tends to rise with the number of included lags of government consumption and deficit, to as much as 0.42 with the inclusion of two more years. This is clearly no good news. Graham (1993) replicates and finds pronounced parameter instability also to changes in the sample.

He suggests that the problem with Aschauer's results lies in the fact that his specification does not include disposable income, YD. In fact, Graham shares the same approach to the PIH+RE question as Campbell and Mankiw (1989), i.e. he nests the assumption by which all households are rational consumers within a model framework allowing for a proportion of them (to be estimated) to be liquidity constrained. However, his IV estimates of the suggested specification[12]:

$$\Delta C_t = \alpha - \theta \Delta G_t + \lambda \Delta YD_t + u_t$$

using the same US data as in Aschauer and obtaining $\hat{\theta} = 0.15$, do not reach robustness, either. The author then suggests that a further problem may be the use of total government consumption as a regressor, because in the course of time the composition of government consumption has changed greatly. He therefore estimates, using the same methodology and data (three different subsamples, one of which extended to include the 80s), the following model:

$$\Delta C_t = \alpha - \theta_1 \Delta GFC_t - \theta_2 \Delta GFD_t - \theta_3 \Delta GSL_t + \lambda \Delta YD_t + u_t$$

[12] This model is the same as in Aschauer (1985) if we set $\beta = 1$, which is sensible in the light of Aschauer's estimate, and $\lambda = 0$. Graham proves the latter restriction is not supported by the data.

where GFC is federal nondefence expenditure on goods and services, GFD is federal defence and GSL is state and local public consumption. $\hat{\lambda}$ always is estimated to be around 0.3, speaking in favour of the thesis by which not all consumers are able to behave as in the neoclassical model[13]. As for the various thetas, $\hat{\theta}_2$ is never significantly different from 0. So is $\hat{\theta}_3$, to the surprise of the author[14], while $\hat{\theta}_1$, when significant, is quite high (from 0.5 to 0.8) but in the sample 1969:I-1990:IV it is not significantly different from 0. The question of parameter stability remains unsolved.

Graham's suggestion to substitute distinct components of government consumption for the aggregate measure is followed by Darby and Malley (1996). Their specification, directly deriving from Aschauer (1985) but not adopting the Euler Equation approach, also allows for the construction of the degree of substitutability between private consumption and *total* government consumption. This is a time-varying measure which is a weighted average of the current amounts of the different components of G (federal defence, federal nondefence and state and local), where the weights are given by their estimated coefficients. These estimates, derived using GMM on US quarterly data for the period 1953:3-1993:3, are found to be robust in within-sample recursive estimations, a clear improvement with respect to earlier contributions[15]. This is the reason why I follow their model derivation here; I will make extensive reference to their work in par.3.

As for their results, since the coefficients of defence and nondefence G are estimated to be negative and positive respectively, the time-varying θ is sensitive to the relative importance of defence in government consumption, being lower before and in times of war. This explains its trend: rising from 0.1 up to 0.35 in the 1953-1975 period (with a slump in the 60s marking the Vietnam War), and then falling to 0.27 under the Reagan administration to later stabilise on a slightly higher value.

As far as the literature using data from other countries is concerned, Nicoletti (1991) starts from a different model, derived from Theil's differential approach (1976), enabling him to consider the relevance of the Hicksian correction and the possible effect of the real interest rate on consumption as well as PIH+RE and substitutability. He uses annual data over the

[13] However, Aschauer (1993) shows that if the restriction by which income and taxes share the same parameter (deriving by the use of YD as regressor) is removed, the two variables have markedly different parameter estimates, with the one associated to taxes not significantly different from 0, so that one of the major conclusions of the neoclassical approach is verified.

[14] In Graham (1995) the author introduces the idea that disposable income should be disposable labour income. In addition, he suggests reasons why in the US state and local government consumption tends to cause problems when included, and re-estimates using only total federal expenditure on goods and services. He finds its parameter estimate is small.

1961-1985 period referring to a number of OECD countries. His conclusion is that a significant and positive estimated θ is typical of the US only. In the OLS and IV regresssions referring to most other countries he considers it is not significant, while it is significant but negative for Germany and Italy, which, he suggests, may be due to the fact that government consumption has distributional effects in those countries. Notice however that his series are very short and therefore his findings subject to a problem of lack of degrees of freedom.

Leiderman and Razin (1988) is interesting for their innovative derivation of a model[16]. Their results, obtained by NLQ on a system of equations: the consumption function and the stochastic processes governing the evolution of its determinants (labour income, taxes and government consumption) and using monthly Israeli data from 1980-1985, are however puzzling as far as the estimate for θ is concerned, as it turns out to be negative and quite high (-0.47). The only explanation offered is a hint at improper measurement of government consumption in their data set.

Following a similar approach, Khalid (1996) investigates the PIH+RE and substitutability issues for a number of developing countries. In most cases, the value for θ is estimated to be not significantly different from 0; for some countries it is negative and only for Brazil it is positive and very high (not significantly different from 1!).

To my knowledge, the only works in this research area using series referring to Italy are Nicoletti (1991), Rossi (1991), and Levaggi (1998,1999). In spite of the fact that Rossi adopts a similar specification, derived from the micro literature, to the one in Nicoletti, his estimated degree of substitutability between public and private consumption for Italy is 0.2. He uses NLS on quarterly data over the 1971-1982 period. Levaggi (1998) adopts a rather ad-hoc specification where the regressors are lagged private consumption and current and lagged disposable income, financial wealth and public consumption (all in logs)[17]. NLS is used on data over the 1960-1994 period, and the estimated parameter for permanent public consumption is found to be positive but not significantly different from 0. Again, distributional issues are hinted at in order to explain the puzzling sign of the estimate. In a second, micro-based contribution dedicated to the subject and using the same data set, however, Levaggi (1999) does find that a certain category of government consumption, what

[15] State and local government consumption does not seem to be as problematic a regressor here as in Graham (1993).

[16] The authors nest PIH-RE within a specification allowing to account for possible deviations from it both in terms of agents with finite time horizons and no altruism (making reference to Blanchard's model (1985)) and of presence of liquidity constraints. They find that PIH+RE cannot be rejected.

[17] It is a non-linear specification as it derives from the substitution into a linear model, including only current permanent disposable income, wealth and permanent government spending, of Friedman's definition of

she defines as impure public goods (education, health and social security), directly crowds out at least a subset of private consumption, namely food, drink, alcohol, clothing and footwear [18], while pure public goods do not. Her model is a variation of the Linear Expenditure System function in which the fact that publicly provided goods may be rationed goods is taken account of, and these are allowed to be non-separable from other goods. The expenditure elasticity evaluated at the sample mean of a change in the quantity of impure public goods provided is –0.10, a small effect. The other two subsets of private consumption, namely housing, renting, furniture and fuel on one hand and leisure goods, transport and communications on the other, are also found to be unaffected by the size of government consumption in pure public goods, but are puzzingly found to be positively related to how much a government spends to provide impure public goods.

3. From model to specification.

Almost all theoretical work about the degree of substitutability between private and public consumption starts from the following generic utility function[19]:

$$u(C_t^*) = u(C_t + \theta G_t) \qquad (1)$$

where C^* is effective per capita consumption of nondurables and services, C is per capita private consumption, G is per capita public consumption and θ measures how much the latter substitutes for the former[20]. This parameter is 0 in the standard neoclassical treatment of fiscal policy (i.e. in the Ramsey model), but in the extension I am considering here it may take any value within the range [0, 1], with $\theta = 1$ implying perfect substitutability[21]. I also take account of the fact that the value for θ may depend on the size and composition of public

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permanent disposable income and a similarly constructed measure of permanent government spending on goods and services. Future variables play no role, as this is not a context of rational, but adaptive expectations.

[18] Estimates of the non-linear model are obtained using a maximum likelihood method.

[19] Notice leisure does not enter this utility function. Recently, the necessity to treat the effects of fiscal policy on private consumption and leisure jointly has been emphasised; see par.7.

[20] If G were pure public goods, i.e. their consumption were characterised by non-rivalry, it would be appropriate to model utility as dependent on total, not per capita public goods. Barro (1981) however claims that G is much more often composed by private goods, and that the analysis would not be altered appreciably if some elements of nonrivalry were introduced.

[21] Imperfect substitutability would not necessarily imply that G is valued less than privately produced goods. In fact, we neglect here the possible presence of an additional term in the utility function accounting for "other effects" of G on agents' utility. The standard assumption is that this term enters separably, so that it does not influence consumption decisions.

consumption, and may therefore vary over time. Following Darby and Malley (1996), this is done by assuming that it may be written as:

$$\theta_t = \gamma_1 \frac{G_t^d}{Y_t} + \gamma_2 \frac{G_t^{nd}}{Y_t} \qquad (2)$$

where G^d and G^{nd} are government consumption in defence and nondefence areas respectively, Y is GDP and so dividing both components of public consumption by it may be intended as a normalisation. Each component increase implies simultaneous effects on the level and composition of public consumption[22]: the former may have a negative impact on θ[23], while the sign of the impact of the latter is negative for G^d, positive for G^{nd}. The prediction is therefore that $\gamma_1 < \gamma_2$, and, if one assumes that the composition effect is stronger than the level effect, one should also find $\gamma_1 < 0$ and $\gamma_2 > 0$.

The distinction between defence and nondefence government consumption is not the only possible and interesting one. As I have already mentioned, Levaggi (1999) distinguishes between pure and impure public goods. I have also attempted at replicating this approach; however, lack of reliable data for the period before 1960 makes it not so successful (see par. 5.1, Data Appendix and par. 6).

Following Darby and Malley (1996) I opt for a very standard functional form for the utility function of the representative agent:

$$u(C_t^*) = -\frac{1}{2}(C^{**} - C_t^*)^2 \qquad (3)$$

in which utility decreases as the Euclidean distance between total consumption and bliss consumption C^{**} increases[24]. Intertemporal utility is just the actualisation of present and

[22] An increase in, say, defence consumption, ceteris paribus, determines an increase in the G/Y ratio and a redefinition of the proportions of defence and nondefence spending in goods and services.

[23] This is, at least, Barro's (1981) view, who however does not justify his statement. One can think he has "waste" in mind: the greater G, the greater the diseconomies of scale in the production of public goods.

[24] Quadratic utility functions have been widely used in the literature, in spite of the fact that they are quite specific and have strong implications such as increasing absolute risk aversion and absence of precautionary saving (Deaton (1992)). They are in fact quite convenient, in that they allow to find closed form solutions to intertemporal utility maximisation problems. In order for local non-satiation to hold, the bliss point is assumed not to lie inside the feasible set of consumption bundles. It is interesting to notice that while the literature on

future utilities, i.e. there is a standard assumption of a time separable intertemporal utility function.

Period t budget constraint is given by

$$C_t = (N_t - T_t - SC_t) + W_t - (1+r)^{-1} W_{t-1} \qquad (4)$$

where W_t is the net stock of total wealth (including public bonds) at the end of period t-1, N is income, T is taxes net of transfers, SC is social contributions net of benefits and r is the interest rate. Here I consider not only financial, but also real wealth and, as far as disposable income is concerned, it is not, as in Darby and Malley, N-T, that is non-property income minus taxes, but N-T-SC, that is net labour income. The difference lies in the treatment of social contributions net of benefits, which are here excluded. The reason is that in Italy pensions have always been a public area of action, with a pay-as-you-go scheme as the only method of financing. This means that social contributions and benefits are not so different from taxes and transfers, and so the government time t budget constraint should not be written in the standard way:

$$T_t = G_t + B_t - (1+r)^{-1} B_{t+1} \qquad (5)$$

where B_t is public debt at the end of period t-1, but as:

$$T_t + SC_t = G_t + B_t - (1+r)^{-1} B_{t+1} \qquad (6)$$

The intertemporal government budget constraint, assuming a no Ponzi game condition holds, is therefore:

$$\sum_{j=0}^{\infty} (1+r)^{-j} (T_{t+j} + SC_{t+j}) = \sum_{j=0}^{\infty} \left[(1+r)^{-j} G_{t+j} \right] + B_t \qquad (7)$$

Substituting it into the representative agent's intertemporal budget constraint, obtained imposing again a solvency condition:

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consumption tout court has long been concerned with finding alternative utility functions, the more specific one on the effects of fiscal policy on consumption has not.

$$\sum_{j=0}^{\infty}(1+r)^{-j}C_{t+j}=\sum_{j=0}^{\infty}\left[(1+r)^{-j}(N_{t+j}-T_{t+j}-SC_{t+j})\right]+W_t \qquad (8)$$

the consolidated intertemporal budget constraint obtains:

$$\sum_{j=0}^{\infty}(1+r)^{-j}C_{t+j}=\sum_{j=0}^{\infty}\left[(1+r)^{-j}(N_{t+j}-G_{t+j})\right]+W_t-B_t \qquad (9)$$

This is the same as the one in Darby and Malley, but only if I define N as just gross labour income, not as non-property income (including both gross labour income and net social contributions).

By consolidating the public and private intertemporal budget constraints one implicitly takes the Ricardian Equivalence for granted.

Adding $\sum_{j=0}^{\infty}\theta_{t+j}G_{t+j}$ on both left and right hand side of the above consolidated intertemporal budget constraint is the same as rewriting it in terms of a constraint on the actualised stream of total, not just private consumption. I am therefore able to write down the maximisation problem a representative consumer with perfect foresight must solve:

$$\max \sum_{j=0}^{\infty}(1+\delta)^{-j}\left[-\frac{1}{2}(C^{**}-C^{*}_{t+j})^2\right]$$

$$s.t.\ \sum_{j=0}^{\infty}(1+r)^{-j}C^{*}_{t+j}=\sum_{j=0}^{\infty}\left[(1+r)^{-j}[N_{t+j}+(\theta_{t+j}-1)G_{t-j}\right]+(W_t-B_t) \qquad (10)$$

where δ is the rate of time preference. Manipulations of the FOC give the optimal level of effective consumption he chooses at time t[25]:

$$C^{*}_{t}=\frac{\delta-r}{r(1+r)}C^{**}+\frac{r^2+2r-\delta}{(1+r)^2}\left[(W_t-B_t)+\sum_{j=0}^{\infty}[(1+r)^{-j}(N_{t+j}+(\theta_{t+j}-1)G_{t+j})]\right] \qquad (11)$$

[25] A pretty detailed description of all the manipulations needed to solve the consumer's problem is to be found in Appendix A of Darby and Malley (1996).

and through substitution of C_t^* by its components and further easy manipulation the solution in private consumption obtains:

$$C_t = \beta_o - \theta_t G_t + \beta_1 \left[(W_t - B_t) + \sum_{j=0}^{\infty} [(1+r)^{-j} (N_{t-j} + (\theta_{t+j} - 1) G_{t+j})] \right] \tag{12}$$

where

$$\beta_0 = \frac{\delta - r}{r(1+r)} C^{**} \tag{13}$$

and

$$\beta_1 = \frac{r^2 + 2r - \delta}{(1+r)^2} \tag{14}.$$

Introducing uncertainty and assuming rational expectations makes the problem only slightly different. The solution is the following:

$$C_t = \beta_o - \theta_t G_t + \beta_1 \left[(W_t - B_t) + E_t \sum_{j=0}^{\infty} [(1+r)^{-j} (N_{t+j} + (\theta_{t+j} - 1) G_{t+j})] \right] + \varepsilon_t \tag{15}$$

where E_t is the expectations operator conditional on information available at time t and ε is a white noise disturbance. Notice that the combination of terms in square brackets, i.e. the sum of today's wealth net of public bonds and present and future net labour incomes, may be interpreted as permanent income as evaluated at time t.

