The political economy of unfinished reforms: Reputation versus the "need for enemies"

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Abstract

Why do Politicians not solve social problems ? One reason may be that such problems are very difficult to solve. Another one may be that Politicians have not the ability to solve difficult problems, i.e. they are "incompetent". But there is another reason: Politicians sometimes lack the incentive to solve problems because of inefficiencies generated by electoral process in representative democracies. It is the case when Politicians have the incentive "to keep their enemies alive", precisely because they are competent in solving the problem: once the problem removed, competent Politicians lose their electoral advantage. In this paper, we show that reputational strengths can, to some extent, circumvent Politicians incentives not to address the problems. If the reputation of an incumbent Politician depends on the amount of reforms he implements, and positively affects his probability of been reelected, the trade-off between reputation and the "need for enemies" results in an incomplete set of reforms, which can handle only a part of the problems. This mechanism might contribute to the explanation of the high degree of persistence of some macroeconomic diseases such as inflation, unemployment or, specifically, public indebtedness.

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1. Introduction

The fact that a society can create social cohesion through identifying a common enemy is a leitmotiv of political science and has been described by a number of works in psychology, sociology, history or social anthropology (see e.g. Bailey (1998)). The idea that enemies serve a function for societies and for individuals comes from psychological fundamentals such that children or adolescents construct their identity through a need for opposition and that everybody needs "*to identify some people as allies and others as enemies*" (Volkan, 1985). In its "*beloved enemies*", Barash (1994) even affirms that it is in human nature to need to create opponents. Such arguments have been applied to sociology and politics notably in the context of the cold war (Wolfe, 1983). More generally, following Finlay et al. (1967), "*it seems that we have always needed enemies and scapegoats; if they have not been readily available, we have created them*". Murray and Meyers (1999) distinguish two typical explanations for why people need enemies. The first one is that people "*psychologically need enemies as suitable targets for the displacement of their personal fears and hostilities*"; the second one is that political leaders can create enemies "*to mobilize the nation around common aims*".

In this paper, we consider the possibility that this second motivation to the "need for enemies" might not only be a matter of war (hot or cold) or fear of an external threat, but might be extended to the fight against macroeconomic diseases whose liquidation is a goal shared by the community and which can be manipulated by Politicians in power. There are numerous examples showing that macroeconomic variables may have been diverted from their stated objectives. The objective of "fighting inflation" during the 1980s might have been an instrument to impose reforms in the job market (for ending wage indexation), and the persistence of an inflation threat might help Governments to maintain a pressure on wages. In some European countries, the persistence of high levels of unemployment might have exerted a threat to workers for accepting low working conditions or might have been used as a signal that the Government was tough and determined to fight inflation (Drazen and Masson, 1994), while the declared goal of "fighting unemployment" ensured a sufficient level of social cohesion. More recently, the crisis of sovereign debts in European and Monetary Union gave rise to a novel enemy, namely public debt, whose persistence exerts pressures leading populations to accept austerity measures.

In all of these examples, the macroeconomic "enemy" can be used to create a "unifying myth" (according to Bailey (1998)) for other purposes, possibly welfare enhancing[1]. But such myths can also be used by Politicians interested in their reelection, in the same way than our fear of foreign enemies. And the persistence of inflation, unemployment, public debt, and so on, may be interpreted in a similar way, namely, the need to keep the enemy alive in order not to lose an electoral advantage. The "need for enemies" has often been mentioned to describe situations in which Politicians need enemies to justify continuing failed policies, or in which societies need to create some scapegoats in order to escape from internal reforms [2]. But not implementing internal reforms may also be the consequence of our need for keeping the enemy alive. Indeed, the "need for enemies" will be looked on in quite a different light if, instead of being regarded as a factor which comes from the incapacity of Politicians to undertake reforms, it is seen as a factor which leads Politicians not to undertake reforms.

Fergusson et al. (2012) develops an interesting application of this mecha-

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[1] Notice that mythmaking is not necessarily counterproductive from a social welfare perspective. A society can take advantage to tying its minds on a unifying myth.

[2] One of the most influential examples of this point of view is given in the Report entitled The First Global Revolution by the Council of The Club of Rome (1991): "*The need for enemies seems to be a common historical factor. Some states have striven to overcome domestic failure and internal contradictions by blaming external enemies. [] In searching for a common enemy against whom we can unite, we came up with the idea that pollution, the threat of global warming, water shortages, famine and the like, would fit the bill. But [] all these dangers are caused by human intervention in natural processes, and it is only through changed attitudes and behavior that they can be overcome. The real enemy then is humanity itself.*"

nism to the fight against guerilla groups like the FARC in Columbia, suggesting that president Uribes incentive to eliminate the guerilleros would have been mitigated by the fact his electoral advantage would have been removed if he had eliminated them too quickly. As Fergusson et al. (2012) states the problem arises when Politicians are elected because they are "the person for the job": once the job is over, the Politicians may be replaced even if (and because) they have successfully completed the job for which they were elected. A classic example in history (also cited by Fergusson et al. (2012)) is Winston Churchill who led Britain to victory in the Second World War as prime minister, but was immediately removed by electors as soon as the war was won in 1945. Another example, more recent and more closely related to economics, is the episode of Claudio Monti in Italy. In November 2011, Monti accepted to form a Government that would remain in office until the next scheduled general elections in 2013. He became Prime Minister of Italy and formed a "technocratic" cabinet entirely composed of unelected professionals. On this occasion, he received the largest support ever acquired in a confidence vote in the Italian Parliament. However, after having introduced emergency austerity measures, restored financial stability and implemented structural reforms in the labor market, Monti's centrist coalition was only able to come fourth at the election of 24 February 2013, obtaining 10.5% of the vote. For sure, austerity and unpopular reforms may have led to a desire to sanction the coalition. It remains that the initial massive popular support for Monti has collapsed once the reforms implemented, probably because the threat of the enemy had been pushed aside.

These examples also show that the "need for enemies" story is only one part of the piece. Generally, one can find mechanisms that ensure that reforms are undertaken, at least partially. In some extreme circumstances, "the person for the job" is designated, by an election or not, and she does the job, because she is the "right" person (she has a great sense of community that goes beyond its electoral interest) or because this is the "right" time (she takes advantage of favorable conditions). In other circumstances, the society may delegate some objectives to an independent agent - such that a "conservative" central banker *à la* Rogoff (1985) to fight inflation, for example. However, such a delegation of decisions to an "independent" agent or to a "providential" person, even if she does not become a dictator (benevolent or not), might raise a problem of democratic control.[3]

The other possibility, more usual in democracies where the "rules of the game" are based on elections, is to resort to reputational strengths to circumvent Politicians incentives not to reform. Effectively, in general, electors do not perfectly perceive the "competence" of Politicians, either incumbent Politicians or their opponents. However, the incumbent Government has an advantage, because he can signal his competence by beginning to implement reforms, while his opponent cannot do it, since he is not at the helm of power. By launching reforms, an incumbent Politician can improve its "reputation" to be competent, and increase his chances of reelection. Such a signaling mechanism goes against the strengths underlying the "need for enemies" and gives rise to a trade-off between "not to reform" in order to keep the enemy alive and "to reform" in order to maximize reputation. The present paper relates this trade-off, which, as we will see, may result in imperfect reforms, hence the topic of our paper: the political economy of unfinished reforms.

