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IDEOLOGICAL POLARISATION, COALITION GOVERNMENTS AND DELAYS IN STABILISATION.

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ABSTRACT.

When economic agents care for some extra-economic issue a great deal, there is a polarisation on the subject and this is not coincident with the division of society on the fiscal policy measures the authority should implement, a coalition government with conflicting fiscal purposes is likely to be elected in office. This "ideological" coalition is most likely to cause the accumulation of large public debts, because its members find it impossible to choose a fiscal policy co-operatively. Their strategic interaction leads to delays in stabilisation which are shown to constitute a welfare loss. A necessary condition for all this to happen is a precise institutional set-up, i.e. a parliamentary democracy with proportional representation. A change of the institutional context may be the right cure to follow.

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1. Introduction.

Some OECD economies have accumulated large public debts in the last twenty years (Italy, Belgium and Ireland are among them), while others haven't. The economists who have tried to explain this cross-country difference in fiscal policies have focused on politico-institutional determinants, finding it unconvincing to justify it using just economic arguments such as country-specific shocks or different perceptions of the length of shocks. Since the experience of large budget deficits for several years is typical of just some countries, the explanation must be some country-specific factor; but what is more country-specific than political institutions and context? This line of research has therefore come to be part of that recent branch of literature known as Political Economy which has developed out of the credibility literature[1].

Some empirical works published in the late Eighties and early Nineties (Roubini and Sachs (1989a, 1989b), Grilli et al. (1991)) pointed out that the political factor playing a role in determining the accumulation of large public debts might be a high degree of fractionalisation of governments. Since both Italy and Belgium had a long tradition of coalition governments, economists started thinking that running large budget deficits might be the consequence of the difficulty that a coalition government finds in taking decisions because of its divided nature.

The idea by which the degree of government fractionalisation and growth of public debt are related has since then become rather popular, also because the empirical evidence seems to give some credit to it. This paper aims at putting this thesis into a rigorous theoretical framework. To our knowledge, in fact, the only attempt so far to build a model on the subject is to be found in Alesina and Drazen (1991). However, in Alesina and Drazen's model some basic issues are dealt with in what we think is an unconvincing way. Besides, no-one has addressed so far the question why conflicting coalition governments come into being. A favourable institutional context (parliamentary democracies with proportional representation) is a necessary but not

[1] With respect to the credibility literature, the Political Economy literature (also known as the literature of strategic inefficiencies) retains the game-theoretic structure but it is marked by a stronger emphasis on the relation between sub-optimal economic policies and the interaction between the actors of the political scene (different parties, parties and voters).

sufficient condition. Our answer is that a strong polarisation of the electoral body on some extra-economic issue can play a major role. Our model may then also be read as an investigation into the relation between "ideological" polarisation and fiscal policy.

The main reason why the model by Alesina and Drazen needs in our view a reconsideration has to do with the fact that it does not seem to capture the real nature of the strategic interaction between coalition partners. To see the point, let us briefly describe that 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 the coalition partner to pay for the larger amount of public spending, so no decision can be taken about the amount of tax revenues to be raised from each of them. 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 with an intensity that is not known by his partner. This makes it possible to identify the strategic interaction between the coalition partners with an imperfect and 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 make declarations about their sensitivity to the distortions caused by inflation equivalent to declare to be either ready or not to be burdened with the greater part of the fiscal deficit from then onwards. There is an incentive to be a free rider at first, but since delaying the stabilisation is costly, this incentive becomes smaller and smaller, till the player with the higher sensitivity to the distortions associated to the use of seignorage "concedes".

Clearly, the assumption about the players' information set plays a crucial role in the 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. Yet this feature, which is specific to the War of Attrition game, does not seem to catch what really goes on in coalition governments. It is unlikely that the partners of a coalition do not know each other's payoffs, and anyway, their strategic interaction has more to do with their inability to create binding commitments between each other, as pointed out in Roubini and Sachs (1989a). This may be due to the fact that the procedure to generate a financial bill entails noncontemporaneous votes, making vote-trading easy to renege on.

A second unpleasant aspect of the War of Attrition model is its sketchy presentation of the political context. In our opinion, it is important to define the terms of the question in a more detailed way. This is relevant not just to understand why coalition governments with conflicting fiscal purposes are formed, as mentioned earlier, but also for the better definition of the theses to test empirically. For instance, it is not correct to try to find a relation between the type of democracy of a country and its fiscal performance, as not all parliamentary democracies with proportional representation have a story of coalition governments. One should differentiate among them according to their degree of ideological polarisation.

Identifying the true determinant of the accumulation of large public debts with the presence of a polarisation on some extra-economic matter (where there exists already a polarisation on fiscal policy and the division of the electorate on the subject is different from the ideological one) instead of with the presence of a coalition government has also another advantage. It reminds the fact that not all coalition governments are debt- and inflation-prone, but only those formed by parties with conflicting views on fiscal policy. Too often has this been forgotten in the works on the subject so far published, but it is clearly a gross mistake to put together Mr Kohl's coalition governments with most of the Belgian or Italian ones.

2. Assumptions: the economic context.

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.

It is also possible to run budget deficits and to issue public debt to cover them. Public debt is sold abroad and therefore pays an exogenously given world interest rate, r, to the holder; for simplicity, however, we will set r to 0. 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[2]) public debt is equal to 0.

Since there is a ceiling to the debt which can be issued, public spending cannot be financed through public debt only; a part of it must be financed by raising taxes[3] from agents.

When the elections' results have not given an answer to the question about who should carry the fiscal burden (meaning there is a coalition in office comprising representatives of both social groups) neither of the lump sum taxes can be used singularly, because it is not politically feasible. Nor can the government use both. In fact, coalition parties cannot co-operate on how to have the social groups they represent share the cost of public expenditure. We will see that the reason for this is that the institutional context is such that their commitments are not credible.

A viable option in this case is the use of public debt matched by seignorage, because the latter is a tax affecting everyone's utility in the same way. Inflation is however distortionary. This is essential to qualify the equilibria of the game we will analyse as sub-optimal. It is assumed that the budget deficit is financed through seignorage and public debt in fixed proportions: g and $1-g$ [4].

There exist two types of agents. For a first group, ideology has absolute priority over consumption in their utility: their preferences are lexicographic with ideology at the top of the ranking. If a government with a different ideological tendency is in power, their utility is the lowest possible, no matter the fiscal policy implemented. In contrast, for the second group ideology enters the utility function just like any other argument. We will call these agents "unattached voters". Neither ultra-ideological nor unattached voters identify with just one of the social groups above.