This is a nice closed-form solution to the representative agent's maximisation, but from the point of view of its estimation it presents the relevant problem of a series of terms, the expectations about future values of N and G, that are unobservable. One way out of this problem has been suggested by Hayashi (1982) and adopted by Darby and Malley; I will stick to their choice, leaving to future work to find out alternative solutions.

Following Hayashi, if I define H_t in the following way:

$$H_t = E_t \sum_{j=0}^{\infty} \left[(1+r)^{-j} (N_{t+j} + (\theta_{t+j} - 1) G_{t+j}) \right] \tag{16}$$

I can manipulate the solution to the utility maximisation problem to obtain:

$$H_t = \frac{1}{\beta_1} \left[C_t - \beta_0 - \beta_1 (W_t - B_t) + \theta_t G_t - \varepsilon_t \right] \tag{17}$$

Now consider that, as a series, H_t has a relation to the same series starting at t-1:

$$H_t = (1+r) \left[H_{t-1} - N_{t-1} - (\theta_{t-1} - 1) G_{t-1} \right] + e_t \tag{18}$$

where e, a white noise disturbance, accounts for the fact that the information set at time t may be different than the one at time t-1.

I can now substitute into this equation the value for H_t just obtained, and the same can be done for H_{t-1}, which is analogously given by:

$$H_{t-1} = \frac{1}{\beta_1} \left[C_{t-1} - \beta_0 - \beta_1 (W_{t-1} - B_{t-1}) + \theta_{t-1} G_{t-1} - \varepsilon_{t-1} \right] \tag{19}$$

After these substitutions, I finally solve for C_t, which obtains the following:

$$C_t = (1+r) C_{t-1} - r\beta_0 + (1+r) \left[(1-\beta_1) \theta_{t-1} + \beta_1 \right] G_{t-1} - \theta_t G_t + \beta_1 \left[1 - (1+r) L \right] (W_t - B_t) +$$

$$- \beta_1 (1+r) N_{t-1} + \left[1 - (1+r) L \right] \varepsilon_t + \beta_1 e_t$$

where L is the lag operator. By using the symbol Δ^q, standing for quasi-difference, i.e.:

$$\Delta^q = \left[1 - (1+r) L \right] \tag{20}$$

the above specification may be conveniently re-written as:

$$\Delta^q C_t = -r\beta_0 + (1+r)\left[(1-\beta_1)\theta_{t-1} + \beta_1\right]G_{t-1} - \theta_t G_t + \beta_1[\Delta^q(W_t - B_t) - (1+r)N_{t-1}] + v_t \tag{21}$$

where I have also used v_t to signify the composite error term:

$$\beta_1 e_t + \Delta^q \varepsilon_t \tag{22}$$

This equation is the same as [10] in Darby and Malley, but for the fact that β_0 is multiplied by minus the interest rate: there is probably a typographical error in their intercept term. Notice that all expectation terms have been substituted out, and so all variables are now observable. The unknown parameters are β_0 and β_1 (because δ is unknown[26]) and θ_t.

This is an interesting non-linear specification. As it is derived algebraically from a consumption function, its parameters relate directly to the deep parameters of the model, so it is possible to give them a precise economic meaning and see if their estimates correspond to what the theoretical model predicts. In particular:

- β_1 measures the proportion of permanent income that will be optimally consumed by the representative agent, and should be positive a smaller than 1;
- θ measures how much government consumption substitutes for private consumption, and should lie in the [0, 1] range.

The latter parameter, however, is itself a linear function of even deeper parameters, γ_1 and γ_2, so that the actual specification that I consider is the following:

$$\Delta^q C_t = -r\beta_0 + (1+r)\left[(1-\beta_1)[\gamma_1 \frac{G^d_{t-1}}{Y_{t-1}} + \gamma_2 \frac{G^{nd}_{t-1}}{Y_{t-1}}] + \beta_1\right]G_{t-1} - [\gamma_1 \frac{G^d_t}{Y_t} + \gamma_2 \frac{G^{nd}_t}{Y_t}]G_t \tag{23}$$

$$+ \beta_1[\Delta^q(W_t - B_t) - (1+r)N_{t-1}] + v_t$$

[26] The interest rate is supposed to be known and constant instead.

The predictions about γ_1 and γ_2 are, as I have anticipated, that the former be smaller than the latter, and that possibly the former be smaller, the latter greater than 0; anyway, such that the combination of their values makes it possible for θ to lie in the reasonable range at all times.

4. Choice of an appropriate estimation technique.

The chosen specification has many interesting features that have been discussed at the end of the previous paragraph. From the point of view of an econometrician, however, it poses a couple of questions: non-linearity and a disturbance term that is correlated to the explanatory variables and non serially uncorrelated, because it has a MA component. Particularly the latter problem must be taken seriously: all dynamics is relegated in the error here, and the choice of an estimation technique disregarding this would end up producing inconsistent estimates.
Darby and Malley suggest the use of GMM estimation method. In fact, NLIV would address the problem of correlation between v_t and the explanatory variables through substitutions of these by a set of appropriately chosen instruments, but it would not consider the extra question of its MA component. The generalised method of moments, instead, does not require serially uncorrelated errors. In fact, it consists in the minimisation of a criterion function containing an estimate of the asymptotic covariance matrix of the errors that may not be diagonal.
GMM starts from a theoretical requirement that the parameters should satisfy: that the expectation of the unconditional moments, i.e. orthogonality conditions between the disturbance term and a number of instruments, be equal to 0, in our case:

$$E\left[z'h\left(\Delta^q C_t, G_t, G_{t-1}, \frac{G_t^d}{Y_t}, \frac{G_t^{nd}}{Y_t}, \frac{G_{t-1}^d}{Y_{t-1}}, \frac{G_{t-1}^{in}}{Y_{t-1}}, \Delta^q (W_t - B_t), N_{t-1}, \beta_0, \beta_1, \gamma_1, \gamma_2 \right) \right] = 0$$

where z is a set of appropriately chosen instruments (as many as the unknown parameters or more) and h is LHS-RHS of equation (23). Then the unconditional moments are replaced by their sample counterparts[27], which I will call vector $m(\beta_j, \gamma_i)$, with j=0,1 and i=1,2. If the instruments are just as many as the parameters to be estimated, the estimates are obtained as

[27] This procedure is justified by invoking the law of large numbers.

the solution of the system of equations; if there are more unconditional moments than parameters, instead, Hansen (1982) suggests to minimise the following criterion function:

$$J(\beta_j, \gamma_i) = m(\beta_j, \gamma_i)' A m(\beta_j, \gamma_i)$$

where A is a matrix the purpose of which is to "weight" each unconditional moment, hence each instrument[28].

A may be any matrix, and GMM estimates are guaranteed to be consistent, if the instruments are correlated to the variables they substitute for. As for asymptotic efficiency, a necessary condition has been demonstrated to be that for $n \to \infty$ A should tend to (a matrix proportional to) the inverse of the covariance matrix of the sample moments m.

The first task is therefore to estimate such matrix, often called S. There are different estimation techniques according to whether the sample moments, hence the residuals, are correlated or not, of which more later. In any case, in order to estimate S an estimate of β_j, γ_i is needed, or else we cannot construct the sample moments. This circular reasoning (one needs S to estimate the parameters, but the estimated parameters are necessary to estimate S) is resolved by a two-step procedure. First an estimate of the parameters is obtained that is just consistent, not efficient, by minimising a criterion function containing an arbitrary A matrix; S is then constructed, and a criterion function containing it minimised. This process is finally iterated, so that the resulting estimates are invariant with respect to the scale of the data and the initial choice of A.

If the errors are not serially correlated S is a diagonal matrix and its estimate may be calculated as:

$$S^* = \frac{1}{T}\sum_{t=1}^{T}\left[m_t(\hat{\beta}_j, \hat{\gamma}_i, z_t)\right]\left[m_t(\hat{\beta}_j, \hat{\gamma}_i, z_t)\right]'$$

But this is not our case. When the sample moments, hence the error terms included in them, are not serially uncorrelated, and I assume that all autocovariances are 0 beyond some lag, S can be demonstrated to be equal to:

[28] The answer to the presence of more instruments than parameters to estimate (overidentification) is similar to the one in the IV literature. The idea is to use instruments that are linear combinations of the original ones.

$$S = \sum_{v=-p}^{p} \Gamma(v)$$

where $\Gamma(v)$ is an autocovariance matrix:

$$\Gamma(v) = \frac{1}{T} \sum_{t=v+1}^{T} \left[m_t(\beta_j, \gamma_t, z_t) \right] \left[m_{t-v}(\beta_j, \gamma_t, z_{t-v}) \right]'$$

and p is the lag beyond which all autocovariances are assumed to be 0[29]. A consistent estimate of S is therefore:

$$\hat{S} = \hat{\Gamma}(0) + \sum_{v=1}^{p} (\hat{\Gamma}(v) + \hat{\Gamma}(v)')$$

where $\hat{\Gamma}(0) = S^*$ and $\hat{\Gamma}(v)$ is the sample counterpart of $\Gamma(v)$ (constructed starting from consistent estimates of the parameters, leading to consistent estimates of the sample moments). In fact, $\hat{\Gamma}(v)' = \Gamma(-v)$. This is the first of a class of estimates for the asymptotic covariance matrix known as heteroskedasticity-autocorrelation consistent estimates, or HAC estimates.

Newey and West (1987) have pointed out that it is not infrequent to have estimates of the asymptotic covariance matrix that are not positive semi-definite. To avoid this problem they suggest giving a lag-dependent (linear) weight to each of the elements of the series in the above formula. Such weights also depend on the choice of p, the lag truncation parameter, which they determine as an increasing function of the number of observations in the sample[30]. Lag truncation and bandwidth selection (i.e. the way the weights depend on the value of p) are therefore determined simultaneously.

More recently other authors have suggested their own functional form for these weights, and so nowadays most econometric software allows to choose among them (the so-called "kernel" option). Andrews' (1991) suggestion is particularly interesting. He proposes to make use of all T-1 autocovariance estimates (no arbitrary lag truncation) and proposes quadratic spectral

[29] The result is more general, as it is valid also when all autocovariances are nonzero, provided they tend to 0 as the absolute value of the difference between the lags tends to infinity (Hamilton (1994)).

[30] To keep consistency, p must not grow faster than $T^{\frac{1}{3}}$.

weights[31]. The value of each weight is determined by inserting in the kernel both the lag and the bandwidth selection choice. Andrews suggests making p dependent on the very autocorrelations in the data. This requires specifying a model proxying the correlative structure of the sample moments, estimating it and using such estimates to determine the bandwidth. Most econometric packages do all this automatically if one chooses the "Andrews" bandwidth.

Of the possible choices for a kernel and a bandwidth, I have chosen to follow Andrews (1991) in my estimates[32]. In fact, he proves by simulation that his method of estimation for the asymptotic covariance matrix performs slightly better than all previously proposed methods for finite samples[33].

I have also adopted the "pre-whitening option" suggested by Andrews and Mohanan (1992). In fact, Andrews (1991) finds that all GMM estimators perform rather poorly when the moments involved are I(1) or AR(1) with a correlation as high as 0.9. The estimation technique proposed by Andrews and Mohanan, instead, is applicable also in those cases. Their idea is to construct the HAC asymptotic covariance matrix as:

$$\widetilde{S} = (I - \hat{B})^{-1} \hat{S} (I - \hat{B})^{-1'}$$

Here $\hat{S}$ is Andrews' HAC matrix, but constructed starting from the autocovariances not of the sample moments, but of the residuals of a low-order VAR model applied to them (the very "prewhitening" phase), and $\hat{B}$ is a matrix, derived from the VAR estimates, doing the "recoloring", i.e. reversing the prewhitening[34]. So first a VAR is estimated in order to "soak up" the correlations in the sample moments before estimation: it is like filtering the sample moments to make them suitable for the application of the HAC matrix estimation techniques. Then the result is "translated" in terms of the original, correlated sample moments. Andrews and Mohanan prove by simulation that generally, but especially in the case of high autocorrelation of the sample moments, prewhitening solves the problem of t-statistics that tend to reject too often. The bias of GMM estimates is in fact considerably lower.

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[31] All these authors heavily borrow from the spectral density function estimation literature, exploiting the similarities in the problems the two research areas deal with.

[32] Instead, Darby and Malley follow Newey and West.

[33] Eviews 3.1, which I have used to compute the estimates I present in par.6, follows Andrews in adopting an AR(1) structure for the sample moments in order to determine p. I have no prior information on the data allowing me to object to this choice.

[34] The authors adjust this matrix, in case of sample moments being (very near) unit root processes, so as to have $\left|I - \hat{B}\right| \neq 0$; otherwise it is impossible to invert. However, Eviews does not perform this adjustment.

GMM is a very flexible estimation method in that it requires very few assumptions about disturbances. The drawback lies in the fact that right because so little is required, not so many diagnostic tests may be applied when one uses it. The one I will consider is Hansen's test of over-identifying restrictions. The test uses the criterion function evaluated at the parameters' estimates. In the case of just identification this value is 0, but when there is overidentification this may not be the case. T times the distance between $J(\hat{\beta}_j, \hat{\gamma}_i)$ and 0, which is proved to be asymptotically distributed as a χ^2 with (no. of instruments – number of parameters) degrees of freedom, may then be interpreted as joint test of instruments' validity and general specification. In this work, in particular, good results of this test should wipe out any perplexity regarding the admittedly very structured specification, which owes its being constraint-packed to the fact that it is derived rigorously from a theoretical framework.

5. The data.

5.1. Sources and reconstruction.

It comes as no surprise to economists interested in the relationship between consumption and fiscal policy in Italy that most empirical work on the subject has been so far based on time series stretching not further than 1960, or, in some cases, 1950. Exceptions are few and work with data proxying the relevant variables with some degree of imprecision (Modigliani and Jappelli (1987))[35]. There is in fact a lack of consistent long time series for those variables. This contrasts with the availability of data regarding other macroeconomic items going as far back as 1860, the time Italy's process of unification was completed. The collection and reconstruction of data regarding consumption and related variables are the object of a working paper I have written in collaboration with Mariacristina Cristini (Cristini and Dalle Nogare (1999)), and this paragraph, as well as the Data Appendix, extensively draws from it. For

[35] Modigliani and Jappelli (1987) take the 1952-1982 series in Modigliani, Jappelli and Pagano (1985), the sources of which are mainly OECD, National Accounts and Bank of Italy, Annual Report, and attach to them data from different sources (in their own words, not always entirely consistent) going from 1862 to 1951. They depart from all other works on consumption in that they use final consumption of both durables and nondurables, a series they take from Ercolani (1969) up to 1951. They proxy labour income with disposable income (from Ercolani up to 1951), which clearly includes capital income. But it is the wealth series that is most peculiar. It excludes durables and up to 1952 it only includes land and capital (still from Ercolani), while it includes houses, equities, bonds, deposits, currency, and net worth of insurance policies (but not land) later. Wealth also includes government debt, as the authors move within the LCH tradition.

some series further re-elaboration was needed in view of this empirical analysis: the Data Appendix tells which.

Not all variables needed for my work were tabula rasa, to tell the truth. Particularly, some useful reconstructions, especially as far as private consumption, public consumption[36] and labour income of employees are concerned, are to be found in Rossi, Sorgato and Toniolo (1993). Those series do not go as far back as 1860, and the latter is not complete, but they have been a valid starting point to obtain data for the whole period I take in consideration, using methods that will be described in detail under the respective headings in the Data Appendix.

The one variable we have found almost nothing about was total labour income, and a consistent measure of total wealth (including real wealth) was also absent from all previous work we have come across. These have therefore been the areas where our work has been most creative.

As far as wealth is concerned, it is real wealth that caused most of the trouble. We decided to use the perpetual inventory method whenever data on stocks were not available, and we have taken into account the series in Rossi et al. (1993) for housing and durables.

