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The Political Power of the Owners of Public Debt

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The Political Power of the Owners of Public Debt

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Abstract: We develop a two period model to investigate what makes the promise to repay public debt credible. We explor a political solution excluding any role for long-run reputational arguments. There are two sources of heterogeneity among individuals: wealth and income. Differences in asset holdings determine individuals' preferences over monetary policy; differences in incomes determine individuals' preferences over fiscal policy. The bi-dimensionality of the political choice plays a fundamental role. We show, in fact, that political outcomes on the dimension perceived as less relevant might be decided by minority groups. In this sense, the very fact of issuing public debt creates a constituency in favour of repaying it and, under certain conditions, this constituency might be winning even though it is a minority group.

Sunto: Viene sviluppato un modello bi-periodale per indagare cosa renda credibile la promessa di ripagare il debito pubblico. La soluzione proposta è di natura politica ed esclude qualsiasi ruolo per argomentazioni basate sulla reputazione di lungo periodo. Sono presenti due fonti di eterogeneità fra gli individui: la ricchezza e il reddito. Le differenze nel possesso di titoli di credito determinano le preferenze individuali nei confronti della politica monetaria; le differenze reddituali determinano le preferenze individuali nei confronti della politica fiscale. La bi-dimensionalità della scelta politica gioca un ruolo fondamentale. Infatti, dimostriamo che il risultato politico nella dimensione percepita come meno rilevante, potrebbe essere deciso da gruppi di interesse minoritari. In tal senso, l'emissione di titoli di debito pubblico crea un gruppo elettorale favorevole al loro rimborso e, sotto certe condizioni, questo gruppo potrebbe dimostrarsi vincente anche se minoritario.

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1. Introduction[*]

The political economy of budget deficits and fiscal policy has recently attracted renewed interest, motivated by the unprecedented high levels of public debt reached in a number of OECD economies. Much of the effort of the "new political economy literature"[1] has been directed to find a positive explanation for that phenomenon, implicitly relying on the hypothesis that governments are committed to repay the debt. But if outright default is rare, governments can easily devalue debt obligations by means of an *inflation tax.*

In this paper we investigate the problem of what makes the promise to repay debt credible. We explore a political solution excluding any role for long-run reputational arguments. Our point is that the very fact of issuing debt creates a constituency in favour of repaying it. Under precise conditions this constituency might support a political equilibrium with full repayment, even though the majority of population prefer devaluing debt by inflation.

We develop a two period model in which debt is issued in order to redistribute income over time[2]. This function cannot be efficiently carried out by private capital markets because of the existence of imperfections that constrain the ability to borrow of some individuals. In the first period, agents differ in the amount of initial endowments. In the second period, differences in wealth are combined with differences in incomes; thus there are two sources of heterogeneity among agents.

If public debt is repaid with certainty, there exists no conflict among different agents about the amount of public debt to be issued[3] in the first period. The problem is that future governments can renege on the promise to repay debt by increasing the level of inflation, thus devaluing public obligations. Inflationary pressures come from individuals who, in the second period, own an amount of bonds less than average: they prefer inflationary policies to reduce real transfers to rich individuals. Policy decisions about the level of inflation will depend on how the redistributive conflict is resolved in the second period political process. To model such political process we consider a two-party representative democracy *à la* Besley and Coate (1997 and 2000). Each party chooses a citizen-candidate by majority voting and probabilistic voting decides who will be the party in power. The elected leader decides fiscal and monetary policies according to his personal preferences. Fiscal policy consists of the choice of a tax or a subsidy on labour income and a lump-sum transfer; monetary policy is directly viewed as the choice of an inflation rate.

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[1] See Alesina and Perotti (1994) for a survey.

[2] Although we do not develop an overlapping generation model, the role served by debt is the same as in Cukierman and Meltzer (1989).

[3] In fact, agents who are not constrained are indifferent to debt, while the others benefit from it, since it removes liquidity constraint in the first period.

In our model, political choice is bi-dimensional (fiscal policy and monetary policy), and this bi-dimensionality plays a crucial role in determining political outcomes. More precisely, what is crucial for our results is the priority given by individuals to the (two) different political issues.

In the case in which monetary policy is perceived by all citizens as *non-salient* (benefits deriving from the preferred fiscal policy always exceed benefits from the preferred monetary policy), the presence of an anti-inflationary lobby might cause political outcomes on this dimension to divert fundamentally from that desired by the majority of individuals. The striking result, in fact, is that the political equilibrium will feature an anti-inflationary policy, whatever be the party in power and even if both parties prefer inflation, as the majority of the population[4].

The same result is found if monetary policy is *salient* for a minority of rich individuals. We show that, under certain conditions, the minority group preferences over inflation determine the political outcome, whatever party is in power. So, if the minority group is anti-inflationist, no inflation will result in equilibrium. From these arguments, it turns out that, in order to exclude a political equilibrium featuring inflation, fiscal policy has to be the *salient* policy, at least for the poorest segment of the population. From this condition, it is straightforward to derive the politically viable amount of public debt.

The rest of the paper is organized as follows. A brief survey of the literature is presented in section 2. In section 3, the model is set out and the economic equilibrium is derived; section 4 discusses the political equilibrium; in section 5, the *non-salience* condition is discussed and the politically viable stock of public debt is derived and, finally, section 6 contains some concluding remarks.

2. Related literature

Political-institutional factors are crucial in understanding the management of public debt. In this brief review of the literature, we focus on those contributions which rely on such factors to investigate what makes public debt redemption credible. In so doing, we abstract from long run reputational arguments or institutional commitment devices.

When debt is looked as an instrument of intergenerational redistribution, a fundamental issue arises: what constrains future generations to repay it? This problem has been addressed by Tabellini (1991), who recognizes that, once debt is issued, the decision of whether to repay it or not has intra-generational redistributive consequences (besides inter-generational) due to the fact that agents differ in the amount of debt holdings (rich and poor), and different generations are linked together by intergenerational altruism. The desire to avoid an intra-generational redistribution induces some young taxpayers, non–debt-holders, who

[4] Cfr. Di Gioacchino et al (2003)

care about the welfare of their rich fathers, to join the anti-default coalition consisting in old bond holders. Tabellini shows that, under certain conditions, the interplay between inter-generational and intra-generational conflict might produce a political equilibrium in which, under majority rule, debt is issued and then repaid.

Tabellini's contribution sheds light on the fact that the decision to keep the debt redemption promise is a political one: in fact, it always implies a conflict between taxpayers, who bear the burden of repayment, and debt holders. The relative political power of those two groups is thus determinant in the political choice. Di Gioacchino et al. (1999, 2000) bring this point to the extreme consequences. They assume that the incumbent government takes the political decision to maximise monetary contributions from lobbies. Thus, in deciding whether to repay the public debt, or not, government gauges the political weight of the two opposed groups by the amount of money that each group is prepared to spend to support the policy decision it favours. As the decision is a pure redistribution of resources between individuals, the sum of money contributions of the two sides are perfectly equivalent[5]. Government is thus indifferent between repudiating and honouring the debt. In this situation, even a tiny cost attached to repudiation, or the introduction of a fixed cost of lobbying activities, is enough to make government always honour the debt.

Another interesting strand of research sees the debt as a strategic variable linking the current government with the next one. In this literature[6] a positive relation is found between current deficits and the polarization of political preferences about the future composition of public spending or its level.By committing future tax revenues to debt service, current government reduces spending of future governments. However, the commitment role of debt disappears if future governments are allowed to default on inherited public debt.