The utility function of an unattached voter is the following:

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

[3] This is an assumption borrowed from the original model by Alesina and Drazen. It is essential for the war of attrition, and for the game in our model, too.

[4] g may be thought of as the ceiling to the monetisation of budget deficits imposed by the law.

$$U^i = \sum_{t=0}^{\infty}(1+b)^{-t}u_{t+1}^i$$

$$u_t^i = c_t - y - K_t(q) + dq_t$$

where:

b is the rate of discount, but for simplicity we will set it to 0;

c is consumption of private goods[5];

y is yearly per capita income, and by subtracting it we are just normalising;

K represents the utility loss due to the presence of seignorage, and is a linear function of the level of inflation:

$$K_t(q) = qp_t$$

q is a parameter measuring how sensitive utility is to the distortions caused by inflation. Inflation has two effects on utility: a real balance effect and an indirect effect via the distortions it causes. Both are the same for everyone.

The last term accounts for ideological preferences: d is a dummy equal to 1 if a conservative government is in office and to 0 otherwise; q measures the bias for the conservative ideology[6]. q is the same for all agents and can take up values from $-\infty$ to $+\infty$. It is a random variable which is assumed to move over time as a random walk:

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

By modelling q this way we emphasise a strong serial autocorrelation of the ideological tendencies of a given national context, but also their dependence on "cultural shocks". Agents tend to be ideologically coherent, but new information may make them change their mind.

[5] Utility is also dependent on the consumption of the public good, but since the level for g is given it plays no role in the game and is therefore omitted.

[6] "Conservative" and "left-wing" are used to define the two opposite ends of the ideological polarisation (i.e. pro and against abortion, North and South).

As for ultra-ideological voters, they, too, care for consumption, but only once their favourite ideology is represented in power. The dependence of their utility on non-ideological factors is modelled in the same way as for unattached voters:

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

$$u_t^i = c_t - y - K_t(q)$$

Since all 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. We assume then that this is the path our economy chooses, so this a world with no saving[7].

There is a maximum length of time during which public spending can be financed by recurring to debt. We assume that from T=2 on such a practice is forbidden. This may be seen as the requirement imposed by an international agreement our economy has signed up for. If a coalition party is still in office at that or a later date, they will have to make both social groups pay for half of the fiscal burden. This assumption makes it possible to describe the interaction between the coalition parties before the international agreement is enforced as a game like the one in Diamond and Dybvig (1983) called the Bank Runs game[8]. What is necessary for this is a time the game will end at, while what happens afterwards if a coalition with conflicting fiscal purposes is still in charge may be specified in different ways. We have chosen the random draw just mentioned for simplicity.

3. Assumptions: the political context.

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[7] This obviously means that the 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 intertemporal additivity. It is only when inflation is introduced alongside with debt that there is a reduction in welfare.

[8] This assumption plays the same role as the one about the incomplete information of players in Alesina and Drazen: its presence is functional to the identification of coalition partners' interaction with a game the features of which have already been investigated.

The setting is a parliamentary democracy with proportional representation. 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 N=2n+a, n of which are rentiers and n+a of which are workers (a is an odd number).

If there were no ideological biases only two parties would compete at the elections: one would finance public spending through a lump sum to be paid by workers only and the other through a lump sum imposed on rentiers. The latter would always win, since workers are more numerous than rentiers.

However, this is not the case. Ideology matters, and if the political scenario is affected by this factor in certain ways it is possible to have no absolute majority as a result of political elections, and the formation, as a consequence, of a coalition government (possibly comprising representatives of both rentiers and workers, and thus having conflicting fiscal proposals in itself).

We must then specify a way in which a political context is conditioned by ideological polarisation so that all this may happen. A restricted and not too unrealistic set of assumptions that satisfies this need is the following[9]:

1) the number of voters with lexicographic preferences is equal or greater than the majority plus one of the electoral body ((2n+a+1)/2). Note that these are both workers and rentiers;

2) there exists an ideological division between voters with lexicographic preferences not corresponding to the social distinction workers/rentiers. That is, there are both conservative and left-wing workers, while rentiers may be all conservative or some conservative and some left-wing. There are therefore three (four) "ideological constituencies": one is ideologically left-wing and has a preference for the adoption of a lump sum tax to be paid by rentiers; one is conservative but shares the same fiscal goals as the first one; one is conservative and prefers imposing a lump sum on workers (the last, eventual one has the same preferences as the third one as far as fiscal policy is

[9] What follows qualifies as sufficient but not necessary conditions.

concerned, but it is left-wing by ideology)[10]. The votes of agents with lexicographic preferences are not swinging: they stick to the political party that gives voice to the ideological constituency they belong to;

3) no ideological constituency (IC) gets the majority of votes. In addition, the following inequalities hold:

(IC of left-wing rentiers) < IC of conservative rentiers
IC of conservative rentiers < IC of conservative workers[11]
IC of conservative workers < IC of left-wing workers

4) the number of unattached workers is equal or smaller than the size of the IC of left-wing workers; it is also greater than the number of unattached rentiers;

5) all voters are rational and forward-looking, and they have full information.

If these assumptions are met, those with lexicographic preferences may only vote for someone who is part of their own IC, because this is the only way they can be sure that in case the elections will have no absolute majority as a result, those they have voted for will set up alliances/coalitions giving priority to ideology. Since their votes are only cast for candidates who are ultra-ideological themselves, the following three (four) parties must exist:

- A1: all members are part of the IC of conservative rentiers;
- A2: all members are part of the IC of conservative workers;
- (B1: all members are part of the IC of left-wing rentiers);
- B2: all members are part of the IC of left-wing workers.

[10] The characterisation of ideological constituencies by a preference regarding fiscal policy (which is the reason why there are three/four) 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 ideology first.
[11] This condition must be met if $a > n$; if $n > a$ the IC of conservative rentiers must be greater than the IC of conservative workers.

A/B stands for conservative/left-wing; 1/2 stands for rentiers/workers and correspondingly to the preference on the fiscal policy to implement (1= lump sum on workers, 2= 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 (four) parties above. We will then stick to the simpler set-up and say that the only candidates are those of A1, A2, B2 (B1), and that therefore also unattached voters must cast their vote for either of them[12].

4. The game and its political context: an overview.

We will proceed as follows. First, we take for granted that the elections at T=0 gave no absolute majority to any party, and that through a coalition A1 and A2 form a government with sufficient parliamentary support. We will therefore consider what fiscal policy will be implemented. As A1 and A2 have conflicting fiscal goals, and the institutional context is such that they cannot co-operate, such a policy is the product of their strategic interaction. We will then describe the game played between the coalition members. We will make clear how the value for q is crucial in determining which equilibrium will be reached. If it is one by which the government may finance public spending by using public debt, inefficiency is introduced in the economy, as debt is matched by seignorage, which is distortionary.