In our model, we consider an incumbent Government who is seeking re-election. Before the election, he tries to manipulate the vote by introducing "reforms" which result in "liquidating" a part of public debt. However, the

[3] In modern history, a salient example of issues raised by such a problem of democratic control following a radical change in the "rules of the game" has been the questioning about the implementation of the Constitution of 1958 in France, following the failure of the Fourth Republic to reform the country. Thus, on May 19, 1958, General de Gaulle asserted at a press conference that he was "*at the disposition of the country*". In response to a journalist who feared that he would violate civil liberties, as his opponent Franois Mitterrand later denounced in his famous book Le coup d'état permanent (1964), De Gaulle retorted vehemently: "*Have I ever done that? Does anyone believe that, at age 67, I am going to launch a career as a dictator?*" For an interesting anthropological analysis of the "rules of the political game" in France during the period, see Bailey (1969), chapter 9.

result of reforms depends not only on his reform effort, and on his competence, but also on the "economic or political context", which symbolize the difficulty to reform and that we define as a random shock hitting the efficiency of reforms.

The incumbent Government is more competent than his opponent, but the electors does not know his exact competence (nor that of his opponent) and they do not observe the random shocks that affect the efficiency of reforms, nor the effort of Government, but only the global outcome of the reforms, namely the amount of public debt "liquidation". Knowing this outcome, they attempt to infer the degree of competence of the incumbent Government by using a Bayesian procedure. It follows that a higher amount of reforms will increase the reputation of the incumbent Politician, i.e. the probability that he is competent. Finally, the chance of reelection of the incumbent Government positively depends on its "reputation", but, owing to the "need for enemies" story, negatively depends on the amount of reforms realized before the election. This results in a trade-off which, generally, gives rise to incomplete reforms because it is the interest of the incumbent Government to reform, but only partially. Therefore, our model offers three types of explanations for why reforms are incomplete: because macroeconomic conditions are difficult, because the incumbent Government is incompetent or because he is competent but he acts strategically.

The amount of reforms that will be implemented is the outcome of a political equilibrium resulting from the confrontation between the temptation of the Government to take advantage of its future competence and the control of its reputation by the voters. In equilibrium, this amount will positively depend on the probability that the incumbent Government is competent (which enhances the benefits of "reputation") and will negatively depend on the competence gap between the incumbent Government and his challenger (which strengthens the "need for keeping public debt alive"). In addition, our model exhibits a "Goldilocks theorem" for the probability of reelection of an incumbent Government: to maximize his chances of success, the macroeconomic context must be neither "too bad" nor "too good" (for an unchanged level of reform effort).

Effectively, if a "too bad" economic context generates a low amount of reforms which reduce the incumbent Politician's reputation, a "too good" economic context, ceteris paribus, may give rise to an amount of reform that weakens the electoral advantage of a competent Politician.

This paper is connected with a large number of analyses in political economy literature focusing on "positive" approaches of reforms and that Besley and Coate (1998) qualifies as "sources of inefficiency" in representative democracies. With a closely concern to ours, but using a very different specification, Alesina and Drazen (1991) and Drazen and Grilli (1993) are interested in the optimal delay in reforms following a "war of attrition" and the benefits of crisis to implement reforms more rapidly. In our framework, reforms are not only delayed but remain optimally incomplete. In a model with asymmetric information like ours, Cukierman and Tommasi (1998) also presents a framework where the Politician who cares most about doing something is the least likely to do it (like President Nixon, who opened the door to the international legitimization of the People's Republic of China in the early 1970s, in spite of his strong anti-Communist convictions). But the argument of Cukierman and Tommasi (1998) rests on the fact that incumbent Politicians have better information than voters about the "state of the world". More specifically, two cases of strategic behavior of a Politician facing rational forward-looking voters have been extensively studied in the literature. The first case focuses on uncertainty about Governments preferences (as in, e.g., Alesina and Cukierman (1990)), or about Governments abilities (Cukierman and Meltzer (1986), Rogoff and Sibert (1988) and Rogoff (1990), among others). In these frameworks, the incumbent Politician acts strategically in order to "signal" his preferences or abilities to voters. In the second case, studied in particular by Persson and Svensson (1989), Alesina and Cukierman (1990) and Milesi-Ferretti and Spolaore (1994) among others, the incumbent Politician uses a state variable (typically public debt) to manipulate the choices of voters or of future policymakers [4]. Our model can be viewed as joining these

[4]Aghion and Bolton (1990) presents an interesting model in which public debt can be

two strands of literature. Effectively, by choosing his effort to reform, an incumbent Government can affect election outcomes both through signaling and through the residual burden which he will bequeath to his possible, incompetent, successors.

Section 2 presents the baselines of the model, Section 3 describes the way Households compute the reputation of the incumbent Government, following a Bayesian approach and Section 4 presents the resulting political equilibrium. Finally, Section 5 produces some numerical results and Section 6 concludes.

2. The model

We are interested in a very general set of problems which focuses on an Agent who is hired by a Principal to carry out a specific task, namely to "liquidate" (part of) a "problem" x. There are two periods, $t \in \{1, 2\}$, and the nuisance's initial amount is given by $x_0 > 0$. In the first period, the Agent can remove a part $l_1 \in [0, x_0]$ of variable x, such that, the residual amount of nuisance is simply $x_1 = x_0 - l_1$. In the second period, he can again reduce this amount by liquidating a fraction l_2 of the residual nuisance, thus: $x_2 = (1 - l_2)(x_0 - l_1)$. At the end of period 1, the Principal has to decide whether to renew or not the Agent in office. In this game, the Agent can act strategically: even if he is "competent, i.e. he can solve the problem in the first period by setting $l_1 = x_0$, he has no interest to do so, because he would not be renewed once the problem solved. Thus, he is induced to not liquidate in the first period ($l_1 = 0$), in order to maximize his chances to be renewed. But of course, the fact that the Agent does not liquidate in the first period may affect the probability to be renewed, because it's a bad signaling (zero liquidation might signal that the Agent is

used as a political instrument to ensure reelection. In the incumbent Politician (typically a conservative one) can more credibly commit not to default than his opponent, he has an incentive to excessive accumulation of public debt in order to increase the number of bondholders (which will vote for the most "competent candidate, i.e. the one which is less likely to default).

incompetent or is a shirker and affect its reputation).