To tackle such an issue, Aghion and Bolton (1990) construct a model where the conflict over the level of public expenditure emerges as a result of income differences. They show that, as debt increases, a group of voters might emerge whose concern is more with maintaining the real value of their claims than with the level of expenditure on public goods. High levels of debt might change the result of election in favour of the political party more concerned with the protection of debt holders' interest. In the same direction, Dixit and Lodregan (2000) sustain that the level of debt does influence the electoral result. If debt securities have been acquired by people who play a key role in the political competition, the outcome can only be favourable to them. Thus, debt can be used as a strategic variable affecting the probability of victory of future competing political parties.

This paper joins the last strand of research by taking a new approach. The point we make is that the political conflict should be seen as bi-dimensional: on one side, differences in asset holdings determine preferences over inflation (since any unexpected inflation rate brings about implicit default of public debt), on the other, differences in incomes determine individuals' preferences over the level of taxation and the level of public

[5] If the debt is held entirely by residents.

transfer. The level of inflation is decided by monetary policy, whereas the last two variables are controlled by fiscal policy. In this framework, which relies on Besley and Coate (2000), it is possible to show that the political outcome might be very far from the one predicted by majority voting. Namely, political outcomes on the dimension perceived as less relevant might be decided by minority groups. In the paper we show that when monetary policy is perceived by citizens as *non-salient* (benefits deriving from the preferred fiscal policy always exceed benefits from the preferred monetary policy) the level of inflation realized will be that preferred by anti-inflationary financial lobbies, namely zero inflation. On the other hand, if monetary policy is *salient* for a minority of rich individuals, the political outcome will always feature zero-inflation even in absence of organized lobbies. In this sense, the very fact of issuing debt creates a constituency in favour of repaying it and, under certain conditions, this constituency might be winning even though it is a minority group.

3. The model

Consider a two period open economy with a continuum of private individuals (of measure one[7]) living two periods. In the first period there is no production and agents differ in their exogenous initial endowment of wealth a^i that is distributed in the population according to a known distribution Φ, with mean a and support $(0, \overline{a})$, where $\overline{a}$ is a parameter. In the second period production comes from labour. Agents must decide how much time to allocate to labour and how much to leisure, but they differ in the amount of *effective time* they have available. There is a world capital market and borrowing and lending take place at the given real world interest rate r^w.

In the first period, each individual receives, from government, a lump sum transfer, g_1. The transfer is financed by either domestic or foreign borrowing, since we assume that in the first period wealth cannot be taxed. At the beginning of the second period an election takes place. The elected government sets fiscal and monetary policies and private economic decisions for t=2 are made. The policies selected by the government in office in the second period are: the level of inflation and the parameters of a linear income tax, i.e. the tax rate τ and the per capita guarantee $g_2 \in \Re$. We identify the first control variable with monetary policy and the latter with fiscal policy.

Government budget constraints (in average terms) in the two periods are given by :

$$g_1 = b$$

$$(1+r)b = \tau l - g_2$$

where r is the real interest rate paid on government bonds and l is average supply of labour.

We assume that the *i*-th individual's intertemporal utility function is:

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[6] See Alesina Tabellini (1990), Tabellini Alesina (1990), Persson Svensson (1989).

$$W^i = U(c_1^i) + \frac{1}{1+r^w}\left[c_2^i + V(x^i)\right],$$

where c_1^i and c_2^i are consumption at time one and two respectively, and x^i is leisure at time two. $U(\cdot)$ and $V(\cdot)$ are twice continuously differentiable and concave functions. We assume that individuals' rate of time preference is equal to the world real interest rate.

Utility is maximized under the two budget constraints:

$$c_1^i + s^i = a^i + g_1$$

$$c_2^i = (1-\tau)l^i + g_2 + (1+\bar{r})s^i\ ;$$

and the second period time constraint:

$$x^i + l^i = 1 + e^i\ .$$

where, s^i stands for saving, $\bar{r}$ is the real rate of interest on saving, and l^i is the amount of labour supplied in the second period. The last constraint is a time constraint where e^i indicates the *i*-th individual's productivity. There are two levels of productivity and each individual is either a high productivity worker with $e^i = e^H$ or a low productivity worker with $e^i = e^L$. High (low) productivity individuals enjoy more (less) leisure from each level of labour supplied[8]. We assume that e^i is distributed in the population according to a known distribution function with mean *e*.

If individual *i* desires to save, he can either buy foreign bonds (f^i) or domestic bonds issued by government (b^i). For the sake of simplicity we impose a unique portfolio composition for all savers. We assume that the exchange rate is fixed and equal to one, the two bonds are perfect substitutes and individuals are risk neutral. This means that the expected real interest rate on public debt (r^e) must be equal, in equilibrium, to the real world interest rate: $r^e = r^w$ and government issues bonds at the nominal rate $q = r^w + \pi^e$.

We summarize the above with the following:

ASSUMPTION 1

(i) $s^i \equiv b^i + f^i \quad \forall i \ s.t.\ s^i \geq 0$;

(ii) $b^i = \alpha \cdot s^i$ *and* $f^i = (1-\alpha)\cdot s^i$, *with* $\alpha \in [0,1]$[9];

Assumption 1.i is, admittedly, very strong. We exclude private domestic debt. We justify such complete credit rationing by referring to imperfections in capital markets that prevent individuals, who are

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7 This implies that aggregate and average values coincide.

8 Productivity determines how much "effective time" is available. This is a shortcut to model income differences (Persson and Tabellini 2000)

9 Thus the expected real interest rate on portfolio will be equal to $\bar{r}^e = \alpha\cdot(q-\pi^e) + (1-\alpha)\cdot r^w = r^w$

consumption constrained in the first period, from borrowing[10]. In order to simplify our analytical framework, we assume that all individuals with initial wealth smaller than the desired consumption level are rationed.

We further assume that individuals lend to the rest of the world only if the demand of borrowing by government is completely satisfied and that average saving (s) is always greater or equal to the per capita amount of public debt:

ASSUMPTION 2

$$s \geq b$$

It follows that all government bonds are owned domestically.

3.1 Economic equilibrium

In this section individuals are considered as economic agents who take current and expected future policies as given. We assume that in period 1 individuals know their future productivity level. Solving the *i*-th individual optimisation problem and taking into account assumption 1, we obtain:

$$\hat{c}^i = \begin{cases} U_c^{-1}\left(\frac{1+\bar{r}^e}{1+r^w}\right) = U_c^{-1}(1) & \text{if} \quad U_c^{-1}(1) < a^i + g_1 \\ a^i + g_1 & \text{otherwise} \end{cases}$$

which implies

$$\hat{s}^i\left(a^i, g_1\right) = \begin{cases} a^i + g_1 - U_c^{-1}(1) & \text{if} \quad U_c^{-1}(1) < a^i + g_1 \\ 0 & \text{otherwise} \end{cases}$$

Optimal consumption is equal to $U_c^{-1}(1)$. However, if the *i*-th individual is wealth-constrained, he cannot consume more than $a_i + g_1$ and his saving will be nil.

From the last expression, average saving can be derived

$$s = \int_0^{\bar{a}} \left(a^i + g_1 - U_c^{-1}(1)\right) d\Phi \, .$$

Solving the *i*-th individual's second period optimisation problem, we find:

$$\hat{c}_2^i = (1-\tau)\hat{l}^i + (1+\bar{r}^e)\hat{s}^i + g_2$$

$$\hat{x}^i = \hat{x} = V_x^{-1}(1-\tau) \, .$$

$$\hat{l}^i = 1 + e^i - V_x^{-1}(1-\tau) \, .$$

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[10] We posit such assumption in order to give public debt the role of redistributing income over time. If capital markets were perfect, there would be no need to use public debt for such purpose.