As a second step, we will consider the electoral background to all this. We will see that only two electoral results are possible: a victory for B2 or no absolute majority, after which A1 and A2 form a coalition government. It all depends on the ideological bias of unattached workers, which may be as strong as to have them not vote for B2, in spite of the fact that by voting for A2 their favourite fiscal policy will not be implemented, and they will suffer, like any other agent in the economy, from the inefficiency introduced by the coalition.

[12] 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 absolute majority the coalition that will be formed will be based on ideological affinities (which is what it takes to have coalitions with conflicting fiscal purposes).

Considering the electoral background means setting the conditions for having A1+A2 in power, instead of taking the circumstance for granted. These conditions are about the ideological bias of unattached workers. When the majority of unattached voters (that is what unattached workers are) are strongly "conservative", an economy finds it convenient to bear the economic costs of having a certain ideological view represented in power, because the benefits in terms of utility that this implies are greater than those costs.

5. The game between the coalition partners.

The game is one of complete but imperfect information (simultaneous moves), where a second stage is reached only if there was a certain outcome at stage one (see Diamond and Dybvig (1983)).

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. If the government is an ideological coalition the process through which such a decision is taken is peculiar. A1 and A2, 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 mandate) is financed through debt and inflation. 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 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.

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

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

$$p_1 = gg$$

$$b_2 = (1 - g\ )[(1 - g\ ) + 1]g$$
$$p_2 = g\ [(1 - g\ ) + 1]g$$

Note that as far as the real balance effect of seignorage is concerned, the incidence at an individual level is equal to inflation divided by the number of agents = tax-payers:

$$t_t^{\ d} = \frac{1}{N} p_t$$

(the superscript "d" stands for distortionary). Correspondingly, the incidence of a lump sum tax ($t^{\ nd}$) on rentiers is equal to its revenue divided by n, and the incidence of a lump sum tax to be paid by workers is equal to its revenue divided by n+a.

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

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

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

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

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

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 both social groups having to pay for half of the fiscal burden.

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:

$$E(u_t^{bc}) = -\left(\frac{1}{N} + q\right)p_t$$

while the expected utility at a time after someone has conceded is equal to 0 for the winner and minus the expected tax both for the loser and in case of a bilateral concession.

Suppose now that, however the game evolves, there is 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 we must only consider the utility of the players at t=1, t=2 and t=3. We 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.

Note also that by imposing that at T=2 a stabilisation (with given characteristics) will take place implies that the next election cannot have any disciplinary role on the behaviour of A1 and A2. In fact, the next electoral round will only be about ideology.

Given the game structure, the payoffs of the game can be easily evaluated. The normal form of the game is shown in Table 1. In the next paragraphs we will use short names for the payoffs in this table:

A(i) is player i's payoff when he is the winner at T=0 (i=1, 2);

B(i) is his payoff when he is the loser at T=0;

C(i) is his payoff when there is bilateral concession at T=0;

D(i) is his payoff when he is the winner at T=1;

E(i) is his payoff when he is the loser at T=1;

F(i) is his payoff when there is bilateral concession at T=1;

G(i) is his payoff when there is no concession before T=2.

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, where "next stage" is written, and finally choose their strategies. The result is a subgame-perfect equilibrium.

Notice that "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 have to pay his share at T=2, 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 instead less clear-cut. Both options imply costs in terms of utility, and whether not conceding is more or less costly depends on how sensitive the players are to the distortions introduced by seignorage, that is, on the value of the parameter q .

6. An equilibrium implying growth of debt and inflation in both years of the mandate with certainty.

Let us imagine that at T=1 concession is a dominated strategy, so that "no concession, no concession" is the unique Nash equilibrium. Let us further imagine that the same happens at T=0. This is an interesting case, as it implies that the coalition government makes use of debt and inflation to finance public spending in both years of its office, thus introducing the maximum amount of inefficiency in the economy.

What values may q take so that the game unfolds in this way? At T=1 A2's payoff associated with "no concession", given that A1 does not concede, is greater than the one associated with "concession", still given that A1 does not concede, only if:

$$q < -\frac{1}{N} + \frac{1}{n+a}\left(\frac{1+g}{2g}\right) \qquad (1)$$

If this condition holds, it may be easily be shown that also A1's payoff associated to "no concession", given that the opponent does not concede, is greater than the one associated to concession conditional on the same circumstances. In fact, the condition q must satisfy in this case is the following:

$$q < -\frac{1}{N} + \frac{1}{n}\left(\frac{1+g}{2g}\right) \qquad (2)$$

which is clearly not so stringent.

The next step is to compare for each player the payoff associated with the NE at T=1, now seen as the outcome of playing "no concession, no concession" at T=0, with the payoff associated with conceding at T=0, given that the opponent does not concede, and to impose that the former is greater than the latter. It is again the inequality between A2's payoffs that gives the more stringent condition on q, which is the following:

$$q < -\frac{1}{N} + \frac{2+3g-g^{2}}{2(n+a)g(3-g)} \qquad (3)$$

In fact, at T=0 A1 plays "no concession", given that A2 does not concede, only if:

$$q < -\frac{1}{N} + \frac{2+3g-g^{2}}{2ng(3-g)} \qquad (4)$$

but if (3) is satisfied, (4) is satisfied, too.

Notice that quite obviously condition (3) is also more stringent than (1), so (3) is the condition to be met in order for the game between the coalition parties to evolve in the way we have described. Note also that the RHS of (3) is positive for all possible values of the parameters. This tells us that condition (3) does not contradict assuming that inflation affects utility through the distortions it produces ($q > 0$).

Let us now consider the economic meaning of what is going on here. By playing "no concession" instead of "concession", given that the opponent plays "no concession", both players are 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 by public debt is shared because the international agreement imposes that, while the rest is paid during the mandate as the real balance effect of inflation, and that effect is the same for everyone by assumption. There is also a 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 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 the opponent plays "no concession". But that is not the case. In fact, consider a different assumption about the end of the game: one of the players (say, A2) pays nothing and the other (A1) is burdened with the whole cost of the stabilisation. Imagine at first that $q = 0$. Whatever A1 plays, quite obviously A2 does not concede. But what happens to A1? Whatever he does, he will have to pay for the whole public spending of t=3. But by playing "concession", given that A2 does not concede, the equilibrium will be such that A1 will have to pay also for the whole of public spending of year 1 and 2, while by playing "no concession" he will only have to pay part of that: the repayment of public debt at T=2 and his share of seignorage during the mandate. In other words, by playing "no concession" A1 benefits from the fact that using debt and inflation for the whole of the mandate will make A2 pay, through seignorage, part of what he would pay entirely if he played "concession". Let us now remove the assumption $q = 0$. The result still holds if for A1 the costs of inflation (linked to its distortionary nature) are smaller than the benefits (in terms of redistribution of the costs of public spending at t=1 and t=2). A range of values for q may be found that makes this possible.