In this paper, we attempt to solve the trade-off between these two conflicting forces: the need to keep enemies alive and the need to preserve reputation. We model this trade-off in a public finance set-up, with the Principal the Electors, the Agent the Government and the state variable x the public debt, but our framework can be applied to any problem involving a job contract.

2.1. Agents' preferences

To fix ideas, suppose that the economy is populated by $N > 0$ Households (or Citizens) indexed by $n \in \{1, \cdots, N\}$, and two Politicians (or parties) denoted by D and R respectively, where $i \in \{D, R\}$ represents the ideological bias, which attempt to maximize the probability to be elected.

There are two periods. In period 1, a Politician $i \in \{D, R\}$ holds power, and at the end of period 1 there is an election to decide who is in power in period 2. We suppose that in the first period, the Government initially in power distributes to Households the public good $g_1 = \sum_{n=1}^{N} g_{1,n}$, and implements "reforms" which lead to "save" part of public spending, so that the amount of expenditures that must be financed is only $(g_1 - l_1)$. The part of public expenditure that is "liquidated" $l_1 \in [0; g_1]$, might correspond to decreases in "wasteful" expenditures, such as corruption, central administration spending, or X-inefficiencies. It can also reflects the ability of Government to obtain "extra" resources, such as international donations, debt reductions,...[5] This part depends on the effort of the Government in implementing reforms e, on its degree of competence q, but also on the economic or political context, which may be more or less favorable to the success of reforms, and that we model as a random shock ϵ. Thus the probability of success in attempting to liquidate public spending depends on the Governments competence, on his own intrinsic

[5]Our model can also be applied to local Governments as municipalities, districts or federated states: the liquidation would then correspond to the capacity of local Politicians to extract subsidies from the central or federal state.

effort, as well as on exogenous factors outside the control of the Politician: $l_1 = \epsilon q e$.

At the end of the first period, the remaining part of public spending is financed by issuing public debt d_1, so that the budget constraint is simply: $d_1 = g_1 - l_1$. Then, the election takes place and the Government of type i, $i \in \{D, R\}$, is renewed or his challenger takes office.

In the second (and last) period, the Government newly elected has to repay public debt and interests $(1+r)d_1$ and there is no other spending. He also takes advantage of "windfall benefits", such as a post-electoral "honeymoon effect", that allow him to launch reforms without effort. Hence, a part $l_2 = \epsilon_2 q \in [0; 1]$ of public spending (here the debt burden), depending on the competence of the new Government and on a random shock ϵ_2, can be liquidated at no cost, so that the amount of expenditures that must be financed in period 2 is only $(1-l_2)(1+r)d_1$. To finance its expenditures, the Government must levies taxes from Households $\tau_2 = \sum_{n=1}^{N} \tau_{2n}$, since he cannot borrow in the last period. Hence the budget constraint: $\tau_2 = (1 - l_2)(1 + r)d_1$. We suppose a constant real interest rate r and the initial and terminal levels of public debt are fixed to zero (i.e. : $d_1 = d_2 = 0$), thus the Government intertemporal budget constraint is simply given by:

$$\tau_2 = (1 + r)(g_1 - l_1)(1 - l_2). \tag{1}$$

Households derive utility from consumption in the two periods: c_1 and c_2, and from the public good g_1, namely, assuming a log-linear utility function for simplicity:

$$U_n := u(c_{1n}, c_{2n}, g_{1n}) = \log(c_{1n}) + \frac{1}{1+\rho} \log(c_{2n}) + \lambda \log(g_{1n}), \tag{2}$$

where ρ is the rate of discount and λ is a positive parameter reflecting the preference for the public good. Household n receives a constant level income y_n in the first period and saves for consumption and tax payments during second period, hence the following budget constraints : $s_n = y_n - c_{1n}$ and, $c_{2n} = (1 + r)s_n - \tau_{2n}$. Thus, the intertemporal budget constraint is given by: $c_{1n} +$

$\frac{1}{1+r}c_{2n} = y_n - \frac{1}{1+r}\tau_{2n}$. Consequently, first order conditions for the Households' program conduct to the following usual relationships:

$$\begin{cases} c^*_{1n} = (1+\rho)(y_n - \frac{1}{1+r}\tau_{2n})/(2+\rho), \\ c^*_{2n} = c^*_{1n}(1+r)/(1+\rho). \end{cases}$$

And the household n 's utility becomes:[6]

$$U_n = u_{0n} - \frac{\tau_{2n}(2+\rho)}{y_n(1+\rho)(1+r)} + \lambda \log(g_{1n}). \tag{3}$$

where, $u_{0n} := \frac{1}{1+\rho}\{(2+\rho)\log(y_n \frac{1+\rho}{2+\rho}) + \log(\frac{1+r}{2+\rho})\}$.

Finally, anticipating on resolution, in symmetric equilibrium we have: $\tau_{2n} = \tau_2/N$, and $g_{1n} = g_1/N$. Therefore, by introducing (1) in (3) and defining $\gamma_n := \frac{2+\rho}{y_n(1+\rho)(1+r)N}$, we obtain a reduced form for Household n's utility function:

$$U_n = u_{0n} + \lambda \log(g_{1n}) - \gamma_n(1+r)(g_1 - l_1)(1 - l_2). \tag{4}$$

Consequently, Households' utility positively depends on the amount of "liquidation" in each period (which is the part of public spending which will not lead to an increase in public debt or in taxes).

2.2. Households as voters

The key assumption in our model is that each Politician can be competent (b-type), or incompetent (g-type). Thus, we define the success probability of a Government belonging to the type i, $i \in \{D, R\}$, of competence j, $j \in \{b, g\}$, in attempting to reform in the first period by : $l^j_{1i} = \epsilon q^j_i e^j_i$, where $0 \le q^j_i \le 1$, $0 \le e^j_i$, and ϵ is a random variable[7] representing exogenous factors affecting the possibility to reduce public spending, with mean $\mathrm{E}(\epsilon) =: \alpha \le 1$.

We consider that $q^b_i > q^g_i$ for $i \in \{D, R\}$, namely a competent Government of type i have a higher probability of success in reforming than an incompetent one.

[6] We use, $\log(1 - \frac{\tau_{2n}}{y_n(1+r)}) \approx -\frac{\tau_{2n}}{y_n(1+r)}$ for "small" taxes' rate τ_{2n}/y_n.