Therefore, the per capita amount of labour, which appears in the government budget constraint, is equal to:

$$l = 1 + e - \hat{x}$$

3.2 Political preferences

Individuals' political preferences can be derived from their indirect utility function. In period 1 individuals' preferences about the level of public transfer g_1 comes from their expected indirect utility function over the two periods. Allowing for the government budget constraints, the i-th individual's indirect utility function can be written as:

$$\hat{W}^i(g_1) = U\left[\hat{c}_1^i(g_1)\right] + \frac{1}{1+r^w}\left\{(1-\tau)\cdot\hat{l}^i + \tau\cdot l + V\left[\hat{x}^i(\tau)\right]\right\} + \hat{s}^i(g_1) - g_1$$

The impact of the policy transfer g_1 upon the utility function is the following:

$$\frac{\partial \hat{W}^i}{\partial g_1} = U_c \cdot \frac{\partial c_1^i}{\partial g_1} + \frac{\partial s^i}{\partial g_1} - 1 = \begin{cases} \frac{\partial s^i}{\partial g_1} - 1 = 0 & \text{if} \quad \hat{s}^i > 0 \\ U_c - 1 \geq 0 & \text{otherwise} \end{cases}$$

The derivative of the indirect utility function clearly shows that, in the first period, those with positive savings are indifferent to government transfer. In fact, any additional unit of g_1 is just shifted to period two in order to compensate the smaller amount of g_2 originated by it. On the contrary, rationed individuals do prefer a positive transfer from government. They use it to reduce the difference between desired and actual level of consumption in period 1. As in Cukierman and Meltzer (1989), if debt is eventually repaid, there is no political conflict about the amount of debt to issue. In fact, one group of agents is indifferent to debt, while the other benefits from it, since it removes the liquidity constraint. A social choice reached by majority rule, as well as a benevolent social planner, would choose to issue debt. So, whatever be the constituency of the government in office in period 1, debt will be issued. The political conflict between agents emerges only in the second period.

The socially optimal amount of debt will be:

$$b = g_1 = U_c^{-1}(1).$$

When g_1 is set to the previous amount, the poorest individuals, those with $a^i = 0$, will be able to consume the desired amount, $U_c^{-1}(1)$, in period 1. The previous expression for g_1 implies that $s^i = a^i$ and $s = a$.[11]

In period 2, agents take the outstanding debt and the nominal interest rate q as given. Allowing for the government budget constraint, the *i*-th individual's indirect utility function is the following[12]

[11] Since $b^i = \alpha \hat{s}^i = \alpha a^i$, it follows that the endogenous distribution of government bonds, *F*, is a linear transformation of the distribution of initial wealth, Φ.

$$\hat{W}^i(\tau,\pi) = (1-\tau)\cdot \hat{l}^i + \tau \cdot l + (1+q-\pi)\cdot(\alpha\cdot \hat{s}^i - b) + V[\hat{x}(\tau)] + (1+r^w)\cdot[(1-\alpha)\cdot \hat{s}^i + U(\hat{c}_1)]$$

To determine voters' preferences about fiscal policy and monetary policy, we look at the impact of those policies on individuals' welfare

$$\frac{\partial \hat{W}^i}{\partial \tau} = l - \hat{l}_i - \tau \frac{\partial \hat{x}(\tau)}{\partial \tau} = e - e^i - \tau \frac{\partial \hat{x}(\tau)}{\partial \tau}$$

$$\frac{\partial \hat{W}^i}{\partial \pi} = b - \alpha \cdot \hat{s}^i$$

The *i*-th individual's preferred fiscal policy is then given by

$$\tau^i = \frac{e - e^i}{\frac{\partial \hat{x}(\tau^i)}{\partial \tau}},$$

which does not depend on government transfers g_t with t = 1,2. Less productive individuals prefer a positive tax rate. More productive individuals prefer a negative tax rate, that is a transfer proportional to labour supply, and support a lump sum tax at time two, $g_2<0$.

Finally, the preferences about inflation depend on the amount of government debt owned by each individual. Those with $\alpha \cdot \hat{s}^i > b$, i.e. $b^i > b$, prefer an inflation as low as possible. On the contrary, those with $b^i < b$ prefer an inflation as high as possible.

We assume that inflation can be set within the interval [0, q]. This means that the real interest rate paid on bonds will be zero when $\pi = q$ and equal to q when $\pi = 0$: $r \in [0, q]$. The assumption simplifies our analytical framework. We could have introduced a quadratic cost of inflation in order to catch the real effects of inflation –and its relative costs– other than the redistribution of wealth[13]. In fact, we only need the level of inflation preferred by each individual to be some finite value. As a consequence of our choice, rich individuals prefer π equal to zero, i.e. r equal to q, whereas poor individuals prefer π equal to q, i.e. r equal to zero.

On the basis of the preferences on the two policy instruments, four groups of individuals can be distinguished: $L = \{i | e^i = e^L\}$, $H = \{i | e^i = e^H\}$, $P = \{i | b^i < b\}$, $R = \{i | b^i \geq b\}$. We indicate with $\gamma^P =$

[12] Policy preferences about monetary and fiscal policy can be described by the individuals indirect utility function as a function of π, g_2 and τ. However, given the government's budget constraint, only two of them can be freely set.

[13] Fischer and Modigliani (1979) present a detailed analysis of the costs and the real effects of inflation, as well as of deflation. They make it clear that the effects of inflation depend "on two major factors: first, the institutional structure of the economy; and second, the extent to which inflation is or is not fully anticipated". Our model implicitly assumes that the institutional structure of the economy is not fully adapted to inflation, i.e. indexation is not widespread. Under such conditions, the effects of inflation (or deflation), and the connected costs, are numerous and significant.

$F\left(\frac{b}{\alpha}\right)$ and $\gamma^R = 1 - F\left(\frac{b}{\alpha}\right)$ the fraction of citizen that are, respectively poor and rich. Similarly, we indicate with γ_L and $\gamma_H = 1 - \gamma_L$ the fraction of citizens which are, respectively, low productivity and high productivity.

We make the following assumption:

ASSUMPTION 3

The majority of population is poor: $\gamma^P > \gamma^R$

4. The policy game

At the beginning of the second period an election takes place. There are two parties: party *A* and party *B*. All members of party *A* are low productivity and all members of party *B* are high productivity. Both parties contain a mixture of poor and rich individuals.

The timing of the policy game is as follows: first, parties select candidates by majority voting; then, individuals vote according to their political preferences; finally, the elected leader sets fiscal and monetary policy according to his type.

As in Besley and Coate's (1997) citizen-candidate model, we assume that no ex-ante commitment is possible: once elected, citizen *i* chooses either the tax rate τ^L, if he is low productivity or the tax rate τ^H if he is high productivity and chooses $\pi = q$ if he is poor and $\pi = 0$ if he is rich.

Parties choose the candidate that a majority of their members prefer; thus, party $Z \in \{A, B\}$ maximises the median member's payoff given by:

$$\hat{W}_Z^m(\tau,\pi) = (1-\tau)\cdot \hat{l}_Z^m + \tau \cdot l + (1+q-\pi)\cdot \left(b_Z^m - b\right) + V[\hat{x}(\tau)] + \left(1+r^w\right)\cdot \left[(1-\alpha)\cdot \hat{s}_Z^m + U(\hat{c}_1)\right]$$

where s_Z^m is optimal saving, b_Z^m is public debt holding and $\hat{l}_Z^m$ is optimal labour supply of the median member of party *Z*.