From what has been said so far some conclusions may be drawn as far as the welfare analysis is concerned. If the assumptions are such that the game between the coalition parties has a unique "no concession, no concession" NE, seignorage is used in both years of the term of office, so that the maximum amount of inefficiency is introduced in the economy. However, the condition on the value for q that is necessary for the game to be played this way implies that the welfare loss is not so great, because agents are not very sensitive to the distortions caused by inflation[13].

Note finally that in this context the strategic interaction between coalition partners implies *rising* public debt and inflation during the whole mandate with certainty. In fact, at both stages "no concession, no concession" is the only equilibrium, and it is in pure strategies. At T=0 debt and inflation are set greater than 0 (their initial values) to finance the public spending of the first year of the term; at T=1 public debt rises again so as to renew the old debt and to finance part of g_2; the rest is again raised as seignorage, which grows in turn.

7. An equilibrium likely to determine growth of debt and inflation in one or both years of the mandate.

Let us now imagine that condition (2) above does not hold, so that:

$$q > -\frac{1}{2n+a} + \frac{1}{n}\left(\frac{1+g}{2g}\right)$$

This implies E(1) > G(1), but also E(2) > G(2), as (1) is more stringent than (2) and consequently if (2) does not hold, (1) does not hold, either. This means that now both players find it convenient to concede at T=1, given that the opponent plays "no concession". At the second stage of the game there are therefore two Nash equilibria: {D(1), E(2)} and {E(1), D(2)}.

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"[14]. The two equilibria we have identified are extremely asymmetric: in fact, there is a player who is bound to be the loser (A2 in the first equilibrium, A1 in the second) and a player who is bound to be the winner, and the payoffs are extremely different.

[13] Alesina and Drazen (1991) identify some historical examples of prolonged delays in stabilisation that in their view would not have had an end but for the event of a constitutional reform, because for both players the marginal cost of inflation was negative. We attempt here to model those situations by incorporating the expectations of a reform in the payoffs of the players.

[14] See Rasmusen (1989).

Both equilibria are in pure strategies, and in any game with two equilibria in pure strategies there is also an equilibrium in mixed strategies. Clearly the mixed strategies equilibrium is characterised by a smaller degree of asymmetry, as both players play "concession" and "no concession" with some probability. We are therefore interested in identifying the mixed strategies equilibrium of the game, because it is a likely "focal point". We 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 $\bar{p}$ the probability with which A1 plays "concession", and $\bar{b}$ the equivalent for A2. These probabilities have been calculated to be:

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

$$\bar{b} = 1 - \frac{1}{g\left(2nq - \frac{a}{2n+a}\right)}$$

Note that if $a = 0$, $\bar{p}$ and $\bar{b}$ would be equal, and consequently the mixed strategies equilibrium would be perfectly symmetric; instead here $\bar{p} > \bar{b}$, and we can only talk of a smaller degree of asymmetry with respect to the pure strategies equilibria.

Let us call $MIX1A1$ and $MIX1A2$ the expected payoffs (of A1 and A2 respectively) associated with these strategies. Their values are the following:

$$MIX1A1 = (-2a^2 - 8an - 8n^2 + 4a^2g + 10ang + 4n^2g - 6a^2nqg - 24an^2qg - 24n^3qg +$$

$$-a^2g^2 + 4a^2nqg^2 + 8an^2qg^2 - 4a^2n^2q^2g^2 - 16an^3q^2g^2 - 16n^4q^2g^2)\,g$$

$$\left[2ng\,(2n+a)(-a+2anq+4n^2q)\right]^{-1}$$

$$MIX1A2 = (-2a^2 - 8an - 8n^2 - 2a^2g - 2ang + 4n^2g - 6a^3qg - 30a^2nqg - 48an^2qg +$$

$$-24n^3qg - a^2g^2 - 4a^3qg^2 - 12a^2nqg^2 - 8an^2qg^2 - 4a^4q^2g^2 - 24a^3nq^2g^2 +$$

$$-52a^2n^2q^2g^2 - 48an^3q^2g^2 - 16n^4q^2g^2)g$$

$$\left[2g(n+a)(2n+a)(a+2a^2q+6anq+4n^2q)\right]^{-1}$$

Note that for all values of q not satisfying condition (2), $MIX1A2 > MIX1A1$. This is not just due to the fact that workers are more than rentiers (the reason why also G(2) is greater than G(1)); it is also a consequence of the fact that A1 plays "concession" with greater probability.

After replacing "next stage" with the above payoffs (see Table 1) we can analyse what happens at T=0. Once again there are two NE in pure strategies, namely: {A(1), B(2)} and {B(1), A(2)}, because:

$$B(i) > MIX1Ai \qquad i = 1, 2$$

so every player concedes, given that the opponent does not concede. Following the same reasoning as in the second stage of the game, let us select the mixed strategies equilibrium. We will call $\bar{s}$ the probability with which A1 plays "concession" at T=0, and $\bar{z}$ the equivalent for A2. The values of these probabilities can be found through simple calculations:

$$\bar{s} = 1 + \frac{1}{\frac{3}{2} + \frac{n+a}{g} MIX1A2}$$

$$\bar{z} = 1 + \frac{1}{\frac{3}{2} + \frac{n}{g} MIX1A1}$$

Again, A1 plays "concession" with a greater probability with respect to A2.