In contrast to the reconstruction in Cristini and Dalle Nogare, I have here opted for the exclusion of land from the wealth series. It has been a tough but necessary decision. I am aware that land accounted for a major part of real wealth in the first 30-40 years of the sample, and its role was not negligible for a few more decades. The problem was that all permanent income measures including the value of land resulted in poor estimates for the corresponding coefficient. Land, in fact, is a very peculiar series. Its has a marked downward trend starting around 1876 and lasting almost 20 years[37]. This contrasts with the flatness of the consumption series in the same years[38]. As far as the more recent decades are concerned,

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[36] Rossi et al. (1993) reconstruct private and public consumption as part of the expenditures on gross domestic product. The expenditures on GDP tables usually divide national demand into private consumption, comprising the consumption of both households and "various social institutions", and public, i.e. government consumption, but sometimes the distinction is between households' consumption and "collective" consumption, where collective stands for both government and various social institutions. Rossi et al. seem to adopt the first distinction, but a closer look reveals that what they call public consumption is actually collective consumption. In fact, private consumption is the same as households' consumption in their table on the composition of domestic households' consumption. Besides, they use the term collective consumption in the text describing the expenditures on GDP, in contrast to the heading of the relative series. The series in question is therefore unquestionably collective consumption. However, I will use it here as a proxy for public consumption, which is reasonable considering that for the period since 1960 a series for government consumption is available, it is very close to the one in Rossi et. al. and there is no reason to think that the two were very different in the previous decades.

[37] It might be related to the agricultural crisis which affected the country as a consequence of the fall of the price of corn and wheat (Ciocca and Toniolo (1998)), but it might also be a question of wrong reconstruction.

[38] If the data on land for the period in question are reliable, there are two possible explanations, not necessarily excluding each other: land ownership was concentrated (which makes per capita wealth including land a bad

reliability of data is still an issue. Since 1994 INEA has started a substantial revision of the data collection methods for land prices. In 1997 they published a new series for the value of land for the time period 1968-1996 which is dramatically different from all previous studies. Revisions are probably needed also for the earlier period; attempts at linking the new series to the data for the previous years produce the most puzzling plots.

The total labour income series was impossible to reconstruct as the sum of employees' and self-employed workers' labour incomes for total absence of data on the latter before 1980. Rossi et al. (1993), however, have reconstructed total units of labour in the different business sectors from 1911 onwards (with a ten years' break around the Second World War). We therefore assumed to be in a neoclassical world and used the various sectors' income per standard unit of labour of employees as a proxy for the sectors' income per standard unit of labour (of employees *and* self-employed). In order to find values for the series before 1911 and around World War II we have then made use of the net national product series by ISTAT (1957), in a way that is described in detail in the Data Appendix.

As for the fiscal policy series, the problem was that no economic classification of general government consumption is available up to 1960. All that is to be found are economic classifications of total central government expenditures, which include transfers and capital expenditures as well as consumption. Clearly, total central government expenditures in, say, defence is but an imperfect proxy for general government consumption in the same field. In this specific case, however, there are reasons to believe that the use of such a proxy is quite legitimate (see Data Appendix). A total government consumption series was easily constructed, so having this and a series proxying public consumption in defence, government consumption in nondefence was derived by difference.

More dubious is the use of the data I have for the pre-1960 period for creating a classification that distinguishes between the value of the production of pure and impure public goods. I have nevertheless made an attempt.

5.2. A first look at the series.

Although the specification here considered, being non-linear in both its parameters and regressors, makes it hard to anticipate something about the estimation results just from a look at the series involved, it is anyway worth it to present them. Especially the public consumption series are interesting, because the time-varying θ I construct starting from those

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proxy for a representative household's wealth) and consumption on nondurables was mainly food consumption

estimates may be better interpreted in the light of the economic and political events underlying them.

Real per capita consumption of nondurables and services and labour income are characterised by three breaks:

1) one dating about the turn of the century. Those years were marked by the first wave of industrialisation in the country. It is necessary to stress here that some authors are not so satisfied with all recontructions of income and consumption regarding the pre-Giolitti era, claiming that the series in question started to rise long before ISTAT (1957) and all (including Rossi et al. (1993)) those who re-elaborated its data show (Toniolo (1990)). Fenoaltea (1983) is one of them, but his own reconstructions are not readily available at the moment;

2) one dating around 1950, after which the two series tend to grow at a much faster rate than before. The post-war era was in fact a time of massive industrialisation that would change the very structure of the country's economy;

3) a more recent break point is 1992, marking the start of a prolonged recession. In September the Italian lira was forced out of the ERM and experienced a strong devaluation, as capital was leaving the country. Drastic measures were taken by the government: introduction of a much-needed, although partial, reform of the pension system, large tax increases, some cuts in public spending in goods and services and freeze of public sector wages. Changes in the employment legislation and a privatisation programme, as well as a reform of the electoral law making it less proportional, followed.

The effects of the First and Second World War are also evident, but much more those of the latter than those of the former.

Real per capita consumption of nondurables and services (Figure 1) looks like a stationary series up to 1900, after which it starts to grow. WW1 has no evident effect apart from greater year-to-year changes. The upward trend goes on till 1929, then consumption falls till 1935. After a short-lived reversion of trend, WW2 marks a much deeper fall in the series. The post-war series only reverts its positive trend in 1993; a period of more moderate growth follows.

As for real per capita labour income (Figure 2), it looks, too, as a stationary series up to 1900, after which it starts to grow at a faster rate. WW1 was marked by declining values only in 1917 and 1918. After the war the positive trend continues till 1935[39], then a 10-year period of negative growth rates, particularly remarkable in the last years of WW2. Afterwards labour

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at the beginning of the period, hence not so reactive to downward turns in permanent income.

[39] Mattesini and Quinteri (1997) point out that the effects of the Great Depression were as severe in Italy as in the rest of the industrial countries. The fact that real labour income does not show this is probably due to the fact that the fall in prices was more pronounced than the fall in wages.

income starts growing in line with the economic boom of the 50s and 60s, but continues on the same trend also in the 70s and 80s. 1992 marks the start of a clear fall.

Real per capita wealth is marked by a period of stagnation till the mid-1890s, then it starts to rise, which does not stop during WWI and throughout the Fascist era. With respect to real per capita labour income, it is characterised by a more dramatic change of trend after WW2 and only a small slowdown in growth after 1992 (Figure 3). It is however important to stress, in this respect, that this wealth series does not include future pension benefits[40].

Real per capita public consumption has an almost constant value between 1862 and 1910, exhibits a big jump around the First World War, returns to lower values in the early 20s (still around 9 percent of GDP, as in the pre-war period) and then starts rising around 1925 (Figure 4). This rise sharply increases in the first years of the next decade, then stops in 1944. After 1950 and up to 1992 real public consumption shows a positive trend, although it is to be said that other components of public expenditures, especially transfers, grew much more in the same period[41]. At the end of the 80s it almost reached 18 percent of GDP (Figure 6). There is what is most likely to be a structural break in 1992: after that date public spending on goods and services took on a negative trend[42].

Real per capita government civil expenditures on goods and services is a series generally tracking the one of real per capita public consumption except for the war years (Figure 7). During WW1 it shows a rise, and another modest rise starts in 1925 and becomes stronger since 1930. This was a turning point in the economic policy of the fascist era, which had been marked by a laissez-faire strategy in the early years but later, also in response to the 1929 crisis, turned to more state intervention. Between 1941 and 1945 government nondefence consumption shows a dramatic fall. Between 1950 (1960) and 1996 the ratio between government consumption in non defence and total government consumption increases from 0.72 (0.79) up to 0.92, following a trend only reverting modestly for some years in the mid-Eighties. The cuts in expenditures of the 90s have affected defence and nondefence spending

[40] Future pension benefits are equivalent to transfers in the relationship between households and government. If RE holds, they should *not* be considered as wealth (Nicoletti (1991), note 7).

[41] Between 1972 and 1976 public consumption slightly decreased. This is most of all the effect of calculating real public consumption by dividing its nominal counterpart by the consumption price deflator. In fact, what happened was that public employment kept rising but wages in the public sector took some time to adjust for high inflation (Giarda (1986)). However, between 1974 and 1978 there was also a slight fall in real spending in goods, especially in the defence sector.

on goods and services in the same way (Figure 5), as one can also infer from the fact that from 1992 to 1996 there has practically been no change in the ratio between nondefence and total government consumption in that period (Figure 9). As for the ratio between government civil consumption and GDP, one of the regressors that will be used, see Figure 8.

The fact that government nondefence consumption looks like total government consumption in nonwar years is due to the fact that it is constructed as public consumption minus defence, which, apart from wartime, is traditionally a fairly stable component of government spending on goods and services in Italy, although it is to be noticed that it tends to decline in relative importance in the long run. Up to 1910 there are little changes in the series' data, but notice the high start in 1862 (the process of unification had just ended), a rise in 1866, the time of the third war of independence against the Austro-Hungarian Empire, and the more modest ones associated to the military campaigns in Eritrea and Ethiopia dating 1887 and 1895-1896 (Figure 10). Then a sharp rise in the second decade of last century, marked by the conflict with Turkey for the conquest of Libya (1911-1912) and the involvement in WW1. The time in between the wars shows a rise starting in 1934, a time of rearmament in prospect of the war with Ethiopia (1935-1936); the trend only reverts for a couple of years, after which WW2. Then a sharp fall followed by an upward trend, only briefly reverted in the second half of the 70s. The 90s show more consistent cuts. The ratio between defence spending on goods and services and public consumption has values between 0.2 and 0.35 in the years between 1862 and 1910, it reaches 0.55 in WW1 and 0.9 in WW2 only to go back to 0.2 in the 50s, and gradually declines to 0.1 in the most recent decades of the sample period (Figure 12). Defence spending on goods and services over GDP is shown in Figure 11.

6. Regression results.

Table 1 presents the results obtained by adopting different GMM estimation techniques (GMM-AM stands for GMM - Andrews and Mohanan, GMM-NW for GMM – Newey and West and GMM – A for GMM - Andrews) on the 1862-1991 period, a very large subsample. I have used twice and three times lagged values of per capita consumption, wealth, labour income and government consumption as instruments; as for public consumption in defence and nondefence over GDP, following Darby and Malley, I have used once and twice lagged

[42] Most of the fiscal adjustment characterising the 90s was however performed by raising taxes, not by cutting

values[43]. The use of different HAC matrices does produce different results, but, all in all, both signs and values of all estimated parameters are similar, and they are significant[44]. Notably, all estimates have values in accordance to economic theory[45]. The representative consumer spends each year 0.8-1% of their expected permanent income in nondurables and services. The signs of the estimates of the γ parameters indicate that the greater government consumption in defence, the smaller the degree of substitutability between public and private consumption, while the more a government spends in nondefence areas, the greater the direct crowding out effect. Hansen's tests are good for all regressions, implying that the model is well specified.

The 2SLS estimates are also shown for comparison: surprisingly, they are similar to the GMM results (especially to the one obtained adopting the Andrews and Mohanan approach). I am more inclined to think this is due to the specific characteristics of the series here used than to the scarce relevance of the MA component in the error of the given specification.

Figure 14 shows the different time-varying thetas constructed using $\hat{\gamma}_1$ and $\hat{\gamma}_2$ obtained by the GMM regressions of Table 1:

$$\hat{\theta}_t = \hat{\gamma}_1 \frac{G_t^d}{Y_t} + \hat{\gamma}_2 \frac{G_t^{nd}}{Y_t}$$

where I have made use of the definition of θ_t given by equation (2)[46]. The graph highlights that the use of different HAC matrices produce values for θ_t that are all within the admissible [0,1] range, save for the WW2 years. The value of θ is modest in the pre-WW1 period, a

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expenses.

[43] The results here reported all assume r=0.05; I have tried with 0.04 and 0.06, but it does not make a lot of difference.

[44] Darby and Malley scale both sides of the regression equation by an exponential trend in consumption obtained as the exponent of the fitted values from a regression of the log of real per-capita consumption on a constant and a time trend. Their aim is to reduce heteroskedasticity in the error term. I have tried to do the same, but results are not so different from those found without applying this scaling. In fact, heteroskedasticity should already be taken account of by the use of a HAC matrix in GMM, so that the very scaling seems unnecessary. All results I show have been obtained without scaling.

[45] $\hat{\beta}_0$ is positive, so $r < \delta$ (see equation (13)). Notice that this circumstance poses a problem, in that it implies that the economy is dynamically inefficient. However, I am inclined not to overestimate this question. It is probably the reflection of the fact that my wealth series suffers from some measurement problem, in the sense that, although it is entirely consistent in itself, its relative value vis-à-vis the consumption series is not. Notice also that Darby and Malley found a negative constant, too.

[46] The quite similar values of all three thetas at each point in time reveals that the difference in magnitude of the γ_1, γ_2 estimates obtained using different HAC matrices is not so relevant, since it is their *relative* magnitude that counts.

higher level and a greater volatility characterise it in the intra-war time while the post WW2 era is marked by a positive trend.

The latter phenomenon is much more remarkable if we consider Theta 3, constructed starting from the estimates obtained by use of the Andrews-Mohanan approach, which, for the reasons I have anticipated, will be my favourite.

Theta 3 (Figure 13) starts at a value less than 0.2, but steadily grows in the second part of the XX cent. reaching 0.67 in 1991. Short period changes are also interesting in that they highlight how slumps correspond, as expected, to times of war: not just the World Wars, but also "minor" conflicts are visible (1862; 1866; 1887 and especially 1895-1896; 1911-1912; 1935-1936). The peak in 1921 seems to be due to a strong temporary rise in public spending for civil purposes. The markedly upward trend of the pre-1935 decade is again the effect of the increase of public resources for civil goals, a well-known policy of the fascist regime in those years. The small peak just after 1970 is the reflection of the short-term slump in government consumption in defence.

It is interesting to compare the values found for Theta 3 in the last decades of the sample with the other estimates of θ found for Italy. Clearly, the presence of a direct crowding out effect is confirmed by the analysis, in contrast to the findings in Nicoletti (1991) and Levaggi (1998). It is a remarkably strong effect, much stronger than the estimates in Rossi (1991) would show.

As for the comparison with the literature based on the use of post-WW2 US series, the Italian case seems to be characterised by a fairly higher direct crowding out effect, probably a consequence of the smaller role played by defence as a spending category. As for the trend, the only possible comparison is with Darby and Malley's results: up to 1975, in both countries θ grows, but afterwards it keeps growing in Italy, while in the US Reagan's rearmament makes it fall and then it appears as stationary.

The short term "rebouncing" of all thetas in the post WW2 years is puzzling, especially because it is rather pronounced. This evidence and the negative values characterising the 1940-1942 years are likely to let the question arise whether the results are sensitive to the outliers of the 1940s.

Fortunately, this is not the case. Considering that there is a great difference in the way the series involved in my regression are affected by the years in question, with real per capita consumption, wealth and labour income much less subject to great year-to year changes with respect to pubic consumption, I have tried to deal with the problem by estimating a new regression, in which θ_t is defined as:

$$\theta_t = \gamma_1 \frac{G_t^d}{Y_t} + \gamma_2 \frac{G_t^{nd}}{Y_t} + \alpha * dum1$$

where dum1 is a dummy variable taking the value 1 in the years 1940-1946. The regression results are shown in Table 2. The GMM-AM estimates show that the dum1 estimated coefficient is not significant, and all other parameters are quite similar to those in Table 1 and stay significant. As for the GMM-NW and GMM-A estimates, here $\hat{\alpha}$ is positive and significant, $\hat{\beta}_0$ and $\hat{\beta}_1$ are almost unaffected while $\hat{\gamma}_1$ becomes smaller and $\hat{\gamma}_2$ greater, thus turning even more similar to those of GMM-AM in Table 1. This finding is evident in Figure 15, where it is shown that even in the post-WW2 period the thetas constructed starting from the GMM-NW and GMM-A estimates of Table 2 (Thetatable2nw and Thetatable2a) have the same trend as Theta 3 of Table 1. It may be interpreted as a sign of the fact that the prewhitening-recoloring procedure involved in GMM-AM already solves the problem of the possibly too great a weight given to outliers[47].