In what follows, we assume that the majority of each party's members are poor*:*

ASSUMPTION 4

$$b_A^m < b \quad and \quad b_B^m < b$$

As a consequence of the last assumption, the pay-off of the median member of both parties is maximised by an inflationary policy.

There are two types of voters. A fraction is *rational voters*, who vote for the candidate whose proposed policy maximises their pay-off function. The remaining fractions are *noise voters*. The noise vote is shared between the two candidates according to a symmetric distribution function. The presence of noise voters makes the electoral outcome probabilistic. We indicate with $\Psi(\omega)$ the probability that party *A* wins the election, where ω represents the difference between the share of the voters which draw advantage from the policy chosen by party *A* and the share of the voters which benefit from party *B*'s policy[14].

An election gives rise to a game between the two parties in which each party's strategy has two dimensions and can be represented by a policy vector $s_Z = (\tau_Z, \pi_Z)$ with $Z \in \{A, B\}$. A Nash equilibrium is a couple of policy vectors, $s^*_Z = (\tau^*_Z, \pi^*_Z)$, one for each party, which are mutual best responses.

In order to analyse the political equilibrium, the knowledge of the fiscal policy and the inflation rate preferred by each citizen is not enough. Some assumptions have to be posed on the priority given by each citizen to the two policies. Since citizens have only one vote but each party's strategy is bi-dimensional, when voting, individuals have to compare the gain from the preferred monetary policy with the gain from the preferred fiscal policy.

For the *i*-th citizen, the gain from the preferred monetary policy is given by:

$$\left|W^i(\tau,0) - W^i(\tau,q)\right| = q\left|b^i - b\right|.$$

On the other hand, the welfare gain from the preferred fiscal policy is given by:

$$\left|W^i\left(\tau^L,\pi\right) - W^i\left(\tau^H,\pi\right)\right| = \left|\Delta S + \Delta g - \left(1+e^i\right)\Delta\tau\right|,$$

where $S(\tau) \equiv V[\hat{x}(\tau)] - (1-\tau)\hat{x}(\tau)$ is welfare surplus from leisure and $\Delta S \equiv S\left(\tau^L\right) - S(\tau^H) > 0$ is the differential surplus under the two alternative fiscal policies;

$\Delta g \equiv g_2\left(\tau^L,\pi\right) - g_2\left(\tau^H,\pi\right) = (1+e)\Delta\tau + \tau^H\hat{x}\left(\tau^H\right) - \tau^L\hat{x}\left(\tau^L\right) > 0$ is the difference in (public) transfer received under the two alternative fiscal policies with $g_2(\tau,\pi) \equiv \tau[1+e-\hat{x}(\tau)] - (1+q-\pi)b$; $\Delta\tau \equiv \tau^L - \tau^H > 0$ is the difference between the two alternative fiscal rates, $\left(1+e^i\right)\Delta\tau$ is the differential taxation of resources bestowed to each individual.

In the remainder of this section, we consider the equilibrium of the policy game under different assumptions about the relative importance of the two policies.

4.1 Equilibrium policies when monetary policy in non-salient[15]

In this section, we assume that fiscal policy is the only *salient* issue for all citizens. This means that for each individual, the welfare gain from getting the preferred fiscal policy is greater than the welfare gain from the preferred monetary policy.

ASSUMPTION 5

Monetary policy is non-salient:

$$\left|b^i - b\right| < \frac{\left|\Delta S + \Delta g - \left(1 + e^i\right)\Delta\tau\right|}{q} \quad \forall i$$

Assumption 5 imposes a constraint on the wealth distribution among individuals. The amount of bonds owned by each citizen cannot differ from the average amount *b* by more than the right hand side of the above inequality.

Under the previous assumptions, the equilibrium of the policy game is straightforward. Both parties will choose as a candidate a poor member of their party and rational voters will vote the candidate who shares their fiscal policy preferences. Therefore, the Nash equilibrium policy vectors will be $s^*_A(\tau^L, q)$ and $s^*_B = (\tau^H, q)$, and the party A's candidate will win with probability $\Psi(\gamma_L - \gamma_H)$. Thus, we have:

PROPOSITION 1:

If $b_Z^m < b \;\; \forall Z$ (assumption 4) and if for each individual monetary policy is non-salient (assumption 5), then the majoritarian outcome ($\pi = q$) is chosen with probability one.

Proof: see appendix.

As is intuitive, electoral competition will produce a differentiation between the two parties only in the fiscal dimension, this means that, with probability one, an equilibrium will emerge in which monetary policy is inflationary.

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[14] See Di Gioacchino et al. (2003) for the analytical expression of $\Psi(\omega)$.

[15] This section is based on Di Gioacchino et al. 2003.

We now show how the presence of an anti-inflationary lobby may prevent electoral competition from producing a majoritarian outcome in the *non-salient* policy dimension[16]. We suppose that lobby's contributions are used by parties to "buy" the vote of *noise voters* [17]. Under such condition we argue that, if one party selects an anti-inflationary candidate, the opponent's best-reply is to adopt the same strategy. This will prevent the first party from gaining the electoral advantage of interest-group support.

To prove our result we need the following assumption, which gives the conditions under which the equilibrium involves both parties selecting candidates who share the fiscal policy preferences of their members, but have non-majoritarian monetary policy preferences.

ASSUMPTION 6:

Let $\varepsilon^*(\omega)$ *be the optimal contribution offered by the lobby to party A*[18]*. For* $Z \in \{A, B\}$

$$k = \begin{cases} L & when\ Z = A \\ H & when\ Z = B \end{cases} \text{ and } -k = \begin{cases} L & when\ Z = B \\ H & when\ Z = A \end{cases}$$

(i) $$\Psi(\gamma_k - \gamma_{-k})\left|\Delta S + \Delta g - (1+e^k\ )\Delta\tau\right| > \hat{\Psi}\left[\gamma^P - \gamma^R, -\varepsilon^*(\gamma^P - \gamma^R)\right]\left(b - b_Z^m\right)q$$

(ii) $$\left\{\Psi(\gamma_k - \gamma_{-k}) - \hat{\Psi}\left[\gamma_k\ - \gamma_{-k}, -\varepsilon^*(\gamma_{-k} - \gamma_k)\right]\right\}\left|\Delta S + \Delta g - (1+e^k)\Delta\tau\right| > \\ > \hat{\Psi}\left[\gamma_k - \gamma_{-k}, -\varepsilon^*(\gamma_{-k} - \gamma_k)\right]\left(b - b_Z^m\right)q.$$

If 6.i is satisfied, the gain from choosing the preferred fiscal policy is greater than the gain from compromising on the fiscal policy and choosing the majoritarian monetary policy while the opponent chooses the policy preferred by the lobby and receives the contribution. If 6.ii is satisfied, when both parties are choosing the monetary policy preferred by the lobby, switching to the one which maximises the party median member expected pay-off is not convenient. In fact, the gain from switching to the preferred monetary policy (RHS) does not compensate the loss due to the reduced probability of winning the election (LHS).

PROPOSITION 2

Suppose that there is an anti-inflationary interest group and assumptions 3,4,5 and 6 hold. Then the non-majoritarian outcome ($\pi = 0$*) is chosen with probability one.*

[16] See Di Gioacchino et al. 2003 for a discussion of the conditions under which such a lobby emerges in equilibrium.
[17] Here we follow Besley and Coate (2000).
[18] A symmetric arguments applies in the case *B* is the anti-inflationary party. The optimal contribution to *B* party becomes equal to - $\varepsilon^*(\omega)$.