With some further calculus the expected payoffs characterising the mixed strategy equilibrium at T=0 (called $MIX2A1$ and $MIX2A2$ respectively) can be found, which can also be thought of as the expected utilities of the players at the beginning of the game. Their values are the following:

$$MIX2A1 = (-6a^2 - 24an - 24n^2 + 7a^2g + 20ang + 12n^2g - 8a^2nqg - 32an^2qg +$$

$$-32n^3qg - 3a^2g^2 + 12a^2nqg^2 + 24an^2qg^2 - 12a^2n^2q^2g^2 - 48an^3q^2g^2 - 48n^4q^2g^2)g$$

$$(2n(2a^2 + 8an + 8n^2 - a^2g - 4ang - 4n^2g + a^2g^2 - 4a^2nqg^2 - 8an^2qg^2 + 4a^2n^2q^2g^2 +$$

$$16an^3q^2g^2 + 16n^4q^2g^2))^{-1}$$

$$MIX2A2 = (-6a^2 - 24n^2 - 24an - a^2g + 4ang + 12n^2g - 8a^3qg - 40a^2nqg - 64an^2qg +$$

$$-32n^3qg - 3a^2g^2 - 12a^3qg^2 - 36a^2nqg^2 - 24an^2qg^2 - 12a^4q^2g^2 - 72a^3nq^2g^2$$

$$-156a^2n^2q^2g^2 - 144an^3q^2g^2 - 48n^4q^2g^2)g(2(a+n)(2a^2 + 8an + 8n^2 - a^2g - 4ang +$$

$$4n^2g + a^2g^2 + 4a^3qg^2 + 12a^2nqg^2 + 8an^2qg^2 + 4a^4q^2g^2 + 24a^3nq^2g^2 + 52a^2n^2q^2g^2 +$$

$$48an^3q^2g^2 + 16n^4q^2g^2))^{-1}$$

where $MIX2A2 > MIX2A1$, as expected.

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 strategy 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. 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 ({D(1), E(2)} or {E(1), D(2)}) were singled out, the equilibrium at stage one would be in pure strategies, too ({A(1), B(2)} in the first case, {B(1), A(2)} in the second). This means there would be a winner and a loser at T=0, thus making the use of debt and inflation unnecessary. But we have motivated why the mixed strategies equilibrium is to be considered as the best candidate for selection in this context of multiple equilibria. What happens here is best described by the story of the two players both playing "concession" and "no concession" with some probability.

The second point we want to emphasise is that in the mixed strategies equilibrium rises in debt and inflation are only possible, not certain as in the game described in the previous paragraph. In fact, either or both players may concede at T=0. Moreover, even when the game reaches the second stage because both players have not conceded at T=0, there may be uni- or bilateral concession then[15]. Therefore there may be delays in the adoption of non-distortionary taxes of different duration: the rise of debt and inflation may be interrupted before the end of the mandate, or there may be no stabilisation before T=2. This final option is peculiar of coalition governments only, as it is excluded if B2 is elected.

As far as welfare is concerned, it is interesting to notice that the condition on q characterising this set-up takes the form of a lower bound. This means that the sensitivity to 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 (the greater the longer the delay in adopting non-distortionary taxes).

In terms of payoffs, however, it is interesting to notice that a greater q does not necessarily mean a smaller expected utility. This is because an increase in the sensitivity to the distortions caused by inflation affects the probabilities of playing "concession" at both stages.

To see the point, consider for simplicity the special case of perfect symmetry (a=0)[16]. First of all, consider that a small increase in q increases the probability with which both players play "concession" at T=1, if that stage of the game is reached:

$$\frac{\partial \overline{p}}{\partial q} = \frac{1}{2nq^{2}g} > 0$$

[15] It is interesting to notice that unlike in Alesina and Drazen (1991) concession by either side (or both) does not mean giving up being part of the government. Declaring to be ready to be burdened with the whole of the fiscal deficit while remaining part of the ruling coalition is not an incoherent behaviour, because the coalition parties are strongly ideologically motivated.

[16] Introducing asymmetry between the players does not make any difference from a qualitative point of view.

This is because not conceding is now more costly. Notice the above derivative is decreasing in q .

The next step is to look at the effect on $MIX1Ai$. 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 $\overline{p}$. There are therefore two effects of a small increase of q on $MIX1Ai$: one is indirect, as it affects it via $\overline{p}$, and is positive; one is direct, as it concerns the values of the payoffs $MIX1Ai$ is a weighted average of, and is negative. As the derivative of $\overline{p}$ in q is decreasing, the smaller the starting value of q , the greater the indirect effect, which can then prevail over the direct effect. So for small starting values of q a small increase in this parameter makes $MIX1Ai$ increase, while the contrary is true when the starting value of q is sufficiently high[17].

Consider now that an increase in $MIX1Ai$ makes the probability with which both players play "concession" at T=0, $\overline{z}$, smaller. This is also intuitively clear, because $MIX1Ai$ 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.

We then finally come to the effect of a small increase in q on $MIX2Ai$. This payoff is a weighted average of A(i), B(i), C(i) and $MIX1Ai$, the four weights depending on the value of $\overline{z}$. Again, there are two antagonist effects: q enters the $MIX2Ai$ function via $MIX1Ai$ and via $\overline{z}$, and when an increase in q makes the former greater (which is the case when the starting value for that parameter is small), it makes the latter smaller, and vice versa. It is the effect working through $\overline{z}$ that turns out to be the dominant one here. The conclusion is that when the starting value of q is small, a small increase makes the value of $MIX2Ai$ decrease, but if the starting value for q is sufficiently high its increase determines an *increase* in $MIX2Ai$.

8. An equilibrium implying the possibility of growth of debt and inflation in both years of the mandate.

If the RHS of condition (1) is smaller than the RHS of condition (4), the ranges of values for q considered in the previous paragraphs are the only ones associated with equilibria of the game between the coalition members implying the possibility of a delay in the adoption of non-distortionary taxes[18].

However, it may well be that:

$$\frac{2+3g-g^{2}}{2ng(3-g)} < \frac{1}{n+a}\left(\frac{1+g}{2g}\right)$$

This is the case when the following conditions on the parameter a is met:

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

Let us suppose these conditions hold; then if:

$$-\frac{1}{N}+\frac{2+3g-g^{2}}{2ng(3-g)} < q < -\frac{1}{N}+\frac{1}{n+a}\left(\frac{1+g}{2g}\right)$$

the game has an equilibrium which implies the possibility of the introduction of maximum inefficiency in the economy.

Consider in fact that condition (1) is met, so that 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(1), G(2)}, the expected payoffs of the equilibrium at T=1, are then inserted in the first stage of the game, just like in par. 6. Here, however, q is not so small as to have both A1 and A2 play "no concession" at T=0, given that the opponent does not concede. On the contrary, since condition (4) is not met, both players choose to concede, given that the opponent does not concede. There are

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[17] All derivatives we mention without showing are available upon request.

[18] In fact, for all q included in the intermediate range:

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

the game has subgame perfect equilibria always implying A2's unilateral concession at T=0. This has to do with the fact that workers are more numerous than rentiers (a > 0), so that the individual fiscal burden in case of unilateral concession, to be compared to the one associated to the outcome "no concession, no concession", is always smaller for workers than for rentiers.

therefore at least two NE at T=0: {A(1), B(2)} and {B(1), A(2)}. Both of these are in pure strategies, and just like in par. 7 a third equilibrium, the mixed strategies one, is to be selected as the "focal point".