[7] We introduce a probability space $\Omega := (\mathbb{R}, \mathscr{B}(\mathbb{R}), \mathrm{P})$. Where, $\mathscr{B}(\mathbb{R})$ is a Borel Set of $\mathbb{R}$, and P is the measure of probability. We suppose that $\epsilon \in L^2(\Omega)$.

In addition, for a same type j, two Politicians may differ in their preferences or in their ability when it comes to reduce public spending. We suppose that a Politician of type R who decides to reform can do it with a higher probability than a Politician of type D, i.e.: $q_R^j \geq q_D^j$, $j \in \{b, g\}$. In other words, Politician R has a greater competence in liquidating public spending than Politician D. An alternative interpretation is that the abilities of Politicians are the same, but Politician R has a bias in favor of reforms.

Households know the ideological bias of the Government in place $i \in \{D, R\}$ in the first period (in what follows, we will consider, unless otherwise and without loss of generality, that the Government initially in office is of type R). They also know the amount of "liquidation" that arises in the first period l_{1R}. However, they don't know the competence q_R of the Government in office nor the random shock ϵ that hits the success probability of liquidation, which are private information for the incumbent Government. We will show below how Households can infer the competence of Government in office from the signal l_{1R}. After the election, Government R is reelected or a new Government of type D takes place. From equation (4) in the case of a Government of type $i \in \{D, R\}$ and competence $j \in \{b, g\}$ is elected, Household n's expected utility is given by:

$$\mathrm{E}_i^j[U_n] = \begin{cases} u_{0n} + \lambda \log(g_{1n}) + \gamma_n(1+r)(g_1 - l_{1R})(1 - l_{2D}^j) & \text{if } i = D, \\ u_{0n} + \lambda \log(g_{1n}) + \gamma_n(1+r)(g_1 - l_{1R})(1 - l_{2R}^j) + \theta_n + \xi & \text{if } i = R. \end{cases} \tag{5}$$

In addition to utility derived from consumption, Households as voters have preferences over ideology and other characteristics of Politicians which we call "popularity". Thus, we suppose that Household n feels and additional expected utility $(\theta_n + \xi)$ if the Politician R is in power. This term includes two components: θ_n is isidiosyncratic and ξ is common to all voters. Following the probabilistic voting models of Lindbeck and Weibull (1987), and Persson and Tabellini (2000), we suppose, on the one hand, that each Household n has an ideological preference θ_n in favor of Politician R. Therefore, $\theta_1, \cdots, \theta_N$ are independent random variables, constant over time, and uniformly distributed on $[-\frac{1}{2s}, \frac{1}{2s}]$, with density $s > 0$ [8]. On the other hand, the random variable ξ reflects the general popularity of Politician R and is uniformly distributed on $[-\frac{1}{2h}, \frac{1}{2h}]$. The density of this distribution is given by $h > 0$ and the expected value of ξ is zero.

Finally, even if Households don't know the precise degree of Politicians' competence in reforming, they may have some prior information on this competence, possibly based on past behavior of Politicians. In what follows, we suppose that Households assign some prior probability δ, $0 \leq \delta \leq 1$, to the fact that a Politician is competent (i.e. g-type). Therefore, we introduce a random variable X_i which represents Politician i's competence $i \in \{D, R\}$. If Politician i is skilled (respectively unskilled), then $X_i = g$ (respectively $X_i = b$), with:

$$\mathrm{P}\{X_i = g\} = 1 - \mathrm{P}\{X_i = b\} = \delta. \tag{6}$$

However, there is an asymmetry in our model, since the Government in office can send a signal to increase this prior probability by launching reforms. In other words, he can attempt to increase its reputation to be competent by liquidating a high part of public spending l_{1R}. On the contrary, his opponent, who is not in office, cannot send such a signal, so that his reputation remains at the initial level δ.

2.3. Timing of events

The timing of events can be depicted as follows:

1. The random shock ϵ on the success probability of reforms is revealed to the Government in office. The Government of type $i \in \{D, R\}$, and competence $j \in \{b, g\}$ decides the effort in implementing reforms e_i^j, in order to maximize its chances of reelection. Thus, the amount of effective liquidation of public spending will be $l_{1i}^j = \epsilon q_i^j e_i^j$. If the Government is initially of type R, as we consider, this amount is $l_{1R} = \epsilon q_R^g e_R^g$ if the Government is competent, or $l_{1R} = \epsilon q_R^b e_R^b$ if the Government is incompetent.

[8] s is a measure of voters' responsiveness to Government decisions. Indeed, as s increases, Households care more about Government policy relative to ideology, see equation (5).

2. Households observe the amount of liquidation l_{1R}. They don't know the shock ϵ nor Politicians competence.
3. Households revise their prior probability that the incumbent Government is competent δ, knowing the signal l_{1R}.
4. The general popularity shock ξ is revealed and Households vote according to their expected utility.
5. The Politician $i \in \{D, R\}$ who got the most votes takes power in period 2.
6. If the initial set of reforms have been unsuccessful ($l_{1R} < g_1$), a second set of reforms is launched by the newly elected Government of competence $j \in \{b, g\}$, and the game ends.

As usual, we look for the pure subgame perfect equilibrium, and we solve the model by backwards induction. The two crucial stages in our model are steps 1 (choice of effort by the incumbent Government) and 3 (Households revise their probability that the incumbent Government is competent after having received the signal l_{1R}). Let us depict these stages in the two following Sections.

3. Government's reputation and signaling

Households don't know the incumbent Government's competence, but they observe the effective "liquidation"'s amount of public spending l_{1R} , which they use as a signal to revise their priors about Government reputation δ. In what follows, we suppose that Households adopt a Bayesian procedure to revise the probability that the Government is competent. According to the fact that the incumbent Government is of type R, the signal l_{1R} can only be obtained through two cases:

$$l_{1R} = \begin{cases} l_{1R}^g = \epsilon q_R^g e_R^g & \text{if the Government is competent (g-type),} \\ l_{1R}^b = \epsilon q_R^b e_R^b & \text{if the Government is incompetent (b-type).} \end{cases}$$

Households guess that the amount of liquidation l_{1R}^j is an increasing function of ϵq_R^j, denoted by h, and which is given by the following definition.