The results on the 1862-1991 sample are not only insensitive to the presence of the outliers in defence consumption of WW2, but they are also quite robust if we consider earlier ending dates. Adding the 1992-1996 period, however, determines a complete change in the regression results. In particular, while the GMM-NW estimates keep both right sign and magnitude, both GMM-A and GMM-AM produce reversions in signs for the estimates of the coefficients of public consumption, which are never significant. Technically, this seems to be due to the fact that the selected bandwidth for the construction of the HAC matrix changes dramatically, and it is amazing to see how just 4 data may change the whole picture.

One way to try to deal with the problem is to simply add to my model a dummy, *dum2*, taking the value 1 in the 1992-1996 years. It is a rather rough procedure, but it allows one to try to deal with what seems to be a structural break in all the series involved in the regression, and to consider the effects of the reform package which was implemented in those years as a whole. The GMM-AM result is in column 2 of Table 3 (column 1 is the same as column 1 of Table 1, and is reported for comparison purposes). The coefficient of the dummy is significant

[47] I have also tried the alternative approach of inserting dum1 linearly in the regression equation. In the GMM-AM case, the parameter associated to it is not significant and all other parameters do not change much and remain significant. In the GMM-NW case, it is negative and significant, but again all other parameters are significant and very similar to those in Table 1. GMM-A does not converge after 100 iterations. All these results are available upon request.

and negative, as one would expect considering that private consumption fell in these years. $\hat{\gamma}_1$ and $\hat{\gamma}_2$ are also significant and have the right sign. Their values are such that the theta constructed starting from them looks similar to Theta 3 of Figure 13, only slightly lower in value over the whole period. In the post-1992 period it shows a negative trend, going from 0.51 to 0.47.

Three main fiscal measures were taken in 1992 and confirmed, if not strengthened, in the following years: a tax rise, a reform of the pension system aiming at reducing the excessive generosity of the previous decades and an expenditure cut involving also a reduction in public consumption. Given that I am assuming that the Ricardian Equivalence holds, the first two should not have affected private consumption, while the third one should have made it increase. Therefore, my theoretical framework becomes inadequate here: it seems it cannot account for the decrease of private consumption. Possibly the type of tax rise, pension reform and expenditure cuts adopted had vast distributional effects. I have tried to take account of this by expressing the term for wealth in my specification as:

$$W_t + \lambda * dum2$$

The GMM-AM estimates of this second regression equation are in Table 3, column 3. The similarities to the result in column 1 are evident, and $\hat{\lambda}$ is negative and statistically significant[48]. Hansen's test, though much lower, still accepts the null hypothesis of instruments validity and good specification.

A third experiment considered writing down θ_t as:

$$\theta_t = \gamma_1 \frac{G_t^d}{Y_t} + \gamma_2 \frac{G_t^{nd}}{Y_t} + \mu * dum2$$

following the same line of reasoning as the one adopted when dealing with the 1942-1946 problematic period. The GMM-AM result is reported in Table 3, column 4. $\hat{\mu}$ is negative and

[48] Recursive estimation from 1992 to 1996 obtains $\hat{\lambda}$ always significant and very small, sometimes positive, sometimes negative. The fact that the sign is very unstable is not surprising. It is a sign that the Amato reform of the pension system, because of its being only partial, was not perceived as a one-and-for-all change in the institutional context, but as the first step of a process. The general effect was the introduction of a lot of uncertainty.

significant. $\hat{\beta}_1$ is lower than the estimate in column 1, but the values for $\hat{\gamma}_1$ and $\hat{\gamma}_2$ are such that the corresponding theta's values at all times are extremely similar to those of Theta 3.

As I have anticipated, another problematic question regarding the series I am using relates to the reliability of the data sources as far as the 1862-1890 period is concerned. One is then led to try and see what happens if we exclude those years from the sample. The regression results are in Table 4, and show that the only relevant difference with respect to Table 1, regardless of the estimation method and, in the case of GMM, of the HAC matrix that is used, is in the estimated constant. This of course does not mean that if my series for the 1862-1890 period were not so flat all estimated parameters would be unaffected, but asymptotic theory suggests that the changes would not be great.

The biggest structural break in the series I use is around 1950, and it is therefore interesting to divide the whole sample in two to check for the stability of the above estimates[49].
I will call the first subsample the pre-WW2 sample, because I have decided to eliminate the 1940s from it (I have not excluded the 1862-1890 period, instead, considering that this would make it too small). I have tried different ending dates, and the best results in terms of significance of the GMM-AM estimates are those reported in Table 5, covering the 1862-1937 span. As expected, considering the smaller expected permanent income in the early years of the sample, which are characterised by a much slower process of accumulation, and the fact that some basic nondurables are necessary for life, $\hat{\beta}_1$ is much bigger than in the estimation on the 1862-1991 period. $\hat{\gamma}_1$ and $\hat{\gamma}_2$ have the right sign and are significant. They have values such that the corresponding $\hat{\theta}_t$ always lies in the reasonable range, but it is even smaller than the one constructed starting from the GMM-AM estimates of Table 1, which in the period in question was generally already quite small (Figure 13). By changing the ending date of the subsample, however, $\hat{\gamma}_1$ and $\hat{\gamma}_2$ lose statistical significance[50], though they keep the right sign and more or less the same values.
The post-WW2 subsample is constrained to start in the middle of the 1950s by the fact that, since I am using twice lagged values of the regressors as instruments, and some series enter the specification as lagged values themselves, I would not otherwise eliminate the influence

[49] I only consider two subsamples: pre- and post-WW2. A finer division of the sample would imply the creation of subsamples that are too small for asymptotic theory to apply.
[50] Table 3 also shows 2SLS, GMM-NW and GMM-A regression results when the ending date is 1937. Here, too, statistical significance of the relevant coefficients is a problem.

of the war years in the estimation procedure. This is a problem because it makes the subsample rather small: there are only 38 data from 1954 till 1991. The results, summarised in Table 6, are therefore to be taken as only suggestive. The biggest difference lies in the estimate of β_0, which is now negative, although significant only with GMM-AM. $\hat{\beta}_1$ is always positive and significant, higher than the values in Table 1 but smaller than those in Table 5. The estimated parameter associated to government consumption in defence is never significant, its sign and magnitude are right except in the GMM-NW case. $\hat{\gamma}_2$ is positive, as expected, and has a reasonable value in all cases; it is significant at the 5% confidence level in all cases except GMM- AM, where it is only significant at 10%[51].

All in all, the consideration of two distinct subperiods, though flawed by the fact that the more recent one is probably too short for GMM to be of any use, speaks in favour of a not very high stability of the estimated parameters. However, with GMM-AM the signs of $\hat{\beta}_1, \hat{\gamma}_1$ and $\hat{\gamma}_2$ stay the same, and their values, though different, keep having a meaning from the point of view of economic theory. This is already a great result, considering that the series I am using are clearly marked by a big structural break around 1950.

In order to check if the results are sensitive to the fact that in the definition of θ_t I have normalised government consumption in defence and nondefence by GDP, I have tried a different normalisation. I have defined θ_t as:

$$\theta_t = \gamma_1 \frac{G_t^d}{G_t} + \gamma_2 \frac{G_t^{nd}}{G_t}$$

By substituting this new definition of θ_t in the regression equation and manipulating, a specification similar to (but not exactly the same as) the one in Graham (1993) obtains. This attempt also allows for the detection just of the composition effect. By substituting the new definition of θ_t into the specification and estimating it by GMM-AM on the 1862-1991 period I have obtained the result in Table 7. With respect to the GMM-AM result of Table 1 the two major changes are the size of the parameters associated to government consumption in defence and nondefence (but not so much their relative magnitude) and the fact that $\hat{\gamma}_2$ is not statistically significant (p-value 0.15). In spite of the latter problem, and just for

[51] Considering 1955 as starting date does not make a lot of difference with GMM-AM, while starting from 1956

suggestive comparison purposes, I have constructed $\hat{\theta}_t$, which I have called Theta 4, from the results in Table 7 and plotted it against Theta 3 (Figure 16)[52]. I do not consider this as a bad result[53].

Finally, in Table 8 I report the result obtained when a different decomposition of government consumption is used: the one suggested by Levaggi (1999) between pure and impure public goods[54]. The fact that in Table 8 $\hat{\gamma}_1$ and $\hat{\gamma}_2$ are not statistically significant is probably a sign that the very rough procedure by which the series have been obtained is far from satisfactory. Their signs and values are however compatible with economic theory, while $\hat{\beta}_1$ has not only a sensible value, but it is also significant[55].
It is difficult to relate this result to Levaggi's (1999) because $\hat{\gamma}_1$ and $\hat{\gamma}_2$ summarise *both a composition and a level* effect, hence they are not so easily compared to substitution effect indexes of micro-modelling origin, on *the whole* and not on distinct categories of private consumption. The values for $\hat{\theta}_t$ from the 60s onwards implied by their estimated values suggestively indicate that the direct crowding-out effect has been probably stronger in the period in question than her estimates would show. Remember however that these estimates are non-significant.

7. Suggestions for future refinements.

Although the effort in data collection and reconstruction was great, there probably remains a lot to do in order to have a number of series that proxy the relevant variables satisfactorily.
The data set is likely to be subject to further revisions as far as both labour income and wealth are concerned. Notably, wealth should be inclusive of land, if reliable data were available. It

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makes the coefficient of government consumption in defence positive and not significant.

[52] If we consider Theta 4, the post-WW2 period is characterised by a not so remarkable rise in the strength of the direct crowding out effect. Since θ catches only the composition, not also the level effect here, this might be interpreted as a sign of the fact that, contrary to Barro's view (1981), the level effect adds to the composition effect. However, remember $\hat{\gamma}_2$ is not significant in this regression, and so extra evidence is needed to confirm this result.

[53] Darby and Malley make the same attempt, and define their result, which they do not even report, as unsuccessful.

[54] I have defined θ_t as the sum of (a parameter times) each of these categories of government consumption divided by GDP.

is however important to say that right when the weight of land in total wealth was great, that is in the first part of the sample, the property of land was highly concentrated, which probably made distributional issues more relevant than the present analysis shows. As for income, the pre-1911 period is still subject to a lively debate among scholars, as I have already mentioned. That it is very difficult to find reliable sources for data referring to the remote past is no surprise to anyone, and this is probably not a question regarding Italy only. There are, however, other problems with my data that can be considered as country-specific. One of them regards government consumption. It is well documented that in Italy, especially in the last 30 years, there have been big transfers from government to public sector corporations, constantly unable to balance their budgets due to the politically fixed prices of their services and their inefficiencies. These transfers have been classified in the general government statistics as current account expenditures under the heading of contributions to production (i.e. transfers) and as capital expenses[56], but they hide a lot of government consumption, as they have been at least partially used to pay public sector employees producing public goods (Modigliani et al. (1985), Giarda (1986))[57]. Besides, the year-to year change in public debt has been considerably larger than the deficit reported in the national accounts for a long period of time, which reveals that part of public expenditures are systematically not reported in those statistics, and part of these expenditures may be government consumption[58]. The recent necessity to meet with the Maastricht criteria may have worked as an incentive to even more "creative accounting" (Virno (1995)).

If there are reasons to believe my measure of government consumption is underestimated, there are other ones pointing to the fact that, however exactly estimated, it would never precisely track the value of public goods produced. These reasons are not related to the specific case of Italy. In all empirical works I have come across, government consumption is proxied by government expenditure for wages and purchase of intermediate goods. This is

[55] I have also tried with different definitions of pure and impure public goods with respect to those in the Data Appendix: I have put "infrastructure and support to the economy" in the first category; I have not considered the category of interest payments before 1960. The results are similar to those in Table 8.

[56] Alesina, Maré and Perotti (1998) explain how current account spending can be registered as capital expenditure. The government budget systematically underestimates the transfers needed by public sector corporations, so that these have to take loans from banks. These loans are then remitted by the government, and the corresponding amount registered in next year's budget as capital expenses. This is a sort of creating accounting enabling the government to finance current account expenses by issuing debt, which a combination of laws formally forbids.

[57] It is for this reason that Nicoletti (1988) uses general government data for all countries except Italy, for which he uses public sector data. These are however available only for the last decades, not for all the period I take in consideration.

[58] Modigliani et al. (1985) try to create a truer measure of government consumption by adding to the government consumption reported in the national accounts a fraction of the new debt issues in excess of the deficit. However, they do not specify what fraction, and what criteria they used to fix it.

justified by the fact that, since goods provided by the government are usually at price zero for the consumer[59], their valuation cannot but be at factors' cost. Consider, however, that in the last decades the role of government has developed more in the direction of expanding transfers than in that of providing more and more public goods. Besides, in many countries, including Italy, public investment has never been a negligible part of public expenditure[60]. Both transfers and investments have an impact on the amount the government pays in wages: the former because the more the transfers, the larger the bureaucracy managing them[61], the latter both for the same reason and because installation costs are basically costs of personnel. In my opinion, these circumstances make government spending for wages and goods a poor proxy for government consumption. The former may rise without implying more public goods offered. Ideally, one should be able to impute the actual wage and intermediate goods costs incurred by government to either the production of public goods or other public objectives. This may be at least partially possible with the data available for the last decades (1960-1996): ISTAT in fact presents general government accounts in tables where a functional and an economic classification intersect. It is not possible, however, on the whole period.

Other extensions of this work may centre on the issue of specification. Taking the Ricardian Equivalence for granted may be just as controversial dealing with Italy than with any other country. A recent survey (Ricciuti (2001)) summarises the contradictory results of the empirical literature on RE using Italian data[62]. Some may point out that the problematic results obtained by including the 1992-1996 years have something to do with the fact that I am assuming RE is valid, while it may be not, interpreting the fall in consumption as a consequence of the reform of the pension system. Leiderman and Razin (1988) might be a good starting point if the aim is to consider PIH+RE and substitutability issues together.
The assumption of a fixed interest rate throughout the time period considered is also debatable, as it does not allow to consider intertemporal substitution effects on private consumption.

[59] The standard macro analysis of public goods usually neglects the fact that some public goods are actually not completely free for the consumer. However, even when they have a price, it does not reflect their market value.
[60] Public investment and transfers to firms (some of them belonging to the public sector) have constantly been a relevant heading in government budgets, most of the time amounting to 10% ca. of all public spending. Since 1980, however, there has been a steady decline in this kind of expenditure.
[61] Also the size of public debt may have a non-negligible impact on the size of bureaucracy.
[62] Among these contributions, just Modigliani and Jappelli (1987) use long annual time series, which are however constructed, in their own words, starting from not always entirely consistent sources (see note 35). Moreover, their specification and estimation methods are severely criticised by Rossi (1989), who argues that their rejection of RE heavily depends on them. The advantage of using long annual time series in testing for RE should however be evident. The data set here used, with the addition of a government debt series, is well suited for a further investigation into the topic.

A final issue one should not neglect concerns the econometric properties of the estimates here presented. In particular, I am referring here to the stability of the estimated value for the γ_1 and γ_2 parameters. Just as θ is rightly thought to be varying in time according to public consumption composition, so probably do γ_1 and γ_2 if G^d and G^{nd} change in nature as well as in scale over time. And this is probably the case here for G^{nd}, because the time span considered is very large and the spirit itself of a government's involvements in non-defence matters has changed considerably in time. Think of education, for instance: XIX century's standard was to provide basic education, while in the second half of the last century most university education was also provided by the State in Italy.