Let us therefore analyse the mixed strategies equilibrium of this game. The values of the probabilities with which A1 and A2 play "concession" at T=0, called $\tilde{s}$ and $\tilde{z}$ respectively, are:

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

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

Note that if a were equal to 0[19], $\tilde{s}=\tilde{z}$, but since a > 0, $\tilde{s}>\tilde{z}$ (the equilibrium is not symmetric, but just less asymmetric than the pure strategies ones).

Given the values for $\tilde{s}$ and $\tilde{z}$, the expected payoffs of A1 and A2 at T=0, called $EPA1$ and $EPA2$, are easily found:

$$EPA1 = \frac{4a+8n-9ag+18anqg+36n^2qg+3ag^2-6anqg^2-12n^2qg^2}{2ng(3-g)(a-2anq-4n^2q)}g$$

$$EPA2 = \frac{4a+8n+9ag+18a^2qg+54anqg+36n^2qg-3ag^2-6a^2qg^2-18anqg^2-12n^2qg^2}{2g(3-g)(a+n)(a+2a^2q+6anq+4n^2q)}g$$

Note that $EPA2 > EPA1$ if, as by assumption, a > 0 ($EPA2 = EPA1$ if a = 0).

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[19] If a=0, the RHS of condition (4) is obviously smaller than the RHS of condition (1), because condition (1) is the same as condition (2), condition (4) is the same as condition (3) and we know (3) is more stringent than (1). In this context there are only three ranges of values for q determining for the game different equilibria. These equilibria are those described in par. 6, par. 7 and here; all of them imply the possibility of a delay in stabilisation.

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? Let us now answer these questions.

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 recurs to debt and 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 greater q , the greater this reduction. The value for this parameter is here intermediate with respect to the ranges considered in par. 6 and par. 7.

It is however interesting to notice that the value of q also influences the probabilities with which the coalition members play "concession" at T=0. A small increase makes these probabilities greater, as it is possible to infer from the positive sign of their partial derivatives in q :

$$\frac{\P\tilde{s}}{\P q} = \frac{4(a^3 + 5a^2 n + 8an^2 + 4n^3)}{g(3-g)(a + 2a^2 q + 6anq + 4n^2 q)^2}$$

$$\frac{\P\tilde{z}}{\P q} = \frac{4(a^2 n + 4an^2 + 4n^3)}{g(3-g)(-a + 2anq + 4n^2 q)^2}$$

This is the reason why the values of $EPA1$ and $EPA2$ also increase as a consequence of a small increase in q , as shows the positive sign of their partial derivatives:

$$\frac{\P EPA1}{\P q} = \frac{4(a^2 + 4an + 4n^2)g}{g(3-g)(-a + 2anq + 4n^2 q)^2}$$

$$\frac{\partial EPA2}{\partial q} = \frac{4(a^2 + 4an + 4n^2)g}{g(3-g)(a + 2a^2 q + 6anq + 4n^2 q)^2}$$

In fact, the game is now more likely to end with uni- or bilateral concession, 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 q , but the first, positive effect always prevails here.

9. The political equilibrium.

Let us now consider the political equilibrium. There are two questions to address:

a) whether it is true that the possible winners of an election may only be B2 and A1+A2, and the crucial role of unattached workers' electoral choice;

b) how strong their bias for the conservative ideology must be to get them to vote for A2, in spite of the fact that they can anticipate that this will lead to a coalition government that cannot implement their favourite fiscal policy and may introduce debt and inflation, thus causing a reduction of their own and overall welfare.

To answer these questions it is convenient to make a numerical example satisfying the assumptions set about the political context:

example: n = 10

a = 105

IC of left-wing workers: 54

IC of conservative workers: 8

IC of conservative rentiers: 3

IC of left-wing rentiers: 2

unattached rentiers: 5

unattached workers: 53

(2n+a+1)/2 = 63

a) Only unattached voters' votes are on the market, and which direction they go depends crucially on the realisation of q at T=0, which is common knowledge. Depending on that realisation, unattached workers will either choose to vote for A2 or for B2, the two workers' parties with opposed ideological tendencies, according to a criterion we will consider in b). Still depending on the realisation for q at T=0, but following their own criterion, unattached rentiers will vote for either A1 or B1, if it exists[20].

If unattached workers vote for B2, B2 gains an absolute majority (in the example, 107 votes at least) and there will be a single party, left-wing government. If unattached workers vote for A2, no party will gain absolute majority. A2 and B2 are made up of agents with lexicographic preferences with opposed ideologies at the top of the ranking, and will therefore refuse to form a coalition between each other. A1 and A2 will get together instead so as to form a conservative majority (64 > 63 in the example).

Notice the assumptions made about the relative numerosity of the various social groups and typologies of voters are such that all depends on unattached workers' choice. In fact, one can easily see that unattached rentiers' votes are always irrelevant for the elections' result[21]. Unattached workers know q_0 and consequently they can work out which party unattached rentiers will find it convenient to vote for. But this information is of no use, since there is no strategic interaction between the two groups and unattached workers can cast their vote without any consideration of unattached rentiers' move, knowing it is their choice that counts. Also unattached rentiers can calculate unattached workers' convenience, but their knowledge of unattached workers' choice is useless because their electoral choice is irrelevant, anyway.

We can therefore concentrate on unattached workers' criterion in making their electoral choice, as this is all the electoral result depends upon.

b) In order to choose whom to vote for, unattached workers make a comparison between their expected utilities in case of a victory of B2 and the formation of a

[20] If B1 does not exist, but q_0 is very high, unattached rentiers might choose B2.

[21] It might seem that in the example this is a consequence of the fact unattached rentiers are much less than unattached workers, which is due to fact that a is much greater than n. However, it is not always so. The assumptions about the political context may be satisfied even if n > a, in which case the number of unattached rentiers is just a little smaller than the number of unattached workers (the difference between the two can be unity).

conservative coalition[22]. The option that guarantees them the greater utility will obviously be their choice. Of course, unattached workers can anticipate the game that will be played between A1 and A2 if they vote for A2. They will therefore vote for A2 only if the benefit coming from having their ideology in power is greater than the smaller expected value of the non-ideological component of their utility function associated with the fiscal policy that will be implemented by the conservative coalition. A choice for B2 would actually mean that all production costs of the public good during the mandate would be paid by rentiers, while it is not so when A1+A2 is in office, no matter the way the game is played (that is, no matter the value of q). In fact, in this case unattached workers' expected consumption and eventual disruption due to the presence of inflation are the same as A2's payoff at T=0.

The condition for a victory for the A1+A2 coalition is therefore a condition on the minimum value which q_0, representing how much agents care for ideology at T=0, can take up. This condition varies according to how the game between the coalition partners is expected to be played, which is in turn dependent on the value of q . We will consider the three possible cases in the next paragraph.