Definition 1. (Households guess)

Households guess is given by the function $h(\cdot)$ continuous, increasing, positive, such as:

$$l_{1R}^j = \begin{cases} 0 & \text{if } \epsilon < \epsilon_0^j \\ h(\epsilon q_R^j) & \text{if } \epsilon_0^j \leq \epsilon \leq \epsilon_1^j \\ g_1 & \text{if } \epsilon > \epsilon_1^j \end{cases} \tag{7}$$

For an interior solution to appear, this means that the elasticity of effort in implementing reforms with respect to ϵq_R^j must be less than unity (in absolute value), i.e. $|\frac{\partial e^j/e^j}{\partial \epsilon q_R^j/\epsilon q_R^j}| \leq 1$, which will be the case in equilibrium (see equation (31) in the following Section). More precisely, in numerical simulations of Section 5 below, we will assume that Households guess that $h(\cdot)$ is a linear increasing function of the facility to reform ϵq_R^j, namely:

$$h(\epsilon q_R^j) = a + b\epsilon q_R^j, \tag{8}$$

where a and b are positive parameters that have to be identified in equilibrium. Using the method of undetermined coefficients, this guess will be verified as rational expectation equilibrium in Section 5, as we will see.

Now we define the probability that the incumbent Government is competent knowing the signal l_{1R}, that we note p_R and whose value is established in the following Theorem.

Theorem 1. *(Bayesian revision of probability)*

Given the signal l_{1R}, the probability that the incumbent Government is competent is:

$$p_R = \delta + \frac{\delta(1-\delta)\Lambda}{1+\delta\Lambda} \quad \textit{where, } \Lambda := \frac{P\{\epsilon = \epsilon^g(l_{1R})\}}{P\{\epsilon = \epsilon^b(l_{1R})\}} - 1. \tag{9}$$

Proof.

The bayesian revision of probability takes place in two stages.

Step 1. The signal received by Households can take any particular value l_{1R} only in two cases: if the random shock ϵ takes the value ϵ^b or ϵ^g respectively, where ϵ^b and ϵ^g are given by:

$$l_{1R}^j = h(\epsilon q_R^j) = l_{1R} \Rightarrow \epsilon = \frac{1}{q_R^j} h^{-1}(l_{1R}) =: \epsilon^j(l_{1R}), \forall j \in \{b, g\}. \tag{10}$$

To reduce the notations, we note $\epsilon^j(l_{1R}) = \epsilon^j, j \in \{b, g\}$. Notice that ϵ^b and ϵ^g depend of course on the signal l_{1R}, more precisely: $\mathrm{d}\epsilon^j/\mathrm{d}l_{1R} \geq 0$, $j \in \{b, g\}$. In addition, $\epsilon^g < \epsilon^b$. Indeed, if the observed amount of liquidation is high, it's likely that the shock that caused this amount is also high. But, since a competent Government has more chances to success in reforms, the required shock associated to a skilled Government to verify the observed level of liquidation (ϵ^g) is less than the one required if the Government is unskilled (ϵ^b).

Step 2. Let l be the signal received by Household in period 1. The probability that the incumbent Government is competent knowing the signal $l = l_{1R}$ is, according to Bayes rule:

$$p_R = \mathrm{P}\{X_R = g | l = l_{1R}\} = \frac{\mathrm{P}\{l = l_{1R} | X_R = g\}\mathrm{P}\{X_R = g\}}{\mathrm{P}\{l = l_{1R}\}}. \tag{11}$$

Yet the unconditional probability that Government is competent is the initial value of its "reputation" δ, thus, $\mathrm{P}\{X_R = g\} = \delta$. Besides, in accordance with the law of total probability, $\mathrm{P}\{l = l_{1R}\} = \mathrm{P}\{l = l_{1R} | X_R = g\}\mathrm{P}\{X_R = g\} + \mathrm{P}\{l = l_{1R} | X_R = b\}\mathrm{P}\{X_R = b\}$. Furthermore, according to Step 1, $\mathrm{P}\{l = l_{1R} | X_R = b\} = \mathrm{P}\{\epsilon = \epsilon^b(l_{1R})\}$ and, $\mathrm{P}\{l = l_{1R} | X_R = g\} = \mathrm{P}\{\epsilon = \epsilon^g(l_{1R})\}$. Therefore, (11) becomes:

$$p_R = \frac{\delta \mathrm{P}\{\epsilon = \epsilon^g(l_{1R})\}}{\delta \mathrm{P}\{\epsilon = \epsilon^g(l_{1R})\} + (1 - \delta)\mathrm{P}\{\epsilon = \epsilon^b(l_{1R})\}}. \tag{12}$$

Finally, after rewriting, we obtain the above expression (9). □

Corollary 1. *The probability p_R is increasing with Λ.*

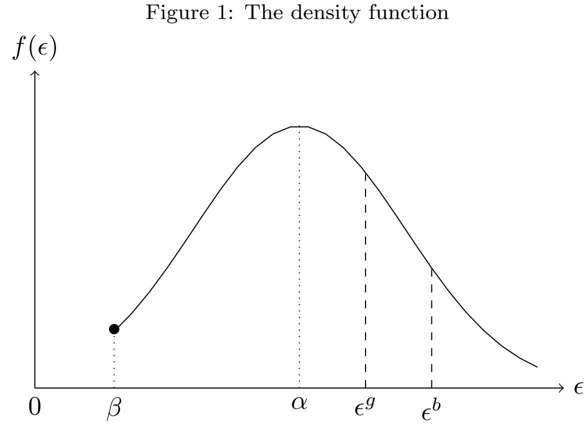
Proof. Proof in conformity with equation (9), $\partial p_R/\partial \Lambda = \delta(1-\delta)/(1+\delta\Lambda)^2 \geq 0$. □

Theorem 1 shows that the reputation of the incumbent Government p_R depends on the signal received by Households. Effectively, since ϵ^g and ϵ^b positively depends on the amount of observed liquidation l_{1R}, Λ is also a function of the signal l_{1R} in equation (9). The next step is to precise the probability distribution of the shock ϵ in order to explicit the linkage between l_{1R} and p_R. For this purpose, we introduce f the probability density function of the shock ϵ, defined on the support $[\beta, +\infty[$, where $\beta \geq 0$. In addition, we suppose f is a Normal density $\mathrm{N}(\alpha, \sigma^2)$, as in Figure 1, and is given by:

$$f(x) = \frac{1}{\kappa\sqrt{2\pi\sigma^2}} \exp\{-\frac{(x-\alpha)^2}{2\sigma^2}\} \mathbf{1}_{[\beta,+\infty[}(x), \tag{13}$$

where, $\mathbf{1}$ is the indicator function, and κ is the density parameter given by: $\kappa := [1 - G(\beta)]$, and $G(\cdot)$ is the a cumulative distribution function of the Normal distribution $\mathrm{N}(\alpha, \sigma^2)$.