Proof: see appendix. Intuition: If one party selects an anti-inflationary candidate, the opponent's best-reply is to adopt the same strategy. This will prevent the first party from gaining the electoral advantage of interest-group support.

Hence, we have shown that the presence of a lobby can dramatically change the outcome of the policy game.

4.2 Equilibrium policies when monetary policy is salient for the very rich

In this section we consider the possibility that for a fraction of wealthy voters, the very rich, monetary policy becomes *salient*. This means that the gain from the preferred monetary policy is so big as to overcome the gain from the preferred fiscal policy. Formally:

$$\left|b_i - b\right| > \frac{\left|\Delta S + \Delta g - \left(1+e^i\right)\Delta\tau\right|}{q} \qquad \text{for some } i \text{ with } b_i > 2b.$$

This minority cast their vote only looking at a candidate attitude towards monetary policy.

Even if the majority of party members, as well as the majority of the population, are inflationary, the best choice for the party is an anti-inflationary candidate. Intuitively, if party *B* is choosing an anti-inflationary candidate, the best-reply for party *A* is to make the same choice. In fact, if party *A* were to choose an inflationary candidate it would lose the votes of very rich low-productivity individuals, for whom monetary policy is *salient*. A symmetric reasoning ensures that party *B* will choose an anti-inflationary candidate. Therefore, the equilibrium policy vectors will be be $s^*_A = (\tau^L, 0)$ and $s^*_B = (\tau^H, 0)$ and party *A* will win with probability $\Psi(\gamma_L - \gamma_H)$.

The following assumption gives the conditions under which the equilibrium involves both parties selecting candidates who share the fiscal policy preferences of their members, but have non-majoritarian monetary policy preferences.

ASSUMPTION 7:

For $Z \in \{A, B\}$, $k = \begin{cases} L & when\ Z = A \\ H & when\ Z = B \end{cases}$ *and* $\quad -k = \begin{cases} L & when\ Z = B \\ H & when\ Z = A \end{cases}$

(i) $\quad \Psi(\gamma_k - \gamma_{-k})\left[\Delta S + \Delta g - \left(1+e^k\right)\Delta\tau\right] - \hat{\Psi}\left[\gamma^P - \gamma^R\right]q\left(b - b_Z^m\right)$

(ii) $\quad \left\{\Psi(\gamma_k - \gamma_{-k}) - \hat{\Psi}\left[(\gamma_k - \gamma_k^{VR}) - (\gamma_k^{VR} + \gamma_{-k})\right]\right\}\left[\Delta S + \Delta g - \left(1+e^k\right)\Delta\tau\right] - \hat{\Psi}\left[(\gamma_k - \gamma_k^{VR}) - (\gamma_k^{VR} + \gamma_{-k})\right]q\left(b - b_Z^m\right)$

where $\hat{\Psi}\left[(\gamma_k - \gamma_k^{VR}) - (\gamma_k^{VR} + \gamma_{-k})\right]$ is the probability that party Z wins when choosing (τ^k, 0) while the opponent party is choosing (τ^k, q) and monetary policy is *salient* for a fraction γ_k^{VR} of very rich individuals, whose productivity is of type k (the same as party Z members).

If 7.i is satisfied, the gain from choosing the preferred fiscal policy is greater than the gain from compromising on the fiscal policy and choosing the majoritarian monetary policy, while the opponent chooses the policy preferred by the rich. If 7.ii is satisfied, when both parties are choosing the non-majoritarian monetary policy, preferred by the individuals for whom monetary policy is *salient*, switching to the one which maximises the party pay-off is not convenient. In fact, the gain from switching to the preferred monetary policy (RHS) does not compensate the loss due to the reduced probability of winning the election (LHS).

PROPOSITION 3: *Suppose that for a minority of rich individuals monetary policy is salient and assumptions 3,4,5 and 7 hold. Then the non-majoritarian outcome ($\pi = 0$) is chosen with probability one*

Proof: see appendix.

5. The non-salience condition

We now show the existence of an interval of values for q such that: if q is beneath such interval, monetary policy is *non-salient* for all agents; if q falls inside the interval, monetary policy is *salient* for at least a subset of the richest segment of the population; finally, if q falls above the interval, monetary policy becomes *salient* for the poorest segment of the population as well. We will then argue that when q falls below the upper bound of the interval, then, either the presence of a financial lobby or of a minority of individuals for whom monetary policy is *salient*, will prevent an inflationary equilibrium from emerging. On the contrary, if q falls above the upper bound, an inflationary equilibrium is the outcome in period two. This is anticipated by the potential buyers of public debt at time one and government can not issue any amount of debt.

Recall that assumption 5, which posits the *non-salience* of monetary policy, reads:

$$\left|b^i - b\right| < \frac{\left|\Delta S + \Delta g - \left(1 + e^i\right)\Delta\tau\right|}{q} \quad \forall i\,.$$

Under such assumption, for each individual the gains from fiscal policy are greater than the gains from monetary policy.

Let $\Delta x = \hat{x}(\tau^L) - \hat{x}(\tau^H) > 0$ be differential leisure and $\Delta V = V[\hat{x}(\tau^L)] - V[\hat{x}(\tau^H)] > 0$ be differential welfare from leisure under the two alternative fiscal policies. By straightforward substitution of ΔS and Δg the *non-salience* assumption can be rewritten as:

$$\left|b^i - b\right| < \frac{\left|\Delta V - \Delta x + (e - e^i)\Delta\tau\right|}{q}$$

It is easy to verify that the *non salience* condition is more easily met when (i) the nominal interest rate q is low; (ii) the distribution of government bonds is concentrated around its mean; (iii) preferences on fiscal policies are highly polarised[19]; (iv) income (productivity) dispersion around its mean is high.

For low productivity individuals, the *non-salience* assumption can be written as

$$\left|b^i - b\right| < \frac{(e - e^L)\Delta\tau + \Delta V - \Delta x}{q} > 0 \quad \forall i : e^i = e^L \tag{1}$$

Let $d(e^L) = (e - e^L)\Delta\tau + \Delta V - \Delta x$, then from (1) we get

$$b - \frac{d(e^L)}{q} < b^i < b + \frac{d(e^L)}{q} \quad \forall i : e^i = e^L .$$

Similarly, for high productivity individuals, the *non-salience* condition implies:

$$b - \frac{d(e^H)}{q} < b^i < b + \frac{d(e^H)}{q} \quad \forall i : e^i = e^H , \tag{2}$$

where $d(e^H) = (e^H - e)\Delta\tau - \Delta V + \Delta x$.

Given individuals' preferences and the distributions of wealth and productivity, the previous *non-salience* intervals depend on *q*. Namely, the higher is *q*, the larger is the number of individuals for which monetary policy becomes *salient*. This means that the value of *q*, which is determined in period 1, impinges on the second period political equilibrium.

Let $b^H_{\max}$ denote the wealth of the richest individual among the high productivity ones. Similarly, let $b^L_{\max}$ be the wealth of the richest individual among the low productivity ones.

ASSUMPTION 8

$$b^H_{\max} > 2b \ \text{ and } \ b^L_{\max} > 2b .$$

[19] In fact, $\Delta\tau = \frac{e - e^L}{\frac{\partial\hat{x}(\tau^L)}{\partial\tau}} + \frac{e^H - e}{\frac{\partial\hat{x}(\tau^H)}{\partial\tau}}$

Under such assumption, the distance from average wealth (b) for the richest individuals is larger than for the poorest ones $\{i : b^i = 0\}$.