10. The minimum value for the ideological bias allowing a victory for the conservative coalition.

We have already anticipated that the elections' result depends on the unattached workers' choice, and that this is made comparing their expected utility associated with a victory of B2 with that associated with a victory of A1+A2. Let us make the same comparison, supposing that the conservative coalition wins the elections at T=2[23]. The

[22] Unattached workers only have to consider their expected utilities in the first three years to come, because three years is the maximum length of the effect of any fiscal policy implemented within the term, given the assumption about the stabilisation at T=2.

[23] Both these expected utilities actually depend also on the elections' result at T=2: in fact, the fiscal policy implemented in the third year is totally predetermined, but as far as the ideological component of the utility function is concerned one must anticipate who wins the elections at T=2 in order to know if it is 0 (B2's victory) or not. The electoral competition at T=2 is only centred on ideology, and the elections' result does not depend on what fiscal policy has been implemented in the previous mandate, but just on q_2. At T=0 all voters can do to predict the value of the ideological bias at T=2 is to remember that q is a random walk, so that:

$$E(q_2) = q_0$$

expected utility of unattached workers for the next three years if B2 wins the elections at T=0 is then:

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

that is, payoff A(2) augmented with the ideological component referred to t=3. In fact, when in office B2 finances public spending by taxing rentiers only, just like A2 when he is the only winner of the game at T=0.

Notice however that we cannot exclude the possibility that B2 uses public debt at T=0, while in the game between the coalition partners we have implicitly assumed that debt is used only when "no concession, no concession" is the outcome. If B2 issues debt for the $1-g$ proportion of public spending at T=0, the remaining part is covered by a non-distortionary tax on rentiers. However, debt is never renewed at T=1, as this would imply transmission of debt to the time of the enforcement of the international agreement, when both social groups are called to contribute to the fiscal stabilisation. B2 therefore finds it convenient to stabilise at T=1 by raising the tax on rentiers so high as to finance both the public spending of that year and the repayment of debt. In terms of workers' expected utility this behaviour on B2's part is equivalent to running no deficit in any year of the mandate, because debt is not matched by inflation here[24]. This aspect of the model is interesting in that it denies that only coalition governments of the ideological kind are debt-prone. What is distinctive of those governments' rules are only a higher probability of rising inflation and of *prolonged* delays in stabilising.

Therefore, if $q_0 > 0$ the conservative coalition is expected to win the elections at T=2 (because all unattached voters will vote for them), while if $q_0 < 0$ B2 is the expected winner at T=2, and so the expected utility referred to t=3 will not have an ideological component. However, one could also do without all these predictions. In fact, unattached workers' aim is to see whether their expected payoff in case of a victory for the conservative coalition at T=0 is greater than the one associated to B2's victory and these payoffs both have or have not an extra q_0, depending on the predictions on the elections' result at T=2: their comparison is therefore not affected by that.

[24] There is also equivalence is in terms of general welfare. In fact, thanks to the peculiar shape of the utility function and the fact that the rate of interest is equal to the rate of discount, rentiers are indifferent between the option of paying the same amount of taxes at T=0 and at T=1 and that of paying little today and more tomorrow. This emphasises the fact that in this model a rising public debt is not welfare-reducing in itself, but only when matched by inflation, because of its distortionary effects.

As for unattached workers' expected utility if the A1+A2 coalition is elected, it all depends on how the game between the coalition partners is expected to be played, which depends on the value of q . If condition (3) holds, their expected utility is:

$$-g\left(\frac{1}{N}+q\right)(3-g)g-\frac{1}{2}\frac{1}{n+a}g\sum_{t=0}^{2}(1-g)^{t}+3q_{0}$$

that is, G(2) augmented with the ideological component now referred to all the three years of interest. If:

$$q>-\frac{1}{2n+a}+\frac{1}{n}\left(\frac{1+g}{2g}\right)$$

then unattached workers' expected utility is:

$$MIX2A2+3q_{0}$$

Finally, if the parameters of the model are such that we may have:

$$-\frac{1}{N}+\frac{2+3g+g^{2}}{2ng(3-g)}<q<-\frac{1}{N}+\frac{1}{n+a}\left(\frac{1+g}{2g}\right)$$

unattached workers' expected utility if the conservative coalition wins the elections at T=0 is:

$$EPA2+3q_{0}$$

By setting unattached workers' expected utility if B2 gets the majority of votes at T=0 equal to their expected utility if A1+A2 wins the elections and solving for q, we get the value of the bias for the conservative ideology given which unattached workers are indifferent between the two political perspectives. A greater value will lead them to vote for the conservative coalition, a smaller one for B2.

Let us consider the case in which condition (3) holds and let us call $\hat{q}$ the value for q that sees unattached workers indifferent between B2 and A1+A2. This value is the following:

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

Note first of all that $\hat{q} > 0$. A value of the bias in favour of the conservative ideology that is positive but smaller than $\hat{q}$ will make unattached workers vote for B2. B2 can therefore be the winner of the elections even if the ideological atmosphere of the moment is conservative, provided it is only moderately so. In fact, when $0 < q_0 < \hat{q}$ unattached workers find that by voting B2, the party that makes things most favourable to them from a fiscal point of view, the benefit in terms of greater expected consumption is greater than the cost in terms of lack of representation in power of their ideological view. If $q_0 > \hat{q}$, instead, unattached workers will vote for A2 in spite of the smaller value of the non-ideological component of the utility function that this choice will entail, because they now care for their ideology more.

It is interesting to see how $\hat{q}$ varies as the value for some of the parameters of the model increases:

$$\frac{¶\hat{q}}{¶q} = \frac{1}{2} g\,(3-g\,)g > 0$$

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

$$\frac{¶\hat{q}}{¶g} = \frac{1}{2}\left[g\,(3-g\,)\left(\frac{1}{N} + q^{\ A2}\ \right) + \frac{(1-g\,)(2-g\,)}{2(n+a)} \right] > 0$$

The fact that all three partial derivatives are positive is intuitively clear: the greater the value of public expenditure to finance every year, or the proportion of the deficit financed through seignorage, or the sensitivity to the distortions caused by inflation, ceteris paribus, the greater the reduction in the value of the non-ideological component of the utility function when an ideological coalition is in office. The greater this inefficiency, the stronger the bias for the ideology the coalition represents must be in order for voters to choose it, anyway.