Recent advancements in the neoclassical approach to fiscal policy have highlighted the importance of intertemporal labour substitution effects (Aiyagari, Christiano, and Eichenbaum (1992)). These modify the basic theoretical framework used here because there may be aggregate supply effects as well as aggregate demand effects.

From a theoretical point of view, if labour supply is elastic but there is perfect substitutability between G and C, there is neither an effect on permanent income nor, in the case of unexpected temporary changes in government consumption, an effect on the interest rate. This implies that labour supply stays the same, meaning that any effect of government consumption on private consumption via influence on aggregate supply is excluded. But, in principle, one cannot rule out the more realistic cases of imperfect substitutability. Here things are not so easy. Labour supply may rise both in the case of a permanent and in that of a temporary rise in G[63], and consumption is subject to two different effects: a direct one, by which it should tend to decrease (permanent income plus substitution effect); and an indirect one passing through a rise in labour supply. The presence of the latter is justified by the fact that labour supply changes affect growth, hence the optimal consumption path[64].

The macroeconomic literature on consumption has generally made extensive use of the assumption of a fixed labour supply, and I have shared this approach here. However, if it should be confirmed that supply side effects are not negligible, partial equilibrium analysis would have to be abandoned. This actually seems to be the latest trend in the empirical literature on the effects of government consumption (Perotti (2000)). It implies giving up searching for the value of deep parameters. The objective is to find estimates for reduced-

[63] More in the former than in the latter.

form models the coefficients of which are composite multipliers, i.e. combinations of deep parameters. The VAR approach is used, and a direct reference to economic theory is lost.

8. Concluding remarks.

The relative weight of public consumption in government current expenses has seen a constant decline in recent years, transfers being a much more dynamic heading. Nevertheless, it still accounts for about 15% of the GDP of OECD countries taken as a whole at present. This may be due to either democratic majorities' preference for a high level of public goods' production, or, more plausibly, to an asymmetric past behaviour of governments, who have increased public consumption in times of recession, in the belief it would stimulate aggregate demand, without doing the reverse in boom periods. The final message of this work stresses however the relevance of the direct substitution effect between public and private consumption when government produces primarily nondefence goods.

The regression results obtained using the Darby and Malley (1996) approach on Italian annual data on the 1862-1996 sample confirm that composition matters, and so the direct crowding out effect is higher when the relative weight of government consumption in nondefence increases. Just because the latter has seen its relative weight grow so much in the post-WW2 period, the degree of substitutability has followed an upward trend, reaching values as high as 0.67 in the early Nineties. The values found on the whole 1860-1996 sample seem to be all considerably higher than the estimates in previous works on the subject. They are also quite high if we compare them with what has been found so far in the literature using US time series, but this may just be a confirmation of the importance of government consumption composition, being the weight of defence spending much higher in the US than in Italy.

On the whole sample, the results seem to be robust to the use of different estimation techniques, although the above mentioned upward trend characterising the last five decades is much more marked if I use the HAC matrix suggested by Andrews and Mohanan (1992). This seems appropriate in order to mitigate the effect of the outliers of WW2. They also seem robust to an alternative way of defining the degree of substitutability parameter that is still dependent on the composition of government consumption between defence and nondefence.

An attempt at detecting the effects of changes in the relative weight of the costs of the

[64] The original idea that temporary changes in G have an impact on aggregate demand while permanent ones have not is put into question by this latest stream of literature.

production of pure and impure public goods is not so successful instead, probably because of lack of quality data.

These findings speak in favour of a more cautious attitude vis-à-vis the use of government consumption for stabilisation purposes, stressing that the stimulus to aggregate demand is not to be taken for granted. A high direct crowding out effect works together with the permanent income effect in the direction of denying that changes in government consumption, no matter how qualified (temporary/permanent, expected/unexpected), have an expansionary influence on the economy.

The analysis has been conducted in a context where labour supply is held fixed. Further empirical investigation to assess if the above conclusions are not dependent on this assumption imply a radical change in approach (VAR models), which however implies giving up searching for the value of deep parameters.

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Data Appendix.

In what follows, I will report all the data sources and describe in detail the use Cristini and Dalle Nogare (1999) have made of them in order to obtain their annual series. I also specify which of these have been used here without being re-elaborated and which were modified instead.

DOMESTIC CONSUMPTION OF NONDURABLES AND SERVICES: it is derived as the difference between households' total domestic consumption and households' domestic consumption of durables. For both these series the sources are Barberi (1961) for the years 1862-1890, Rossi et al. (1993) for the period 1890-1990 and Bank of Italy, unpublished data, for the remaining years. For the years 1862-1889 we have rescaled the consumption series in Barberi (1961), using the variation rate method, so that Barberi's 1890 value is equal to the initial value of the series built by Rossi et al. (1993).

WEALTH: we have reconstructed both real and financial wealth.
REAL WEALTH: Cristini and Dalle Nogare (1999) reconstructed real wealth for the time period 1863-1996 as the sum of the stock of consumer durables, land and residential buildings owned by households. Here, instead, real wealth includes the value of the stock of consumer durables, capital and residential buildings owned by households. As anticipated, land is excluded, and capital is added[65].

Stock of consumer durables: the statistical reconstruction of the value of the stock of consumer durables follows Marotta (1988) who derives this aggregate for the period 1975-1984 using the perpetual inventory method based on the formula:

$$STOCKDUR(t) = (1-d)\,STOCKDUR(t-1) + (1 - d/2)\,DURABLES(t) \qquad (1)$$

where DURABLES is households' domestic expenditure on durable goods (of which above) and d is the physical depreciation rate between period t-1 and t. In conformity with Marotta, we assume a value for d equal to 20%.

[65] Capital was proxied by the value of national shares, part of financial wealth, in Cristini and Dalle Nogare (1999). However, the stock of capital series I use here stretches as far back as 1861, while the estimated value of national shares was only available for the post-WW2 period, so that a considerable improvement has been made, in my opinion, by the use of the former series.

After converting STOCKDUR and DURABLES at constant price using the expenditure on durables price deflator in Rossi et al. (1993), we have assumed that the stock of durables in 1866 was equal to the sum of the expenditure on durables in 1866 and in the four years before. We have then applied the above equation for the period 1866-1975, rescaling the series to Marotta's data.

The data on the value of the stock of durables for the years 1862-1865 are extrapolated backwards using the rescaled observation for 1866. We have adopted the following equation, derived from (1)[66]:

$$STOCKDUR(t-1) = [STOCKDUR(t) - (1-d/2)\,DURABLES(t)]/(1-d) \qquad (2)$$

Marotta's information on the value of the stock of durables in 1984 is used to derive, still using equation (1), the value of the stock of durables for the period 1985-1996.

Residential buildings owned by households: this aggregate is obtained following the same method adopted to reconstruct the value of the stock of durable goods. For the period 1890-1990, Rossi et al. (1993) provide information about gross fix investment in residential housing and net housing stock at current and constant price. For the years before 1890, we have rescaled gross fix investments in Ercolani (1969) to the data in Rossi et al. and used the implicit price deflator Ercolani (1969) provides. Then we have derived recursively the value of net housing stock using an equation similar to (2), where all the variables were expressed at constant price. From 1990 onwards, the data about gross fix investment in residential housing and implicit price deflator are taken from ISTAT - Annuario Statistico Italiano (hereafter ISTAT-SA), various issues. The value of households' residential buildings has then been derived using a formula similar to (1).

Rossi et al. (1993) do not give any information about the implicit value of the physical depreciation rate, d, adopted to derive their housing series. In order to find it we have regressed the formula of perpetual inventory on the series in Rossi et al., using OLS. The estimate for d suggests an average life for residential buildings of 100 years ca.

Stock of capital: from 1890 to 1990 the source is Rossi et al. (1993). The data referring to the previous decades in the sample have been reconstructed by backward application of the perpetual inventory method, with a physical depreciation rate of 3%, to the series for gross

fixed investment (machinery plus non residential buildings) in Ercolani (1969) rescaled to the one in Rossi et al. From 1991 onwards we have applied the perpetual inventory method, now with a 6% physical depreciation rate, to the series for gross investment in ISTAT- SA, various issues[67].

The early decades of the sample were characterised by a strong growth of the railways sector. Investment in this sector was both private and public at these early stages. By considering just gross fixed investment in machinery and non-residential buildings, and not also public works, we are therefore likely to have underestimated early accumulation. This was however the only viable option, for we had no clue as to how to distinguish between private and public investment in public works.

FINANCIAL WEALTH: net financial wealth held by households, defined as the sum of these items:

- currency (coins, notes and foreign currency)
- deposits (postal and bank deposits, other accounts, certificati di deposito)
- medium and long term bonds issued by firms and by "special credit institutions"
- other national assets (mainly represented by net worth of insurance policies)
- foreign assets
- investments funds (since 1975)

minus:

- short term liabilities (debts on credit cards, car loans, other forms of consumers' debts)
- long term liabilities (mortgage on houses, properties and additions)

has been easily reconstructed for the time period 1963-1996[68]. The series are taken from Cotula and Caron (1971), Tresoldi and Visco (1975) and Marotta (1988). For the years 1971-

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[66] We could not apply equation (2) to derive the stock of durables for the years 1862-1974 starting straight from Marotta's data because this gave negative values for some years.

[67] Statistical sources usually distinguish between three types of gross fixed investment: machinery, non-residential buildings and public works. In the last years, however, ISTAT has divided aggregate gross fixed investment just between machinery and "other". Since we wanted to reconstruct the stock of private capital, we needed to start from private gross fixed investment. It has therefore been necessary to make an assumption about the proportion of "other" imputable to public works (presumably all publicly financed in the period considered). Considering that in the previous decade public works were less than one half of the value of investment in non residential buildings, we have calculated gross fixed investment as the sum of machinery and 70 % of what is under the heading "other".

[68] We did not include in net financial wealth of households' future pension benefits for lack of data. The only reconstruction we came across was about a small part of it (fondi di quiescenza) and considered only the last eight years of our sample (Marotta (1988)). Recently I have found out that some more comprehensive estimates are available for a longer period of time (Beltrametti (1996)); still, no data are available for most of my sample, i.e. from 1862 till 1951. Even if I were to find a more complete series, however, I would not use it in this theoretical context, because future pensions should not be considered as wealth under the assumption that RE holds.

1974 and 1987-1996 they have been completed with the information on net financial assets published yearly in Bank of Italy's Annual Report (hereafter BI-AR)[69].

There is no information about households' financial wealth before 1963. Cotula and Caron (1971) compute the time series forming financial assets and liabilities of the economic sector for the period 1950-1970, where the economic sector is defined as the sum of households and business sectors; BI-AR does the same for the 1971-1996 time period. A statistical reconstruction of households' net financial wealth for the time period 1950-1962 has been derived comparing each item forming households' net wealth to the corresponding one of the economic sector. Different statistical methods have been applied. For example, the time series: currency, deposits, other bonds, other national assets and foreign assets owned by households show the same cycle dynamics of the corresponding ones for the economic sector, so we have simply rescaled the latter to the corresponding households' items, using the variation rate method. Using variation rates is not a proper method for getting households' short and long term liabilities from the corresponding time series of the economic sector, because these aggregates show different trends. On the contrary, a regression of households' liabilities on economic sector's liabilities, using OLS, provides satisfactory predictions.

For the period before 1950 the only time series available are currency and (postal and bank) deposits held by the public, both of them reconstructed by Fratianni and Spinelli (1991). For the years 1862-1949, the financial wealth held by households was derived summing these two items. We have thus implicitly assumed that, before 1950, the currency and deposits held by households were a stable proportion of the currency and deposits held by the economy, and that currency and deposits were the main components of households' financial wealth[70]. Rescaling to the initial value of households' net financial wealth starting in 1950 seems unnecessary.

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[69] In accordance with the National Accounts European System (SEC), BI-AR has changed the definition of household in 1991, so that in the National Financial Assets and Liabilities Table households are now divided into two sub-sectors:

- pure households or consumer households (excluding individual firms)
- production households.

In order to guarantee homogeneous time series the information about net wealth after 1989 is obtained considering only the pure households' sub-sector. We have thus kept the old household definition adopted by BI-AR.

[70] This is not so unrealistic: in 1950 the sum of currency and deposits represents around 54% of total financial net wealth of households, and presumably the weight of these two items on total households' financial wealth was even bigger before that date.

While in Cristini and Dalle Nogare (1999) financial wealth included public bonds, here I have reworked on the series in order to exclude them, as Darby and Malley's specification takes the Ricardian Equivalence for granted[71].

GROSS LABOUR INCOME OF TOTAL WORKERS: it was impossible to reconstruct this series as the sum of employees' and self-employed workers' labour incomes, because data on the latter is only available after 1980 (ISTAT, 1998). All we had was a number of series on the standard units of total labour[72] in the different business sectors (agriculture, industry, services, public sector) in Rossi et al. (1993) and in ISTAT- SA for the time periods 1911-1938 and 1951-1996, plus data on the gross domestic labour income of employees per standard unit of labour, still in the different business sectors (Rossi et al. (1993) and ISTAT), years 1893-1996. By comparing the series of gross labour income of employees with the corresponding series referring to self-employed workers after 1980 we have come to the conclusion that it is not unreasonable to use labour income for standard unit of labour of employees as a proxy for labour income for standard unit of total workers (employees plus self-employed workers). So we have calculated gross labour income of total workers for the periods 1911-1938 and 1951-1996 by simply summing the products of each business sector's standard units of total labour and gross domestic labour income of employees per standard unit of labour. For the years 1862-1910 and 1939-1950, for which data on the standard units of total labour are missing, we have tried two different procedures.

The first one was based on the use of a net national product series we had reconstructed by rescaling the series in ISTAT (1957) to match the series in Pagliano and Rossi (1993) covering the 1951-1990 span, with the 1991-1996 data taken from ISTAT-SA, various issues. In fact, we noticed that for the period the series for gross labour income of total workers had been reconstructed it had the same cycle dynamics as the one of NNP. We then used the variation rates of the latter to calculate the values for the former for the time period 1862-1910[73]. As for the Second World War gap we have used same method, but considered the

[71] To be precise, I should make a distinction between deadweight debt and debt raised to finance capital expenses. The former is excluded because the Ricardian Equivalence is assumed to hold. As for the latter, when debt is used to finance capital expenses, capital then produces a stream of profits that will pay back debt and debt interests, thus making it unnecessary to raise taxes for the same purpose. So this debt should be excluded even if I did not assume the Ricardian Equivalence to hold.

[72] Before 1970, ISTAT used to refer to units of labour, i.e. number of workers no matter if full-time or part-time, as well as workers employed in more than one job. In order to get rid of all dishomogeneities, ISTAT introduced the notion of standard unit of labour, which measures the effort made by a full-time worker, with only one job, during one year.

[73] It is important to remind that some authors hold the reconstruction of the income series made by ISTAT for the first decades of the sample as very dubious (Toniolo (1990)).

double constraint given by the values of gross labour income of total workers in 1938 and 1951.

The second procedure was the same, but instead of using NNP we chose a measure of total labour income obtained by subtracting to NNP capital income. A series for the latter was roughly derived by multiplying our W at t-1 and a series for the long term government bond yield kindly provided by Spinelli (unpublished data).

The two procedures gave very similar results. I have decided to use the series obtained by the first one in the empirical work I present here.

GENERAL GOVERNMENT TOTAL CONSUMPTION: Sources and Uses General Account reconstructed by Rossi et al. (1993) for the period 1890-1990; for the years 1862-1889 we have used information taken from the Sources and Uses Account reported in Ercolani (1969), whose data we scaled down to those in Rossi et al.. From 1991 onwards the data are from ISTAT- SA, various issues.