ASSUMPTION 9

$$q < \min\left\{ \frac{d(e^H)}{b^H_{\max} - b}, \quad \frac{d(e^L)}{b^L_{\max} - b} \right\}$$

PROPOSITION 4

Under assumptions 8 and 9, monetary policy is non salient for the whole population

Proof:

We will show the result for high productivity individuals. From assumption 9, we get

$$0 < q < \frac{d(e^H)}{b^H_{\max} - b},$$

that is

$$b^H_{\max} < b + \frac{d(e^H)}{q}.$$

This means that, monetary policy is *non-salient* for the richest individual[20]. If this is true, monetary policy is non *salient* for all rich individuals, i.e. $\{i : e^i = e^H, b < b^i < b^H_{\max}\}$. Furthermore, from the previous inequality the following expression can be derived

$$b^H_{\max} - b - \frac{d(e^H)}{q} < 0$$

and, using assumption 8, we have

$$b - \frac{d(e^H)}{q} < 0.$$

The last expression implies that monetary policy is *non-salient* for poor individuals[21], i.e. $\{i : e^i = e^H, 0 < b^i < b\}$. In conclusion, under the condition of the proposition, monetary policy is *non-salient* for all high productivity individuals. A similar proof applies for low productivity ones. Q.E.D.

ASSUMPTION 10

$$\min\left\{ \frac{d(e^H)}{b^H_{\max} - b}, \quad \frac{d(e^L)}{b^L_{\max} - b} \right\} < q < \min\left\{ \frac{d(e^H)}{b}, \quad \frac{d(e^L)}{b} \right\}$$

[20] See expression (2) in the first part of this section.
[21] See previous footnote.

PROPOSITION 5

Under assumptions 8 and 10, monetary policy is salient for at least a subset of the very rich $(b_i \geq 2b)$. *It is non salient for all other individuals.*

Proof:

Suppose that[22]

$$\min\left\{\frac{d(e^H)}{b^H_{\max}-b}, \quad \frac{d(e^L)}{b^L_{\max}-b}\right\} = \frac{d(e^L)}{b^L_{\max}-b}$$

From assumption 10 we get

$$q > \frac{d(e^L)}{b^L_{\max}-b} > 0;$$

then,

$$b^L_{\max} > b + \frac{d(e^L)}{q}.$$

This means that q is such that monetary policy is *salient* at least for very rich, low productivity individuals.

If, on the other hand,

$$\min\left\{\frac{d(e^H)}{b^H_{\max}-b}, \quad \frac{d(e^L)}{b^L_{\max}-b}\right\} = \frac{d(e^H)}{b^H_{\max}-b}$$

a similar reasoning shows that monetary policy is *salient* at least for very rich, high productivity individuals.

For poor individuals, however, fiscal policy remains *salient*. In effect, from assumption 10, we get

$q < \frac{d(e^i)}{b}$, with $i = H, L$, which implies

$$b - \frac{d(e^i)}{q} < 0,;$$

and so, for poor individuals monetary policy is *non-salient*[23]. Q.E.D.

We can thus argue that, when q is such that monetary policy is *non-salient* for poor individuals, i.e. when

$$q < \min\left\{\frac{d(e^H)}{b}, \quad \frac{d(e^L)}{b}\right\}, \tag{3}$$

then, either the presence of a financial lobby (see proposition 2) or of a minority of individuals for whom monetary policy is *salient* (see proposition 3) will prevent an inflationary equilibrium from emerging. For values of q above such threshold, an inflationary equilibrium is going to come out at time two and government can not issue any amount of debt at time one.

[22] This is so, for example, when $e^H - e = e - e^L$

[23]See footnote 19.

From (3), some interesting conclusions can be drawn. First, the larger the level of outstanding debt per capita, the smaller the maximum level of real interest rate politically feasible. This is a standard and reasonable result. Second, the more unequal the income distribution –determined by the productivity distribution –, the higher the real interest rate paid on bonds can be. Thus, the political conflict on income redistribution deflects attention from the inflation tax[24]. Therefore, our analysis leads to a strong and verifiable result: in order to assess the credibility of public debt, lenders should evaluate the burden of debt service, not only with respect to the total income of the country, but also with respect to the existing inequality in income distribution. Any measure of distributive conflict should be positively related to the merit of government issues. Finally, it is worth mentioning another unexpected consequence of our analysis: any policy which reduces the productivity differences among individuals, e.g. a public investment aimed at increasing human capital and/or at reducing income differences, makes society more prone to inflation.

5.1. The politically feasible amount of public debt

We now turn to a description of the political equilibrium in period 1, in which a decision has to be taken on how much debt to issue. From propositions 2 and 3, we know that in order to exclude a political equilibrium featuring inflation, the *non-salience* assumption must apply at least to the poorest segment of population. Then, from inequality (3) it is straightforward to derive the politically viable amount of public debt. Noting that when $\pi^e = 0$ the rate at which government can sell bonds must be equal to the world real interest rate ($q = r^w$) , the maximum amount of politically feasible debt per capita is given by:

$$\tilde{b} = \min\left[\frac{d(e^H)}{r^w}, \frac{d(e^L)}{r^w}\right].$$

No amount greater than $\tilde{b}$ can be issued in equilibrium, since nobody would buy it . If

$$\tilde{b} \geq U_c^{-1}(1)$$

the equilibrium level of debt issued in period 1 is equal to $U_c^{-1}(1)$ and the socially optimal intertemporal redistribution of resources is obtained. But, if

$$\tilde{b} < U_c^{-1}(1)$$

the equilibrium redistribution is affected by model parameters. Namely, intertemporal redistribution increases as (i) r^w decreases; (ii) polarization of preferences on fiscal policies increases; (iii) income (productivity) dispersion around its mean increases.

6. Concluding remarks

[24] See Aghion and Bolton (1990) for a similar conclusion although in a different political framework.

In this paper we have developed a two period model to investigate the problem of what makes the promise to repay debt credible. We have explored a political solution excluding any role for long-run reputational arguments. Debt is issued in order to redistribute income over time. This function cannot be efficiently carried out by private capital markets because of the existence of imperfections that constrain the ability of borrowing of some individuals. In equilibrium, debt is issued only if the promise to repay it is credible, that is only if, in the first period, an anti-inflationary monetary policy is expected for the second period.

In our model there are two sources of heterogeneity among individuals: in the first period, agents differ in the amount of initial endowments; in the second period, differences in wealth are combined with differences in incomes. Differences in asset holdings determine preferences over monetary policy (which directly sets the level of inflation i.e. the level of implicit default on debt), differences in incomes determine individuals' preferences over the level of taxation and the level of public transfer (fiscal policy). Policy decisions will depend on how the redistributive conflict is resolved in the second period political process. In the paper the bi-dimensionality of the political choice plays a fundamental role. We have shown, in fact, that political outcomes on the dimension perceived as less relevant might be decided by minority groups. Namely, when monetary policy is perceived by citizens as *non-salient* (benefits deriving from the preferred fiscal policy always exceed benefits from the preferred monetary policy) the level of inflation realized will be that preferred by anti-inflationary financial lobbies. On the other hand, if monetary policy is *salient* for a minority of rich individuals, the political outcome will always feature zero-inflation, even in absence of organized lobbies. In this sense, the very fact of issuing debt creates a constituency in favour of repaying it and under certain conditions this constituency might be winning even though it is a minority group.
Our result is similar to the one by Dixit and Londregan (2000). They argue that, because the decision of repaying the debt is made in competitive elections, political equilibrium can lend credibility to the promise to redeem bonds. In their model, the more politically powerful groups hold the bonds and so they turn the political process on their interest. Their result is conditional on the initial distribution of wealth. Ours depends on the joint distribution of bonds and income.