Consider now a context where q is such that condition (2) does not hold. If we call $\bar{q}$ the value for q making unattached workers indifferent between B2 and the conservative coalition, it is easy to see that this value is:

$$\bar{q} = \frac{1}{2}\left(-MIX\,2A2 - \frac{1}{2(n+a)}g\right)$$

Again, this value is positive. It is interesting to have a little bit of comparative statics here, too. The sign of the partial derivative in g is again positive[25], but those in q and g depend on the starting value for the parameter in question. This is due to the fact that the values for both these parameters affect the way the game between the coalition partners is played, and particularly the probability with which they play "concession" at each stage of the game.

We have already seen in par. 7 that this is true for q, and how a small increase in this parameter determines an increase or decrease in $MIX\,2A2$ depending on whether the starting value for the parameter is high or small respectively. The partial derivative of $\bar{q}$ in q is simply the partial derivative of $MIX\,2A2$ in the same parameter with the opposite sign, so a small increase in q, starting from a modest value, will make $\bar{q}$ increase, while a small increase in q, starting from a high value, will make $\bar{q}$ decrease. This second case is counterintuitive, but it has to do with the fact that when both players concede with greater probability at both stages of the game the inefficiency a coalition government is expected to introduce is smaller. The smaller the inefficiency expected, the smaller the minimum bias for the conservative ideology that makes it convenient for unattached workers to vote for the coalition. It can be shown that the way a small increase in g affects $MIX\,2A2$, and hence $\bar{q}$, is totally similar.

Finally to the third context in which an ideological coalition is likely to determine delays in the adoption of non-distortionary taxes to cover public spending, the one analysed in par. 8. Here the critical value for q will be called $\tilde{q}$:

[25] This and all partial derivatives we mention without showing are available upon request.

$$\tilde{q} = \frac{1}{2}\left(-EPA2 - \frac{1}{2(n+a)}g\right)$$

and, just like in the previous cases, it is positive. The partial derivative in g is also positive, while:

$$\frac{\partial \tilde{q}}{\partial q} = -\frac{\partial EPA2}{\partial q} < 0$$

$$\frac{\partial \tilde{q}}{\partial g} = -\frac{\partial EPA2}{\partial g} < 0$$

In fact, we already know the partial derivative of $EPA2$ in q is always positive, and the one in g can be shown to be positive, too. So the counterintuitive result seen in the context where condition (2) does not hold shows up again here, and for all values of the parameters.

We conclude by saying that all the three contexts we have analysed confirm what may be seen as one of the core messages of the model: although rational agents can anticipate their electoral choice will lead to the formation of a coalition government whose policy is not the most favourable one for them in terms of allocation of the fiscal burden, and who is likely to bring about inefficiency through the introduction of inflation, such a government can still be elected in office. This happens when agents' attachment to the ideology the coalition represents is strong enough.

11. Conclusions.

By identifying the strategic interaction between coalition partners with a game of complete information, the Bank Runs game, we have succeeded in creating a model in which the basic problem with coalition governments identifies with the fact that its members' commitments to each other are not binding. By creating a political context around the game we have pointed out that the true determinant of prolonged periods of rising debt and inflation is a high degree of polarisation of the electorate on some extra-economic issue (when matched by a polarisation on the attribution of the fiscal burden that is not coincident with it). These are our main achievements.

Form a theoretical point of view, the weak point of the model presented here is on the other hand the crucial role played by the assumption about the existence of an end of the game at a given point in time. This assumption may however be seen as a sort of loose translation of a no-Ponzi-game condition. Another aspect of the model that could be improved is the treatment of monetary policy, which is here simply considered as a branch of fiscal policy. The introduction of saving and the consideration of the possibility for coalition governments to choose the value of public expenditure seem instead almost impossible tasks in this set-up, which is already complicated by the dynamics of debt and seignorage.

As for the translation of the message of our model for empirical purposes, there are many new elements. First of all, it would be interesting to consider the presence of ideological polarisation in different countries throughout time in relation to the fiscal policies implemented[26]. Secondly, if the empirical work is to be about coalition governments, we put a strong emphasis on the fact that only ideological coalitions are likely to introduce inefficiencies; one must distinguish between coalitions according to the nature of the common purposes that keep it together. Thirdly, our model does not affirm that single party governments or non-ideological coalitions never use public debt; it only says ideological coalitions are more likely to cause *prolonged* delays in stabilisation. Finally, our model denies that coalition governments are unable to stabilise. Making reference to Alesina and Drazen and identifying unilateral concession with the end of a coalition government, some authors (Alesina and Perotti (1994)) have stated that stabilisations can only be performed by single party governments. Since the coalitions likely to cause large accumulations of debt are ideological coalitions, concession does not necessarily mean retirement from the government: the loser has still to carry on with the task to represent an ideological view. We can only say that when an ideological coalition is in office, the stabilisation is likely to happen later in time, hence to be stronger.

[26] However, it must be said that if we suppose the sensitivity to the distortions caused by inflation are high, not necessarily the countries with the highest degree of ideological polarisation are the most likely to run deficits for long periods of time, as we have seen analysing the mixed strategies equilibria.

Table 1.

stage 1 (T = 0)

		A1	
		concession	no concession
A2	concession	$3\left(-\frac{1}{2n}g\right);\ 3\left(-\frac{1}{2(n+a)}g\right)$	$-\frac{1}{2n}g;\ 2\left(-\frac{1}{n+a}g\right)-\frac{1}{2(n+a)}g$
	no concession	$2\left(-\frac{1}{n}g\right)-\frac{1}{2n}g;\ -\frac{1}{2(n+a)}g$	next stage

stage 2 (T =1)

		A1	
		concession	no concession
A2	concession	$-g\left(\frac{1}{N}+q\right)g-\frac{1}{2}(2-g)\frac{1}{n}g-\frac{1}{2n}g;$ $-g\left(\frac{1}{N}+q\right)g-\frac{1}{2}(2-g)\frac{1}{n+a}g-\frac{1}{2(n+a)}g$	$-g\left(\frac{1}{N}+q\right)g-\frac{1}{2n}g;$ $-g\left(\frac{1}{N}+q\right)g-(2-g)\frac{1}{n+a}g-\frac{1}{2(n+a)}g;$
	no concession	$-g\left(\frac{1}{N}+q\right)g-(2-g)\frac{1}{n}g-\frac{1}{2n}g;$ $-g\left(\frac{1}{N}+q\right)g-\frac{1}{2(n+a)}g$	$-g\left(\frac{1}{N}+q\right)(3-g)g-\frac{1}{2n}g\sum_{t=0}^{2}(1-g)^{t};$ $-g\left(\frac{1}{N}+q\right)(3-g)g-\frac{1}{2(n+a)}g\sum_{t=0}^{2}(1-g)^{t}$

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