GENERAL GOVERNMENT CONSUMPTION IN DEFENCE/NONDEFENCE: for the subsample 1960-1996 ISTAT ((1984) and Collana d'Informazione, various issues) reports a cross-tabulation with decompositions of public expenditures into functional (consumption, transfers, capital expenditures) as well as economic categories: general services, defence, education, health, social insurance and assistance, housing, economic services (a quite relevant heading also including transfers to government enterprises), and other services (mainly consisting of interest payments on government debt). All that is available up to 1960 are the reconstructions of central government total expenditures classified by economic purpose made by Repaci (1962) and Pedone (1969) and some series on general government in Brosio and Marchese (1987), as well as their primary source: Ministero del Tesoro (1969). The former two do not take in consideration local governements and social security institutions; these lacked a major role in Italy for a long time after Italy's unification, yet that role may not have been totally negligible. All of them then classify *public expenditures*, which is to say that each series contains not only public consumption, but also other current account entries (transfers) and capital expenditures. However, at least one of these series can be used as a proxy of general government consumption in the economic category it refers to: defence. This is because defence is a task local governments have never been asked to perform, and, as a public spending category, it contains almost no transfers and very little

capital expense[74], as the data after 1960 confirm. By harmonising data before 1960 (taken from Ministero del Tesoro (1969)[75]) and after 1960 I have therefore reconstructed public consumption in defence for the whole period, and by subtracting it to the series of total general government consumption a series for public consumption for civil purposes obtains.

GENERAL GOVERNMENT PRODUCTION OF PURE/IMPURE PUBLIC GOODS: as I have anticipated, there is a lack of data for the different categories of general government consumption before 1960, so the series have been constructed by scaling down the series for central government spending (including transfers and capital expenditures) so as to match the 1960 level of general government expenditure in the production of pure and impure public goods. The sources are the same as those for government consumption in defence/nondefence. The procedure is not so well justified as in the case of the distinction between defence and nondefence, because neither pure nor impure public goods include, as spending categories, little capital and transfers, and the fact that before 1960 data are about central, not general government may make a difference. I have included in the pure goods government consumption category the following headings: defence, order, administration and interests payments[76], while social expenses, education and expenses in infrastructure and support to the economy have been classified as impure goods.

As all series were aggregate and at current prices, I have divided them by population (in millions) times total consumption price deflator, year 1985. Population is taken from Ercolani (1969) for the period 1862-1966, and from Relazione Annuale sulla Situazione Economica del Paese, various issues, for the years 1967-1996. The price deflator is taken from Barberi (1961) for the years 1862-1890, from Rossi et al. (1993) for the period 1890-1990 and from Bank of Italy, unpublished data, for the remaining years.
In the estimates I present here defence and nondefence public consumption are divided by gross domestic product, following Darby and Malley (1996). The GDP series is taken from Rossi et al. (1993) for the period 1893-1990, and from ISTAT- SA, various issues, from 1991

[74] It is important to point out that, by international agreement, all mobile infrastructure related to defence is classified as public consumption (ISTAT (1984)).
[75] The use of primary sources gives a more complete and homogeneous reconstruction of government accounts.
[76] The heading "interest payments" in government consumption only includes the costs of their management, so it is a kind of administrative cost; the same is true for expenses in infrastructure and support to the economy. Some authors (Kormendi (1983)) classify administrative costs as "waste", not as consumption, and they may have a point there.

onwards. For the period 1862-1889, the series has been obtained by rescaling the series in Ercolani (1969)[77] to the data in Rossi et al.

[77] The GDP series in Ercolani is a re-elaboration of the ISTAT (1957) series, and so some historians regard it with suspicion.

TABLES AND FIGURES.