Our analysis leads to a strong and verifiable result. Since the political conflict on income redistribution deflects attention from the inflation tax, the credibility of public debt might be assessed not only with respect to the total income of the country, but also with respect to the existing inequality in income distribution. Any measure of distributive conflict should be positively related to the merit of government issues. Finally, it is worth mentioning another unexpected consequence of our analysis: any policy which reduces the productivity differences among individuals, e.g. a public investment aimed at increasing human capital and/or at reducing income differences, makes society more prone to inflation.

The role of the government in our model is admittedly very limited. Its only aim is to correct the market failure due to the imperfections in private capital markets. We are planning to extend the present research to introduce a more fundamental role for fiscal policy in the first period, namely the possibility of redistributive policies and/or policies that influence individuals' level of productivity in the second period. The implementation of these policies might by itself affect the probability of repayment of public debt.

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Appendix

Proof of proposition 1: We have to show that $s^*_A(\tau^L, q)$ and $s^*_B = (\tau^H, q)$ are the unique Nash equilibrium strategies in the policy game, that is they are the unique reciprocal best responses. Each party can choose between four possible strategies: $(\tau^L, 0)$, $(\tau^H, 0)$, (τ^L, q), (τ^H, q). However, given the assumption about the distribution of debt, no party will ever choose a rich candidate. In fact, if a party were to choose a rich candidate, the expected pay-off for its median member would be smaller because of the assumption that $b > b_Z^m$. To illustrate this point, take the situation where $s_A = (\tau^L, q)$ and $s_B = (\tau^H, q)$. If party A were to choose $(\tau^L, 0)$, its probability of winning would remain equal to $\Psi(\gamma_L - \gamma_H)$, by assumption 3, but the median member expected pay-off would decrease. In fact,

$$E_\eta\left[\hat{W}^m_A \middle| s_A = (\tau^L, q), s_B = (\tau^H, q)\right] = b_A^m + \Psi(\gamma_L - \gamma_H)\left[S(\tau^L) + g_2(\tau^L, q) + (1-\tau^L)(1+e^L)\right] +$$
$$+ \left[1 - \Psi(\gamma_L - \gamma_H)\right]\cdot\left[S(\tau^H) + g_2(\tau^H, q) + (1-\tau^H)(1+e^L)\right] +$$
$$+ (1 + r^w)\cdot\left[(1-\alpha)\hat{s}_Z^m + U(\hat{c}_1)\right]$$

and

$$E_\eta\left[\hat{W}^m_A \middle| s_A = (\tau^L, q), s_B = (\tau^H, q)\right] - E_\eta\left[\hat{W}^m_A \middle| s_A = (\tau^L, 0), s_B = (\tau^H, q)\right] =$$
$$= \Psi(\gamma_L - \gamma_H)\left[g_2(\tau^L, q) - g_2(\tau^L, 0) - qb_A^m\right] = \Psi(\gamma_L - \gamma_H)\left[q(b - b_A^m)\right] > 0.$$

Therefore, the strategy (τ^L, q) is preferred to the strategy $(\tau^L, 0)$. A similar reasoning would apply if the two parties were to choose the same fiscal policy and one of them picked up a rich candidate. Take the situation where $s_A = (\tau^H, q)$ and $s_B = (\tau^H, q)$. If party A were to choose $(\tau^H, 0)$, the expected pay-off of its median member would decrease by the following amount:

$$E_\eta\left[\hat{W}^m_A \middle| s_A = (\tau^H, q), s_B = (\tau^H, q)\right] - E_\eta\left[\hat{W}^m_A \middle| s_A = (\tau^H, 0), s_B = (\tau^H, q)\right] =$$
$$= g_2(\tau^H, q) - \left[1 - \Psi(\gamma^P - \gamma^R)\right]\cdot\left[g_2(\tau^H, 0) + (1+q)b_A^m\right] - \Psi(\gamma^P - \gamma^R)\left[g_2(\tau^H, q) + qb_A^m\right] =$$
$$= \left[1 - \Psi(\gamma^P - \gamma^R)\right]\cdot\left[q(b - b_A^m)\right] > 0.$$

As for the fiscal policy, both parties always choose a candidate with the same preferences of their members. Given that both candidates will be poor, there is no advantage in choosing the fiscal policy preferred by the opponent party. Therefore, the unique equilibrium strategies are $s^*_A = (\tau^L, q)$ and $s^*_B = (\tau^H, q)$. Q.E.D.

Proof of proposition 2: We have to show that, under the assumptions specified in the previous proposition, $s^*_A = (\tau^L, 0)$ and $s^*_B = (\tau^H, 0)$ represent Nash equilibrium strategies of the policy game, that is $s^*_A = (\tau^L, 0)$ is the best response to $s^*_B = (\tau^H, 0)$ and vice versa. We concentrate on the choice of the party. A similar argument applies in the case of the opponent party. The specified strategies bring about the following expected pay-off of party A's median member:

$$E_\eta\left[\hat{W}_A^m \middle| s_A=(\tau^L,0), s_B=(\tau^H,0)\right]=(1+q)b_A^m+\Psi(\gamma_L-\gamma_H)\left[S(\tau^L)+g_2(\tau^L,0)+(1-\tau^L)(1+e^L)\right]+$$
$$+\left[1-\Psi(\gamma_L-\gamma_H)\right]\cdot\left[S(\tau^H)+g_2(\tau^H,0)+(1-\tau^H)(1+e^L)\right]+$$
$$+(1+r^w)\cdot\left[(1-\alpha)\hat{s}_Z^m+U(\hat{c}_1)\right]$$

In order to show that $s_A = (\tau^L, 0)$ is the best response to party *B*'s strategy, we have to compare the previous expected pay-off with the pay-off obtainable by choosing the alternative strategies: (τ^L, q), (τ^H, q), $(\tau^H, 0)$.

$(\tau^L, 0)$ is certainly preferred to $(\tau^H, 0)$ if $\Psi(\gamma_L\text{-}\gamma_H) > 0$. If party *A* were to choose $s_A = (\tau^H, q)$, the monetary policy would be the unique policy at stake in the gubernatorial elections and the interest group would contribute to party *B*'s campaign. Therefore, the expected pay-off of the party *A*'s median member would be:

$$E_\eta\left[\hat{W}_A^m \middle| s_A=(\tau^H,q), s_B=(\tau^H,0)\right]=\hat{\Psi}\left[\gamma^P-\gamma^R,-\varepsilon^*(\gamma^P-\gamma^R)\right]g_2(\tau^H,q)+$$
$$+\left\{1-\hat{\Psi}\left[\gamma^P-\gamma^R,-\varepsilon^*(\gamma^P-\gamma^R)\right]\right\}\cdot\left[g_2(\tau^H,0)+qb_A^m\right]+S(\tau^H)+$$
$$+(1-\tau^H)(1+e^L)+b_A^m+(1+r^w)\cdot\left[(1-\alpha)\hat{s}_Z^m+U(\hat{c}_1)\right]$$

The difference between the two expected pay-off is equal to:

$$E_\eta\left[\hat{W}_A^m \middle| s_A=(\tau^L,0), s_B=(\tau^H,0)\right]-E_\eta\left[\hat{W}_A^m \middle| s_A=(\tau^H,q), s_B=(\tau^H,0)\right]=$$
$$=\Psi(\gamma_L-\gamma_H)\left[\Delta S+\Delta g-(1+e^L)\Delta\tau\right]-\hat{\Psi}\left[\gamma^P-\gamma^R,-\varepsilon^*(\gamma^P-\gamma^R)\right]q(b-b_A^m).$$

Under the previous assumption 6.i, the expression is positive and party A prefers the strategy $(\tau^L,0)$ to (τ^H, q).