Figure 1: The density function



With such a density function we hypothesis that intermediate shocks are more probable than “high” or “low” ones. Therefore, the opportunities to reduce public spending are distributed in such a manner that “moderate” liquidations are more probable. Another interpretation might be that ϵ is a shock on Politician competences, and that there is higher occurrence of moderately competent Politicians.

In what follows, we define $q_i^b = (1 - \tilde{q}_i)q_i$, and $q_i^g = (1 + \tilde{q}_i)q_i$, $i \in \{D, R\}$. Where, $q_i := (q_i^b + q_i^g)/2$ depicts the Government i's average competence, and $\tilde{q}_i := (q_i^b - q_i^g)/2q_i$ is the differential of competence (in percent) between a skilled and an unskilled Government of type i. Furthermore, we suppose that this differential is small.

The following Proposition establishes the link between the signal l_{1R} and "reputation" of the incumbent Politician.

Theorem 2. *(The Government's reputation)*

The probability that the incumbent Politician is competent according to the signal l_{1R} is given by :

$$p_R = \delta + \Pi(\epsilon), \tag{14}$$

In addition, for "small" values of $\tilde{q}_R$ the signal function $\Pi(\cdot)$ takes the value:

$$\Pi(\epsilon) = \frac{2\delta(1-\delta)\tilde{q}_R}{(1-\tilde{q}_R)(1+\tilde{q}_R)}\Sigma(\epsilon), \tag{15}$$

where, $\epsilon := \frac{1}{q_R}h^{-1}(l_{1R})$ and $\Sigma(\epsilon) := -\frac{\epsilon f'(\epsilon)}{f(\epsilon)}$ is the elasticity of the distribution function relative to ϵ.

Proof.

We proof the Theorem 2 in two Steps. The first Step consists in replacing the probability p_R with a density relation, which is given by the following Lemma, and the second Step is an approximation of this relation for small values of $\tilde{q}_R$.

Lemma 1. *Given the density of probability $f(\epsilon)$, the probability p_R in equation* (9) *can be written as:*

$$p_R = \frac{\delta f(\epsilon^g)}{\delta f(\epsilon^g) + (1-\delta)f(\epsilon^b)}. \tag{16}$$

Proof. See Appendix A.

Step 2. Equation (16) can be rewritten as : $p_R = \delta + \Pi(l_{1R})$, where:

$$\Pi(l_{1R}) = \frac{\delta(1-\delta)\check{\Lambda}}{1+\delta\check{\Lambda}} \text{ and, } \check{\Lambda} := \frac{f(\epsilon^g)}{f(\epsilon^b)} - 1.$$

From equation (10), we obtain:

$$\epsilon^b = \frac{h^{-1}(l_{1R})}{q_R(1-\tilde{q}_R)} \text{ and, } \epsilon^g = \frac{h^{-1}(l_{1R})}{q_R(1+\tilde{q}_R)}.$$

Let us define $\epsilon := h^{-1}(l_{1R})/q_R$. So, we can rewrite ϵ^g and ϵ^b as:

$$\epsilon^g = \epsilon(1 - \frac{\tilde{q}_R}{1+\tilde{q}_R}) \text{ and, } \epsilon^b = \epsilon(1 + \frac{\tilde{q}_R}{1+\tilde{q}_R}) = \epsilon^g + \Delta \text{ where, } \Delta := \frac{2\tilde{q}_R\epsilon}{(1-\tilde{q}_R)(1+\tilde{q}_R)}.$$

For small $\tilde{q}_R$, Δ is small also, so that:

$$f(\epsilon^b) - f(\epsilon^g) = f(\epsilon^g + \Delta) - f(\epsilon^g) \cong \Delta f'(\epsilon^g).$$

Thus, we have, $\check{\Lambda} \cong \dfrac{-\Delta f'(\epsilon^g)}{f(\epsilon^b)}$. In addition: $\tilde{q}_R \to 0 \Rightarrow \epsilon^g \to \epsilon^b \to \epsilon, \forall l_{1R}$. Thus it's true that:

$$\check{\Lambda} = -\frac{\Delta f'(\epsilon)}{f(\epsilon)} = \frac{2\tilde{q}_R}{(1-\tilde{q}_R)(1+\tilde{q}_R)}[-\frac{\epsilon f'(\epsilon)}{f(\epsilon)}], \tag{17}$$

Finally notice that, if $\tilde{q}_R \to 0$, then $\check{\Lambda} \to 0$, [9] so that we can approximate $\Pi(l_{1R})$ for small $\tilde{q}_R$ by, [10] $\Pi(l_{1R}) = \delta(1-\delta)\check{\Lambda}$. Equation (15) directly results of substituting the value of $\check{\Lambda}$ from equation (17). □

Corollary 2. *For the Gaussian distribution* (13), *there is* $\beta > 0$ *such as the reputation is an increasing function of the signal* l_{1R}.

Proof.

According to equations (14) and (15), we have, taking into account the derivative of $\epsilon(l_{1R})$:

$$\frac{\mathrm{d}p_R}{\mathrm{d}l_{1R}} = \Pi'(l_{1R}) = \frac{2\delta(1-\delta)\tilde{q}_R}{(1-\tilde{q}_R)(1+\tilde{q}_R)} \frac{(h^{-1})'(l_{1R})}{q_R} \frac{d\Sigma(\epsilon)}{d\epsilon},$$

where:

$$\frac{d\Sigma(\epsilon)}{d\epsilon} = \frac{f'(\epsilon)[\epsilon f'(\epsilon) - f(\epsilon)] - \epsilon f''(\epsilon) f(\epsilon)}{f(\epsilon)^2}.$$

Notice that: $(h^{-1})'(\cdot) \geq 0$, since $h'(\cdot) \geq 0$. In addition, $\frac{d\Sigma(\epsilon)}{d\epsilon} \geq 0$ if $\epsilon \geq \frac{f'(\epsilon)f(\epsilon)}{f'(\epsilon)^2 - f''(\epsilon)f(\epsilon)}$. This condition is non restrictive for a number of distribution functions (including the triangular distribution), such that $\frac{f'(\epsilon)f(\epsilon)}{f'(\epsilon)^2 - f''(\epsilon)f(\epsilon)} \leq 0$,

---

[9] Because, $[-\dfrac{\epsilon f'(\epsilon)}{f(\epsilon)}] < +\infty$ almost elsewhere.