Figure 1: real per capita consumption of nondurables and services

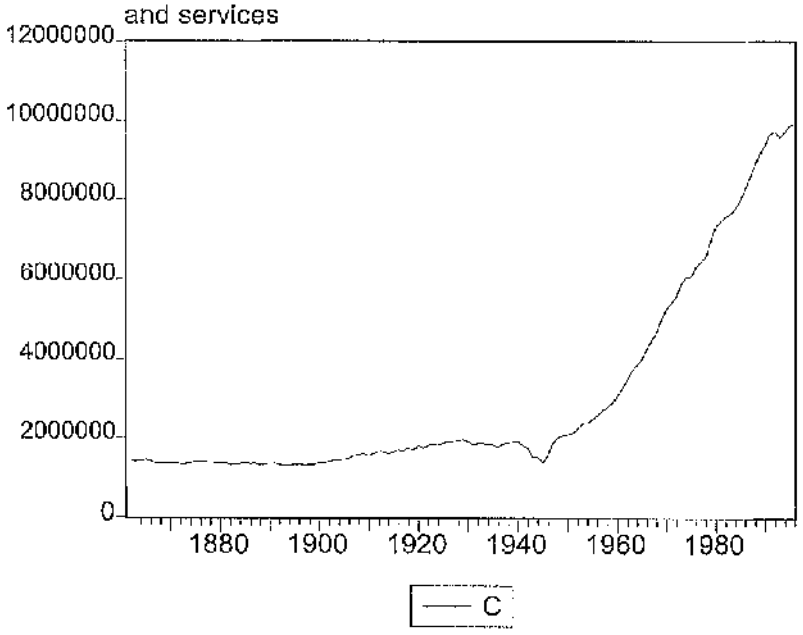

Figure 2: real per capita gross labour income

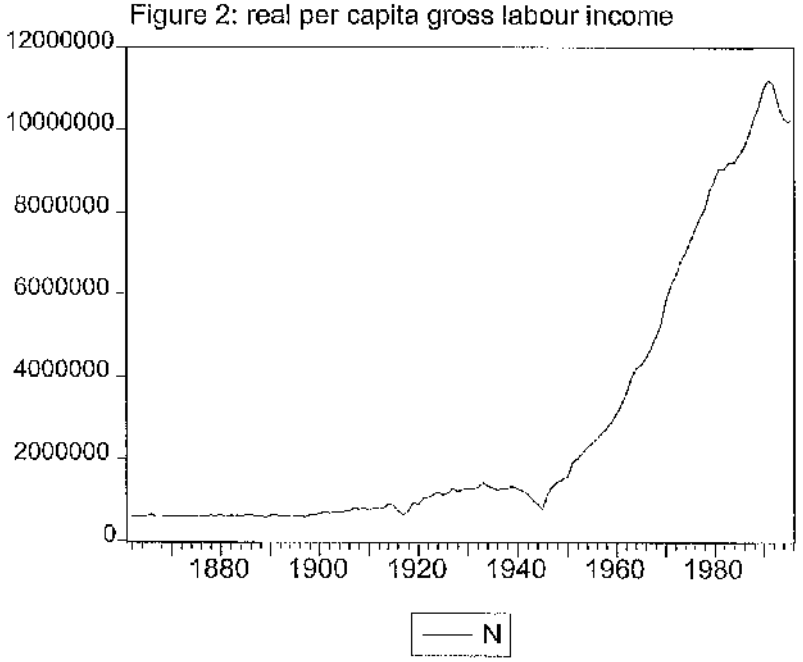

Figure 3: real per capita wealth net of public bonds

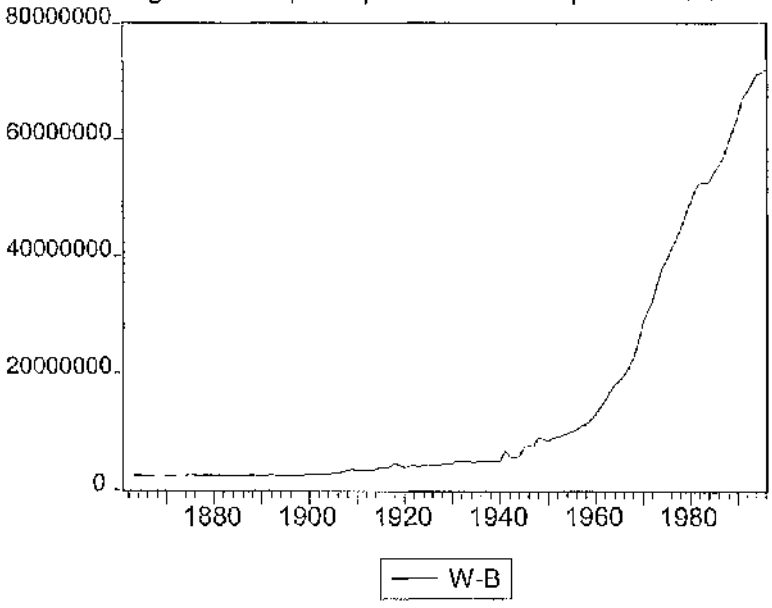

Figure 4: real per capita gov.consumption

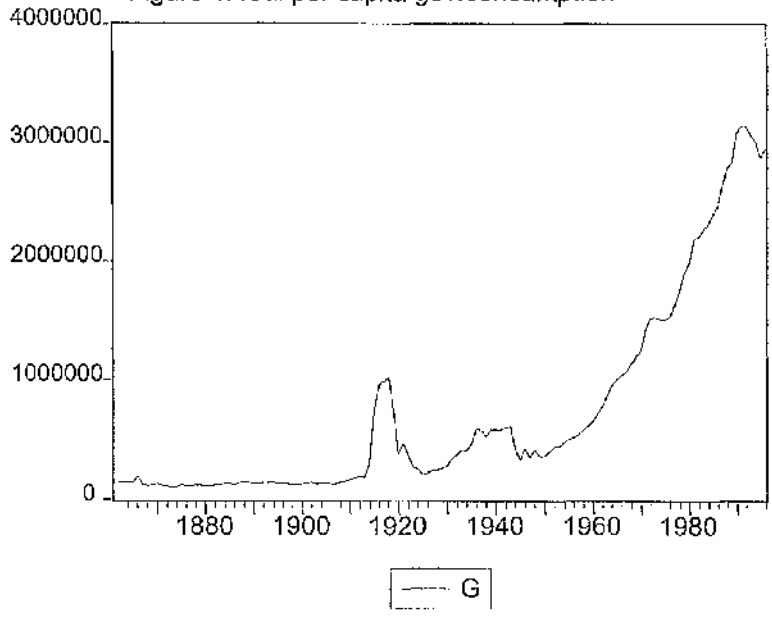

Figure 5: real per capita government total, nondefence and defence consumption

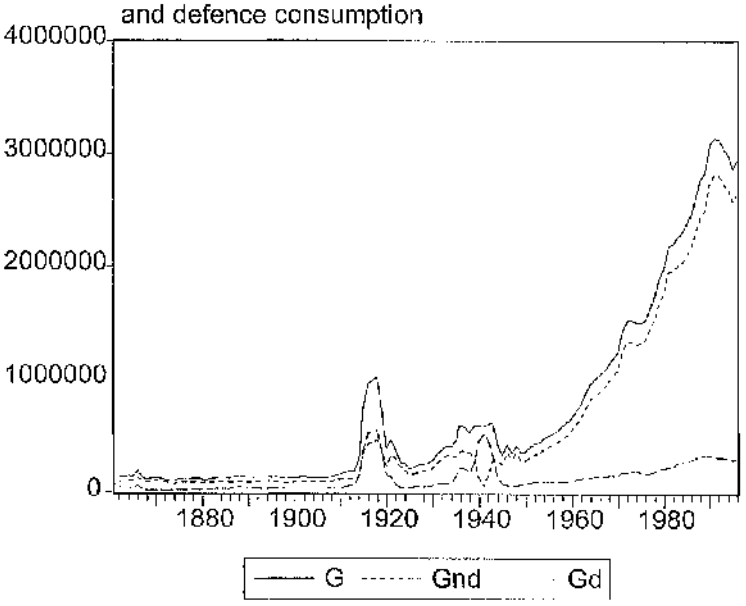

Figure 6: government consumption over GDP

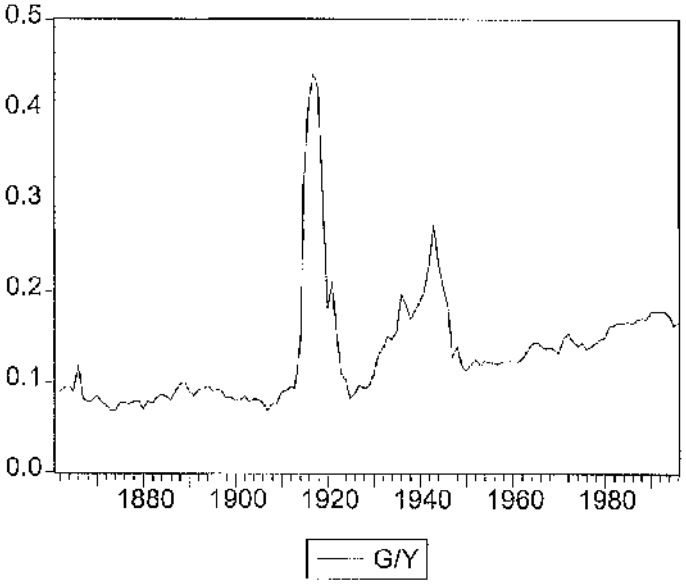

Figure 7: real per capita gov. nondefence consumption

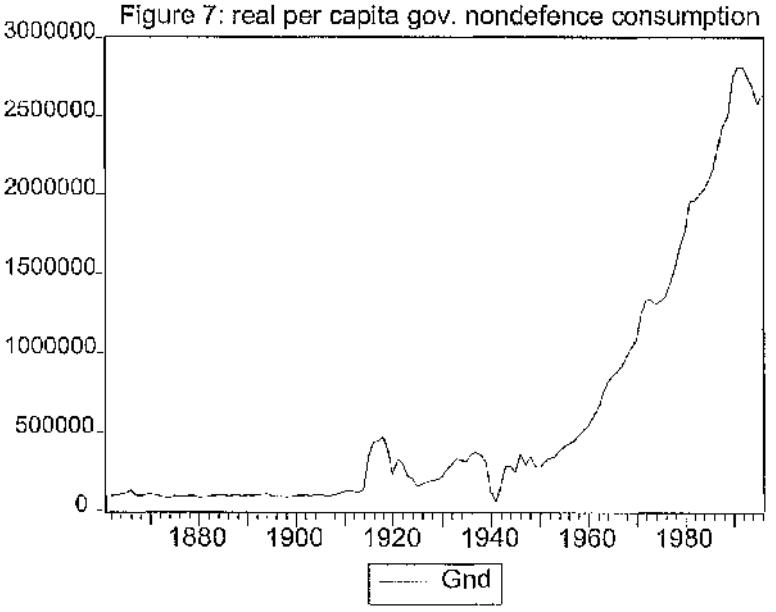

Figure 8: gov. nondefence consumption over GDP

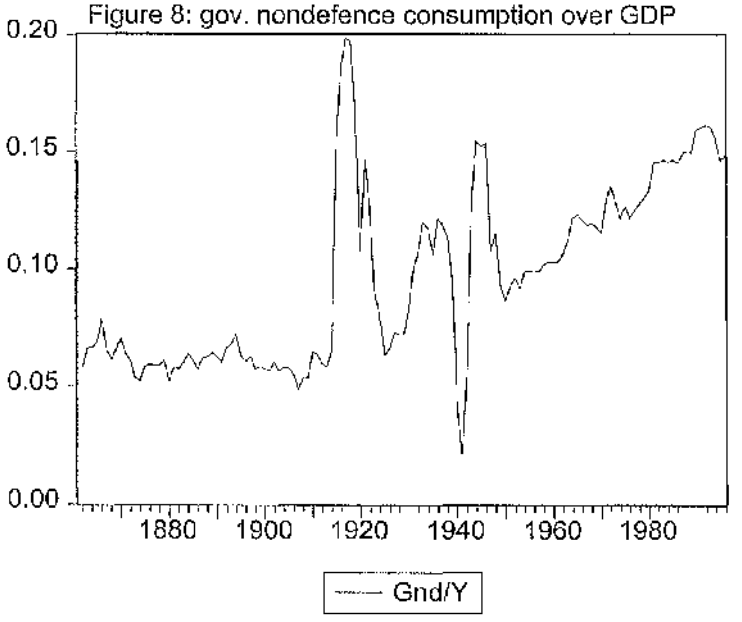

Figure 9: gov. consumption in nondefence over G

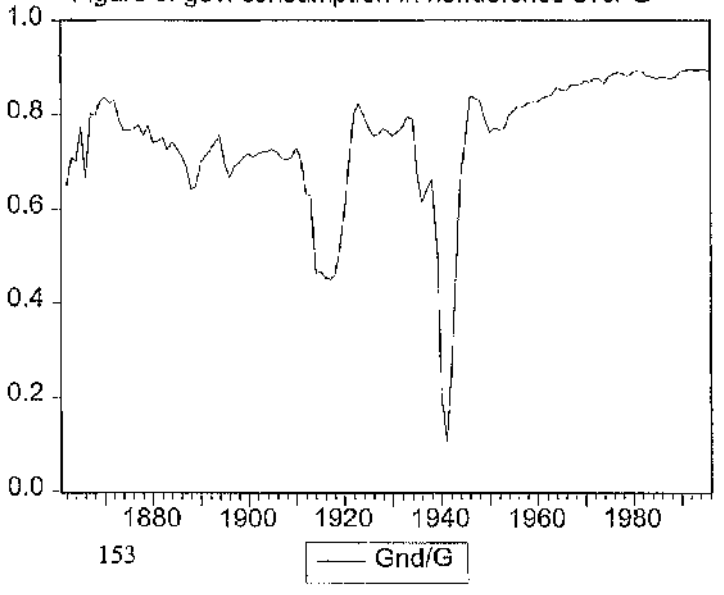

Figure 10: real per capita gov. consumption in defence

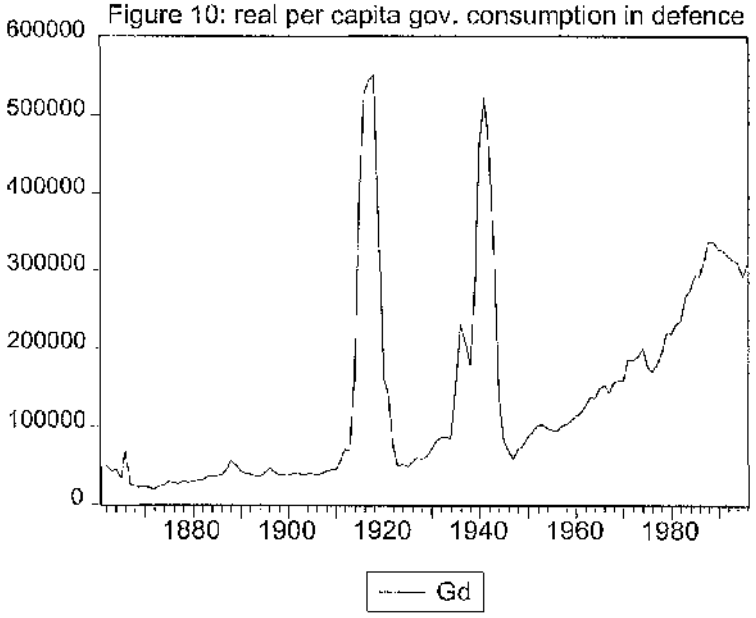

Figure 11: gov. defence consumption over GDP

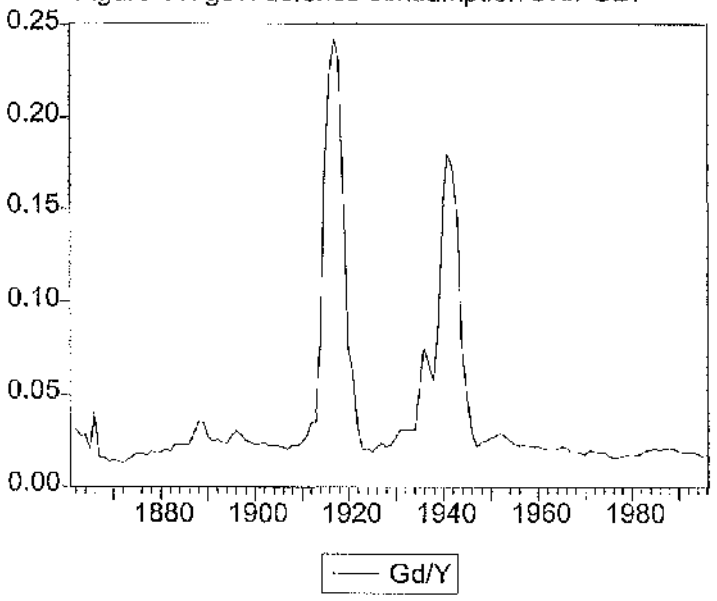

Figure 12: gov. defence consumption over G

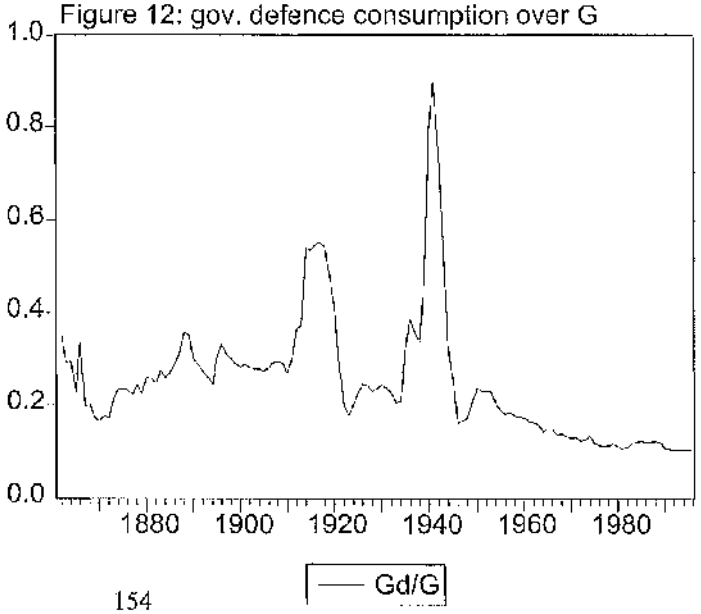

Table 1: 1862-1991, GMM and 2SLS estimates.

	GMM-AM	**GMM-NW**	**GMM-A**	**2SLS**
$\hat{\beta}_0$	**1.039.395** **(5.56)**	1.147.342 (9.25)	1.136.909 (9.34)	1.147.340 (5.92)
$\hat{\beta}_1$	**0.008** **(2.91)**	0.011 (5.94)	0.012 (10.34)	0.007 (2.74)
$\hat{\gamma}_1$	**-3.609** **(-3.30)**	-1.754 (-3.46)	-1.163 (-2.82)	-2.411 (-2.97)
$\hat{\gamma}_2$	**4.652** **(2.82)**	2.352 (3.33)	1.648 (2.67)	3.885 (3.40)
Hansen's test (p-value)	**0.72**	0.59	0.58	

Note: here and in all following tables t-statistics in parentheses.

Figure 13: Theta 3.

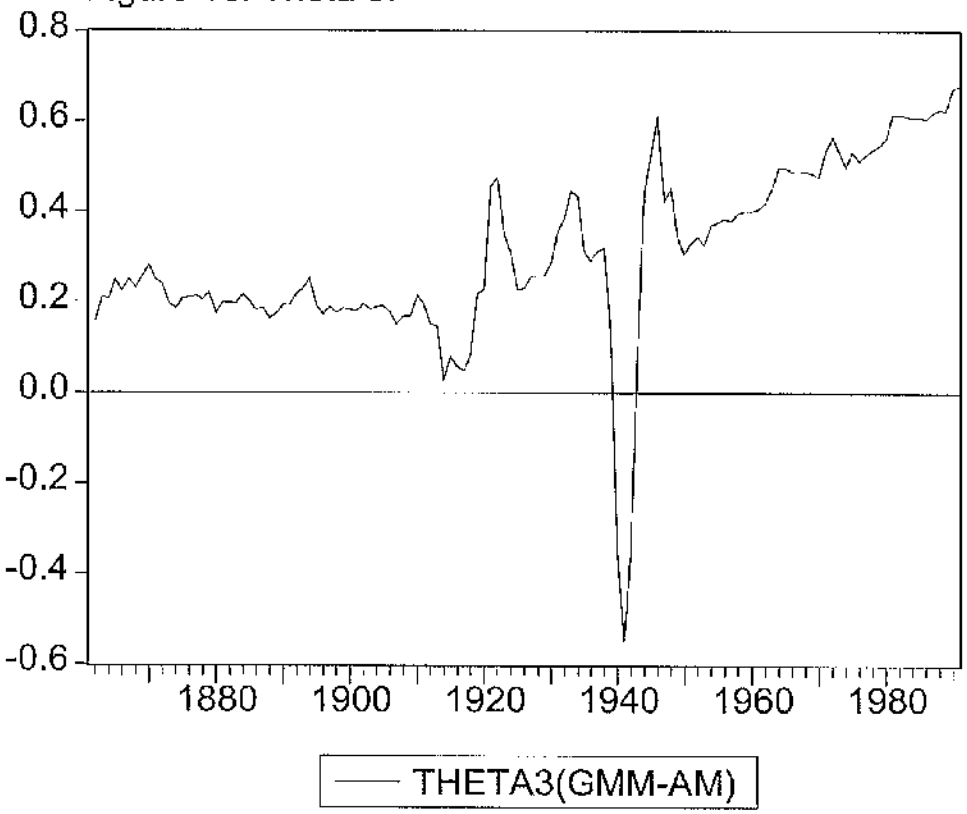

Figure 14: estimated thetas.

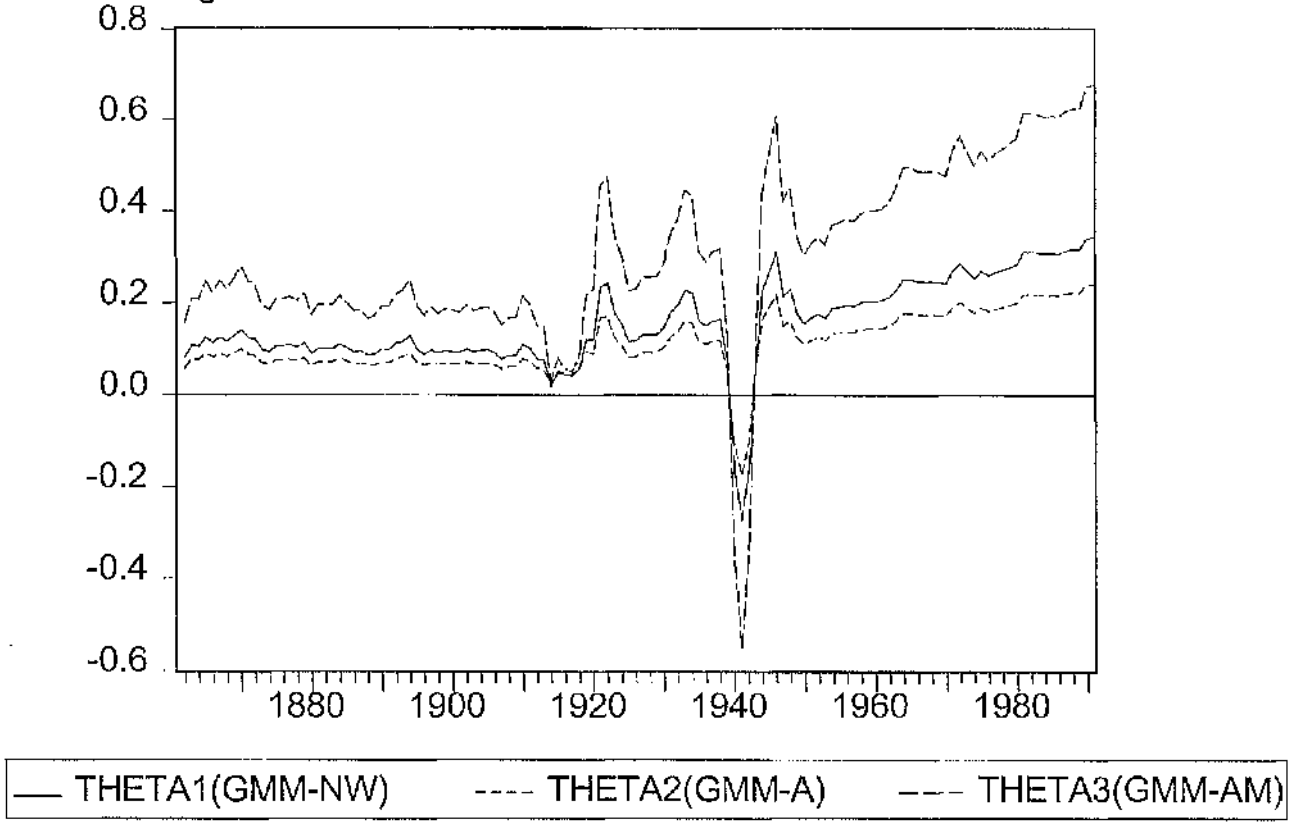

Table 2: 1862-1991 excluding 1940-1946, GMM estimates.

	GMM-AM	**GMM-NW**	**GMM-A**
$\hat{\beta}_0$	**1.110.407** **(7.31)**	1.191.646 (9.86)	1.141.862 (11.23)
$\hat{\beta}_1$	**0.008** **(2.88)**	0.010 (5.19)	0.012 (5.32)
$\hat{\gamma}_1$	**-3.572** **(-4.94)**	-3.075 (-3.97)	-3.083 (-3.73)
$\hat{\gamma}_2$	**4.663** **(4.9)**	3.924 (4.74)	4.158 (4.19)
$\hat{\alpha}$	**0.431** **(1.48)**	1.000 (4.32)	1.802 (9.51)
Hansen's test (p-value)	**0.71**	0.78	0.72

Figure 15: Theta 3 and the estimated thetas from Table 2 (NW and A).

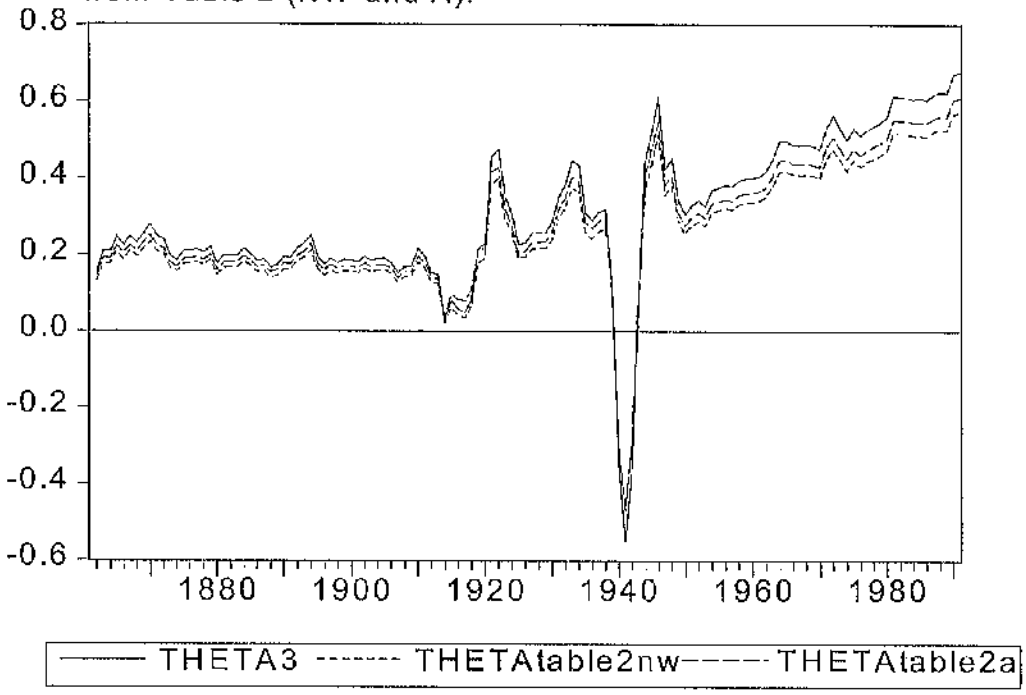

Table 3: 1862-1996, GMM estimates.