Finally, if $s_A = (\tau^L, q)$,:

$$E_\eta\left[\hat{W}_A^m \middle| s_A=(\tau^L,q), s_B=(\tau^H,0)\right]=\hat{\Psi}\left[\gamma_L-\gamma_H,-\varepsilon^*(\gamma_L-\gamma_H)\right]\cdot\left[S(\tau^L)+g_2(\tau^L,q)+b_A^m+(1-\tau^L)(1+e^L)\right]+$$
$$+\left\{1-\hat{\Psi}\left[\gamma_L-\gamma_H,-\varepsilon^*(\gamma_L-\gamma_H)\right]\right\}\cdot\left[S(\tau^H)+g_2(\tau^H,0)+(1+q)b_A^m+(1-\tau^H)(1+e^L)\right]+(1+r^w)\cdot\left[(1-\alpha)\hat{s}_Z^m+U(\hat{c}_1)\right]$$

therefore, the expected loss of the median member would be:

$$E_\eta\left[\hat{W}_A^m \middle| s_A=(\tau^L,0), s_B=(\tau^H,0)\right]-E_\eta\left[\hat{W}_A^m \middle| s_A=(\tau^L,q), s_B=(\tau^H,0)\right]=$$
$$=\left\{\Psi(\gamma_L-\gamma_H)-\hat{\Psi}\left[\gamma_L-\gamma_H,-\varepsilon^*(\gamma_L-\gamma_H)\right]\right\}\cdot\left[\Delta S+\Delta g-(1+e^L)\Delta\tau\right]-\hat{\Psi}\left[\gamma_L-\gamma_H,-\varepsilon^*(\gamma_L-\gamma_H)\right]q(b-b_A^m).$$

Under the previous assumption 6.ii, the expression is positive and party *A* prefers the strategy $(\tau^L, 0)$ to (τ^L, q). This shows that $s^*_A = (\tau^L, 0)$ is the best response to $s^*_B = (\tau^H, 0)$. Q.E.D.

Proof of proposition 3:

We have to show that, under assumptions 3,4,5 and 7, $s^*_A = (\tau^L, 0)$ and $s^*_B = (\tau^H, 0)$ represent Nash equilibrium strategies of the policy game, that is $s^*_A = (\tau^L, 0)$ is the best response to $s^*_B = (\tau^H, 0)$ and vice versa. We concentrate on the choice of the party *A*. A similar argument applies in the case of the opponent party. The specified strategies bring about the following expected pay-off for party *A*'s median member:

$$E_\eta\left[\hat{W}_A^m \middle| s_A=(\tau^L,0), s_B=(\tau^H,0)\right]=(1+q)b_A^m+\Psi(\gamma_L-\gamma_H)\left[S(\tau^L)+g_2(\tau^L,0)+(1-\tau^L)(1+e^L)\right]+$$
$$+\left[1-\Psi(\gamma_L-\gamma_H)\right]\left[S(\tau^H)+g_2(\tau^H,0)+(1-\tau^H)(1+e^L)\right]$$
$$+(1+r^w)\cdot\left[(1-\alpha)\hat{s}_Z^m+U(\hat{c}_1)\right]$$

In order to show that $s_A = (\tau^L, 0)$ is the best response to party *B*'s strategy, we have to compare the previous expected pay-off with the pay-off obtainable by choosing the alternative strategies: (τ^L, q), (τ^H, q), $(\tau^H, 0)$.

$(\tau^L, 0)$ is certainly preferred to $(\tau^H, 0)$ if $\Psi(\gamma_L-\gamma_H) > 0$. If party *A* were to choose $s_A = (\tau^H, q)$, then monetary policy would be the unique policy at stake. Therefore, the expected pay-off for the party *A*'s median member would be:

$$E_\eta\left[\hat{W}_A^m \middle| s_A=(\tau^H,q), s_B=(\tau^H,0)\right]=\hat{\Psi}\left[\gamma^P-\gamma^R\right]g_2(\tau^H,q)+$$
$$+\left\{1-\hat{\Psi}\left[\gamma^P-\gamma^R\right]\right\}\cdot\left[g_2(\tau^H,0)+qb_A^m\right]+S(\tau^H)+(1-\tau^H)(1+e^L)+b_A^m$$
$$+(1+r^w)\cdot\left[(1-\alpha)\hat{s}_Z^m+U(\hat{c}_1)\right]$$

The difference between the two expected pay-off is equal to:

$$E_\eta\left[\hat{W}_A^m \middle| s_A=(\tau^L,0), s_B=(\tau^H,0)\right]-E_\eta\left[\hat{W}_A^m \middle| s_A=(\tau^H,q), s_B=(\tau^H,0)\right]=$$
$$=\Psi(\gamma_L-\gamma_H)\left[\Delta S+\Delta g-(1+e^L)\Delta\tau\right]-\hat{\Psi}\left[\gamma^P-\gamma^R\right]q(b-b_A^m).$$

Under assumption 7.i, the above expression is positive and party *A* prefers the strategy $(\tau^L,0)$ to (τ^H, q).

Finally, by choosing $s_A = (\tau^L, q)$ party *A* would lose the votes of rational, low-productivity and very-rich voters (which we indicate with γ_L^{VR}):

$$E_\eta\left[\hat{W}_A^m \middle| s_A=(\tau^L,q), s_B=(\tau^H,0)\right]=\hat{\Psi}\left[(\gamma_L-\gamma_L^{VR})-(\gamma_L^{VR}+\gamma_H)\right]\cdot\left[S(\tau^L)+g_2(\tau^L,q)+b_A^m+(1-\tau^L)(1+e^L)\right]+$$
$$+\left\{1-\hat{\Psi}\left[(\gamma_L-\gamma_L^{VR})-(\gamma_L^{VR}+\gamma_H)\right]\right\}\cdot\left[S(\tau^H)+g_2(\tau^H,0)+(1+q)b_A^m+(1-\tau^H)(1+e^L)\right]$$
$$+(1+r^w)\cdot\left[(1-\alpha)\hat{s}_Z^m+U(\hat{c}_1)\right]$$

Therefore, the difference between the two expected pay-off is equal to:

$$E_\eta\left[\hat{W}_A^m \middle| s_A=(\tau^L,0), s_B=(\tau^H,0)\right]-E_\eta\left[\hat{W}_A^m \middle| s_A=(\tau^L,q), s_B=(\tau^H,0)\right]=$$
$$=\left\{\Psi(\gamma_L-\gamma_H)-\hat{\Psi}\left[(\gamma_L-\gamma_L^{VR})-(\gamma_L^{VR}+\gamma_H)\right]\right\}\cdot\left[\Delta S+\Delta g-(1+e^L)\Delta\tau\right]-\hat{\Psi}\left[(\gamma_L-\gamma_L^{VR})-(\gamma_L^{VR}+\gamma_H)\right]q(b-b_A^m).$$

Under assumption 7.ii, the above expression is positive and party *A* prefers the strategy $(\tau^L, 0)$ to (τ^L, q). This shows that $s^*_A = (\tau^L, 0)$ is the best response to $s^*_B = (\tau^H, 0)$. Q.E.D.