[10] Indeed, $\Pi(l_{1R}) = \dfrac{\delta(1-\delta)\check{\Lambda}}{1+\delta\check{\Lambda}} = (1-\delta)\displaystyle\sum_{k=1}^{+\infty} \delta^k \check{\Lambda}^k$, because $\delta\check{\Lambda} \leq 1$ for small value of $\tilde{q}_R$. Therefore, $\Pi(l_{1R}) = \delta(1-\delta)\check{\Lambda} + o(\check{\Lambda}^2)$ where, $o(\check{\Lambda}^2) := (1-\delta)\displaystyle\sum_{k=2}^{+\infty} \delta^k \check{\Lambda}^k$. Consequently, when $\tilde{q}_R$ is small, $\check{\Lambda}^k$ is negligible, for all $k \geq 2$, and so $o(\check{\Lambda}^2)$ is also negligible. Finally, if $\check{\Lambda}$ is small, $\Pi(l_{1R}) \cong \delta(1-\delta)\check{\Lambda}$.

$\forall\epsilon \geq 0$. For the Gaussian distribution that we specifically use in Section 5, $\Sigma(\epsilon) = \epsilon(\epsilon - \alpha)/\sigma^2$, thus : $\mathrm{d}\Sigma(\epsilon)/\mathrm{d}\epsilon \geq 0$ if $\epsilon \geq \alpha/2$. Therefore, we define: $\underline{\beta} = \alpha/2$ in equation (13), so that this condition is verified for all admissible values of ϵ. □

Notice that the reputation of the incumbent Government p_R can be positively or negatively affected by the "signal" of liquidation. Effectively, if the liquidation l_{1R} is "small", $\Pi(l_{1R})$ is negative and the incumbent Politician suffers from a loss of reputation ($p_R < \delta$). If the amount of liquidation is "high", on the contrary, $\Pi(l_{1R})$ becomes positive and the reputation of the incumbent Politician improves ($p_R > \delta$). With the Gaussian distribution (13), $\Pi(l_{1R}) \geq 0$ if $\epsilon \geq \alpha$, namely if $l_{1R} \geq h(\alpha q_R)$, and $\Pi(l_{1R}) \leq 0$ if $\alpha/2 \leq \epsilon \leq \alpha$, which corresponds to $h(\alpha q_R/2) \leq l_{1R} \leq h(\alpha q_R)$. However, in both cases, the reputation of the incumbent Government is increasing with l_{1R}, as Corollary 2 ensures. Thus, the Politician on power has an incentive to reform in order to strengthen its reputation as soon as $\epsilon \geq \beta = \alpha/2$. Nevertheless, the actual amount of liquidation is not directly chosen by the Government in power, who can only choose its level of effort in reforming. Therefore, for bad economic or political contexts (low values of ϵ) it is not an advantage to hold power, because the absence of reform will lead voters to degrade the reputation of the incumbent Politician.

In order to establish formal results, we consider from now a linear approximation of the signal function $\Pi(l_{1R})$ on its increasing part. The linearization strategy is depicted in the following Lemma:

Lemma 2. *(Linearization)*

For $\epsilon \geq \underline{\beta}$, the signal function $\Pi(l_{1R})$ can be approximate on the neighborhood of $l_{1R} = g/2$ by:

$$p_R = \delta + \Pi(l_{1R}) \approx \delta + \phi_0 + \phi_1 l_{1R}, \tag{18}$$

with $\Pi'(l_{1R}) = \phi_1 > 0$ and $\Pi''(l_{1R}) = 0$, for all $l_{1R} \geq 0$.

PROOF.

With the Gaussian distribution (13), the signal function is, from equation (15):

$$\Pi(\epsilon) = \omega(\epsilon^2 - \alpha\epsilon), \text{ where: } \omega := \frac{2\delta(1-\delta)\tilde{q}_R}{(1-\tilde{q}_R)(1+\tilde{q}_R)\sigma^2}, \text{and } \epsilon := \frac{1}{q_R}h^{-1}(l_{1R}).$$

Anticipating on the resolution, for "small" values of $\tilde{q}_R$, the equilibrium amount of liquidation will be close to $g_1/2$ (as one can verify in Figure 4 below). Therefore, we consider the following linear approximation of $\Pi(\epsilon)$ in the neighborhood of $\epsilon = \hat{\epsilon} := \frac{1}{q_R}h^{-1}(g_1/2) > \beta$:[11] $\Pi(\epsilon) = \Pi(\hat{\epsilon}) + \Pi'(\hat{\epsilon})(\epsilon - \hat{\epsilon}) + o(|\epsilon - \hat{\epsilon}|^2)$.[12]

By substituting ϵ with its value, we obtain:

$$\Pi(\epsilon) \approx \Pi(\hat{\epsilon}) - \hat{\epsilon}\Pi'(\hat{\epsilon}) + \frac{1}{q_R}\Pi'(\hat{\epsilon})h^{-1}(l_{1R}).$$

Since $h^{-1}(l_{1R})$ linearly depends on l_{1R} in Households guess function (8), we can write $\Pi(l_{1R})$ as: $\Pi(l_{1R}) \approx \phi_0 + \phi_1 l_{1R}$. Notice that ϕ_0 and ϕ_1 depend on parameters a and b of the guess function in relation (8), namely: $\phi_0 = \phi_0(a,b)$ and $\phi_1 = \phi_1(a,b)$. The exact values of ϕ_0 and ϕ_1 are reported in Appendix C.

□

4. The political equilibrium

To describe the political equilibrium in our model, we first characterize the electoral process, before determining the optimal reform effort of the incumbent Government.

4.1. The determination of Citizens' vote

At the end of period 1 the election takes place and citizens vote for the candidate which gives them the highest expected utility according to the signal l_{1R}. There are two candidates: the incumbent Politician, of type-R and his challenger of type-D.

[11] We consider that: $g_1 > a + \alpha b q_R$

[12] Where $\lim_{\epsilon \to \hat{\epsilon}} o(|\epsilon - \hat{\epsilon}|^2) = 0$.