	GMM-AM 1862-1991	**GMM-AM 1862-1996 (a)**	**GMM-AM 1862-1996 (b)**	**GMM-AM 1862-1996 (c)**
$\hat{\beta}_0$	1.039.395 (5.56)	1.104.030 (6.11)	1.127.699 (9.49)	1.142.228 (9.24)
$\hat{\beta}_1$	0.008 (2.90)	0.009 (3.78)	0.010 (3.81)	0.006 (2.25)
$\hat{\gamma}_1$	-3.609 (-3.30)	-2.841 (-3.10)	-3.619 (-4.08)	-3.860 (-4.78)
$\hat{\gamma}_2$	4.652 (2.82)	3.526 (2.64)	4.570 (3.31)	4.839 (4.06)
Dummy estimated coefficient	-	-362.724 (-5.63)	-4.35E+09 (-2.12)	-3.009 (-4.29)
Hansen's test (p-value)	0.72	0.36	0.07	0.39

Table 4: 1890-1991, GMM and 2SLS estimates.

	GMM-AM	**GMM-NW**	**GMM-A**	**2SLS**
$\hat{\beta}_0$	**838.948** **(3.36)**	990.146 (5.95)	1.020.564 (6.37)	990.146 (4.14)
$\hat{\beta}_1$	**0.009** **(3.03)**	0.011 (5.74)	0.012 (8.25)	0.008 (2.85)
$\hat{\gamma}_1$	**-3.920** **(-3.48)**	-2.288 (-4.59)	-1.699 (-3.98)	-2.414 (-2.79)
$\hat{\gamma}_2$	**4.778** **(2.97)**	2.953 (4.29)	2.232 (3.63)	3.709 (3.08)
Hansen's test (p-value)	**0.75**	0.67	0.60	

Table 5: 1862-1937, GMM and 2SLS estimates.

	GMM-AM	**GMM-NW**	**GMM-A**	**2SLS**
$\hat{\beta}_0$	**860.555** **(5.08)**	987.338 (5.59)	1.459.729 (12.56)	990.146 (4.09)
$\hat{\beta}_1$	**0.039** **(3.58)**	0.028 (2.47)	-0.009 (-0.90)	0.029 (1.95)
$\hat{\gamma}_1$	**-1.239** **(-2.08)**	0.007 (0.00)	2.281 (1.60)	-1.297 (-1.49)
$\hat{\gamma}_2$	**1.575** **(2.01)**	-0.138 (-0.10)	-2.997 (-1.62)	1.884 (1.75)
Hansen's test (p-value)	**0.56**	0.67	0.52	

Table 6: 1954-1991, GMM and 2SLS estimates.

	GMM-AM	**GMM-NW**	**GMM-A**	**2SLS**
$\hat{\beta}_0$	**-1.196.620** **(-2.41)**	-418.200 (-1.20)	-348.583 (-1.14)	-1.196.620 (-1.71)
$\hat{\beta}_1$	**0.021** **(5.12)**	0.018 (7.45)	0.017 (7.40)	0.022 (4.17)
$\hat{\gamma}_1$	**-5.656** **(-0.26)**	1.667 (0.23)	-4.880 (-0.82)	-5.191 (-0.36)
$\hat{\gamma}_2$	**4.541** **(1.67)**	4.156 (2.83)	6.192 (5.91)	4.624 (2.11)
Hansen's test (p-value)	**0.97**	0.75	0.68	

Table 7: 1862-1991, new normalisation.

	GMM-AM
$\hat{\beta}_0$	1.172.700 (7.83)
$\hat{\beta}_1$	0.008 (2.38)
$\hat{\gamma}_1$	-0.452 (-2.12)
$\hat{\gamma}_2$	0.608 (1.44)
Hansen's test (p-value)	0.64

Figure 16: Theta 3 and Theta 4.

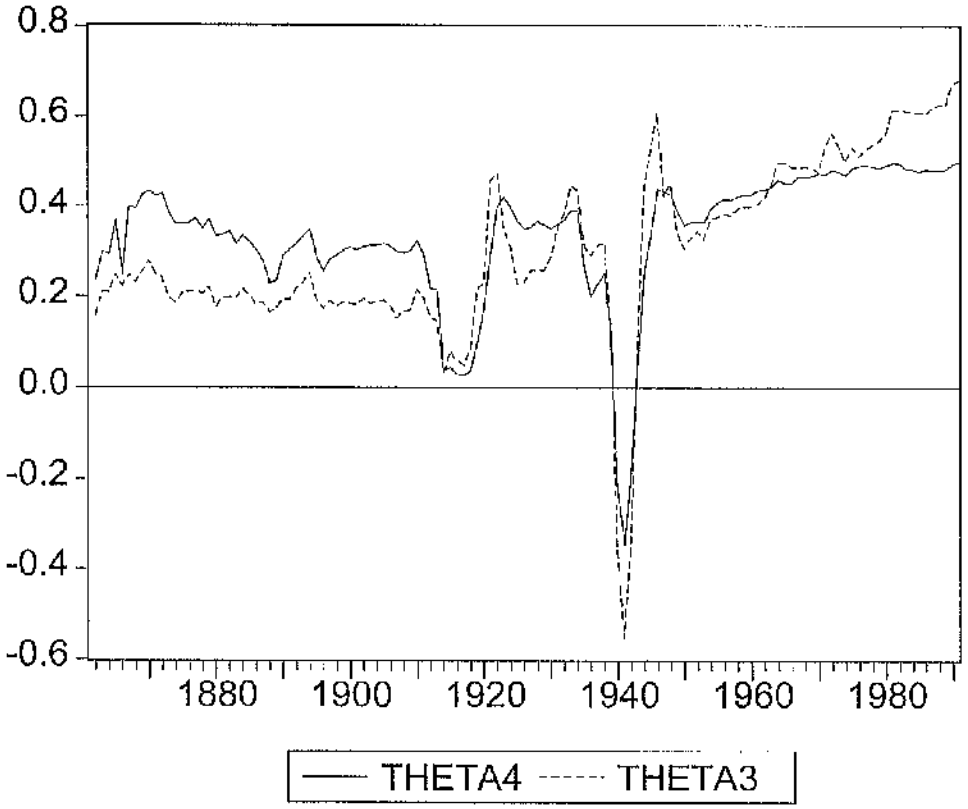

Table 8:1862-1991, pure/impure G.

	GMM-AM
$\hat{\beta}_0$	1.068.346 (7.88)
$\hat{\beta}_1$	0.013 (4.48)
$\hat{\gamma}_1$	-0.180 (-0.35)
$\hat{\gamma}_2$	2.262 (1.21)
Hansen's test (p-value)	0.74

Conclusions.

The aim of this thesis was to contribute originally to two branches of economic literature centred on fiscal policy: the Political Economy approach to fiscal policy determination and the empirical literature on the effects of government consumption on private consumption. In the next paragraphs I summarise the main results I have obtained, articulated for each chapter. Before that, I would like to make two general considerations. The first one is that working on this thesis inevitably led to reflect also on some methodological issues, and more than a hint at these reflections has been reported in each chapter. The second is that if there was one element unifying the analysis, this was the feeling that when addressing fiscal policy issues an economist should try to seek the collaboration of scholars of other social sciences. When one comes to the normative part of contributions such as the one in Chapter 1, for instance, there is a lack of specific knowledge of electoral systems on an economist's part that only a scholar in Political Sciences could fill. The analysis in Chapter 2 would probably be more accurate if political scientists worked on classifications of governments according to criteria suggested by economists. Finally, also Chapter 3 could benefit from further interaction with scholars in Economic History as far as the data construction is concerned. Hopefully the collaboration among scientists of different social disciplines will be more extensive in the future. In my view, this cannot but be beneficial, and not just for Economics, but for all social sciences.

Chapter 1: extra-economic polarisation, coalition governments and delays in stabilisation.

In Part 1 of this chapter I have explored the possibility to express the strategic interaction between coalition partners as a game of complete information. It turns out that this is possible, and that the symmetric equilibria of the game all imply the possibility of a delayed stabilisation.

The game is a complete information variant of the war of attrition model first proposed by Alesina and Drazen (1991), where I assume that inflation affects everyone's utility in the same way and there is a given point in time the game necessarily comes to an end if it is has not ended before (after two years for simplicity). Depending on the parameters' values, the game is either a double Prisoner's Dilemma, or a double Chicken, or a Chicken game that may have a sequel as a Prisoner's Dilemma. In the first case there is a unique Nash equilibrium implying that coalition partners will never concede. However, parameters' values are such that not so much strategic inefficiency is implied. The welfare analysis of this case is

quite new and interesting, as it highlights that here a delayed stabilisation is a means through which coalition partners succeed in sharing part of the fiscal burden, the alternative being, under the assumption of absence of a commitment technology allowing for co-operation, that either party pays for it all. When neither party concedes inflation is used alongside public debt to finance public spending, and it is the real balance effect of inflation determining the sharing.

In the second case there is a mixed strategies equilibrium implying that either or both parties may concede/not concede in both years. Parameters' values are such that if a stabilisation is performed with delay as a consequence of the players' draws, a lot of strategic inefficiency is introduced.

In the third case, there is a mixed strategies equilibrium implying that either there is immediate stabilisation or no stabilisation before the end of the game. As far as the parameters' values is concerned, this case is intermediate with respect to the first two.

One of the advantages of seeing the interaction between coalition partners as a game of complete information lies in the fact that it highlights the real problem with coalition governments' decision-making process, i.e. the lack of credibility affecting their members' commitments. This points to possible solutions in terms of either a reform of the procedure by which financial bills are approved by Parliament (i.e. no sequential voting) or a reform of the electoral system from a proportional to a majority rule.

In Part 2 a possible political scenario has been suggested that is likely to cause that parties with opposite views on the allocation of the fiscal burden form a coalition government. A strong polarisation on some extra-economic issue which is important in voters' and candidates' motivation plays an important role. The extra-economic issue and the fiscal agenda must split the electoral body differently, so that there may be parties with opposite fiscal agenda but common extra-economic views wanting to form a coalition government. Voters are assumed to be rational and forward looking, and the electoral result depends on the choice of the median voter in voters' distribution according to the opinion about the extra-economic issue. If his extra-economic motivation in voting is greater than the economic one he may choose to vote for a party that he can anticipate will form a fiscally irresponsible coalition government. An inefficient fiscal policy is the price to pay to have his extra-economic views represented on power. It is this scenario, and not the presence of coalition governments per se, that ends up being the real cause for inefficient fiscal policies. This points to the importance of a nation's cohesion around a common Weltanschauung.

Chapter 2: is the fiscal performance of all coalition governments bad? Evidence of the contrary.

The empirical literature about coalition governments' fiscal performance has so far taken for granted that the thesis to verify is that all of them tend to be debt- and inflation prone after a shock has hit the economy. In line with the findings of Chapter 1 I argue that when a coalition is formed by parties with conflicting fiscal goals a shock is not needed for a war of attrition to start. When a coalition is formed by parties with a common fiscal agenda, instead, there should be no relevant difference in fiscal conduct with respect to single party governments, not even after big economic shocks. Finally, it is also usually assumed that stabilisations are performed by single party governments only, but this is no direct consequence of the theoretical analysis. Recent history has often witnessed coalitions which were formed in order to bring about a stabilisation. It is even possible that a stabilisation is performed by the same coalition who caused a prolonged rise of debt and inflation: when they do stabilise, they must be vigorous in their action.

In Chapter 2 I have used cluster analysis on data over 11 parliamentary democracies from 1960 to 1990 to verify whether these heterodox theses may be validated. Cases are country-year units, and the variables used in the clustering are two measures of the fiscal impulse filtering the effects of the business cycle, so as to be a truer measure of a government's will. These are the Blanchard Measure for budget deficit and an index, EXPIMP, for expenditure which is constructed in a similar way. The results are read taking in consideration the political characterisation of cases, where the distinction is between single party, homogeneous and non-homogeneous coalition governments. Clustering has been performed using the Ward algorithm (intra-group least squares) with City Block metrics and the K-means cluster iterative partitioning method.

The results obtained using the whole sample confirm two of the above theses, namely that not all coalition governments tend to have an irresponsible fiscal conduct, as there are coalitions with a high degree of cohesion among their members who behave like single party governments, and that coalitions with a low degree of cohesion on fiscal matters tend to determine both strongly positive and strongly negative fiscal impulses.

The clustering solutions relative to the 1962-1971 subsample reject the thesis by which the presence of a coalition government is relevant only if it happens to be in office when a negative economic shock takes place. However, the solutions relative to the 1972-1981 subsample reveal that recessions definitely tend to make differences in fiscal performance

greater. Finally, the results obtained working on the 80s' are not so easy to read. The gradual process towards a European Monetary Unions may be an explanation, as many proportional representation democracies in the sample may have started to perceive this implied a binding commitment on fiscal as well as on monetary policy. As for homogenous coalitions, they implemented strong stabilisations in the 80s more often than single party governments. This may just be a reflection of a shift of power from fiscally irresponsible non-homogenous coalitions to homogenous ones.

Chapter 3: public consumption as a substitute to private consumption: evidence from Italian long time series.

In Chapter 3 an empirical investigation of the degree of substitutability between public and private consumption using Italian data from 1862 to 1996 has been presented. I have followed the approach suggested by Darby and Malley (1996), who use a non-linear specification of the consumption function directly derived from utility maximisation. They also define the degree of substitutability between government and private consumption as a time-varying measure which is a weighted average of the current amounts of the different components of G, where the weights are given by estimated coefficients of the latter. As distinct components of government consumption I consider defence and nondefence, as no finer distinction is possible with the available data.

The disturbance term of the specification is correlated to the explanatory variables and non serially uncorrelated, because it has a MA component. GMM is known to give consistent estimates in these cases, and reaches asymptotic efficiency if a HAC estimate for the asymptotic covariance matrix of the sample moments is used. I have chosen to follow Andrews (1991) in my estimates. I have also adopted the "pre-whitening option" suggested by Andrews and Mohanan (1992), as this seems appropriate in order to mitigate the effect of the outliers of WW2.

The regression results confirm that composition matters: the direct crowding out effect is higher when the relative weight of government consumption in nondefence increases. The degree of substitutability has followed an upward trend in the post WW2 period, reaching values as high as 0.67 in the most recent years.

These results seem robust to an alternative way of defining the degree of substitutability parameter that is still dependent on how much of government consumption is defence and how much nondefence. An attempt at detecting the effects of changes in the relative weights

of the costs of the production of pure and impure public goods is not so successful instead, because of lack of quality data.

These findings speak in favour of a more cautious attitude governments should have towards the use of public consumption for stabilisation purposes, because the stimulus to aggregate demand is not to be taken for granted.