On the one hand, if the incumbent Government R is reelected, Citizen n's welfare is given by:

$$\mathrm{E}_R[U_n] = p_R \mathrm{E}_R^g[U_n] + (1 - p_R)\mathrm{E}_R^b[U_n], \tag{19}$$

with $p_R = \delta + \Pi(l_{1R})$ the probability that the incumbent Politician is competent. According to the definition (4), if the incumbent Politician is of competence q_R^j, citizen n's expected utility if R reelected is given by:

$$\mathrm{E}_R^j[U_n] = u_{0n} + \lambda \log(g_{1n}) - \gamma_n(1+r)(g_1 - l_{1R})(1 - \epsilon_2 q_R^j) + \theta_n + \xi, j \in \{b, g\}. \tag{20}$$

From equations (19) and (20) we obtain:[13]

$$\mathrm{E}_R[U_n] = u_{0n} + \lambda \log(g_{1n}) - \gamma_n(1+r)(g_1 - l_{1R})\{1 - \alpha[p_R q_R^g + (1 - p_R)q_R^b]\} + \theta_n + \xi. \tag{21}$$

On the other hand, if the opponent D is elected, citizen n's welfare is given by:

$$\mathrm{E}_D[U_n] = p_D \mathrm{E}_D^g[U_n] + (1 - p_D)\mathrm{E}_D^b[U_n], \tag{22}$$

where, according to definition (6), the probability that the Politician D is competent is simply : $p_D = \delta$, since the challenger cannot enhance his reputation by signaling. Therefore, Household n's expected utility becomes:

$$\mathrm{E}_D[U_n] = u_{0n} + \lambda \log(g_{1n}) - \gamma_n(1+r)(g_1 - l_{1R})\{1 - \alpha[\delta q_D^g + (1 - \delta)q_D^b]\}. \tag{23}$$

Household n will support the incumbent Government R if the expected differential of welfare W_R is positive, i.e.:

$$W_R := \mathrm{E}_R[U_n] - \mathrm{E}_D[U_n] \geq 0. \tag{24}$$

According to equations (21) and (23), it follows:

$$W_R = \alpha\gamma_n(1+r)(g_1 - l_{1R})[\Delta_R + (q_R^g - q_R^b)\Pi(l_{1R})] + \theta_n + \xi, \tag{25}$$

[13] In (20) we use $\alpha := \mathrm{E}\epsilon_2$.

where, $\Delta_R := \delta(q_R^g - q_D^g) + (1-\delta)(q_R^b - q_D^b) \geq 0$ represents the initial (namely, before signaling) average gap of reputation between type-R and type-D Politicians. In what follows, we will consider that this gap remains positive after signaling, namely that : $\Delta_R \geq -(q_R^g - q_R^b)\Pi(l_{1R})$.

The term $(g_1 - l_{1R})$ in the RHS of (25) reflects the incentive to "keep the enemies alive". Effectively, since $\Delta_R + (q_R^g - q_R^b)\Pi(l_{1R}) \geq 0$, the incumbent Government (of type R) is reputed to be more competent than his challenger. Thus, he has an incentive not to liquidate public spending in the first period. In the absence of any reputational concern (namely, if $\Pi(\cdot) = 0$), the Government in office would not reform ($l_{1R}^* = 0$). But this incentive can be offset by the term $(q_R^g - q_R^b)\Pi(l_{1R})$ in the RHS of (25), which reflects the gain of reputation obtained by signaling: the more the incumbent Government liquidates, the more he increases the probability to be competent on the eyes of the voters. The last two terms of (25) represent the political preferences of citizens.

Finally, we define S_n^R, that is, Household n 's vote for party R. Given our assumptions about the distribution of individual ideology, S_n^R can be expressed as:

$$\begin{aligned} S_n^R := \mathrm{P}_\theta\{W_n^R \geq 0\} &= \mathrm{P}_\theta\{\theta_n \geq -\alpha\gamma_n(1+r)(g_1 - l_{1R})[\Delta_R + (q_R^g - q_R^b)\Pi(l_{1R})] - \xi\} \\ &= \int_{-\alpha\gamma_n(1+r)(g_1-l_{1R})[\Delta_R+(q_R^g-q_R^b)\Pi(l_{1R})]-\xi}^{1/2s} s\, dx \\ &= \frac{1}{2} + s\alpha\gamma_n(1+r)(g_1 - l_{1R})[\Delta_R + (q_R^g - q_R^b)\Pi(l_{1R})] + s\xi. \end{aligned}$$

Clearly, Household n's vote for party D is given by $1 - S_n^R$. From both candidates point of view, S_n^i, $i \in \{D, R\}$, is a random variable, since it is a transformation of the random variable ξ capturing the party R 's average popularity.

Let us consider a majoritarian rule in which the party having obtained at less 50% of votes wins the election. Under this electoral rule, μ_R, which denotes the election probability of Politician R, is given by:

$$\mu_R := \mathrm{P}_\xi\{\sum_{n=1}^{N} S_n^R \geq \frac{1}{2}N\}, \tag{26}$$

where the probability refers to the random variable ξ. By simplification, we suppose that Households have the same income y and thus $\gamma_n =: \gamma$ for all $n \in \{1, \cdots, N\}$. Therefore, by the definition of S_n^R and our previous assumption that ξ is uniformly distributed, we have:

$$\begin{aligned}\mu_R &= \mathrm{P}_\xi\{\xi \geq -\alpha\gamma(1+r)(g_1 - l_{1R})[\Delta_R + (q_R^g - q_R^b)\Pi(l_{1R})]\} \\ &= \frac{1}{2} + \mu_0(g_1 - l_{1R})[\Delta_R + (q_R^g - q_R^b)\Pi(l_{1R})] =: \mu_R(l_{1R}), \quad (27)\end{aligned}$$

where $\mu_0 := h\alpha\gamma(1+r)$.

The expression of the probability of reelection μ_R in equation (27) points out the cross-relation between "reputation" and the "need for enemies".

4.2. The trade-off between reputation and the "need for enemies"

From relation (27), Households' votes depend on the amount of liquidation that the incumbent Government implements before the election l_{1R}. This gives the incumbent Politician of competence $j \in \{b, g\}$ the possibility to manipulate the probability of reelection by setting an adequate amount of liquidation l_{1R}^j. In this Subsection, we first describe how the "economic or political context" ϵ influences the probability of reelection of the incumbent Government, and then what would be the optimal choice of liquidation to maximize this probability.

Proposition 1. *("Goldilocks Theorem")*
Ceteris paribus, to maximize the reelection probability of the incumbent Government, the "economic or political context" must be neither "too bad" nor "too good".

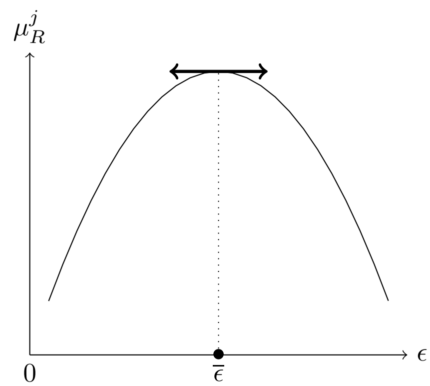
Proof.
From equation (27), the reelection probability of a Politician of competence q_R^j who provides an effort e_R^j is:

$$\mu_R^j - \frac{1}{2} = \mu_0(g_1 - \epsilon q_R^j e_R^j)[\Delta_R + (q_R^g - q_R^b)\Pi(\epsilon q_R^j e_R^j)]. \quad (28)$$

The first term in the RHS of (28) is decreasing in ϵ, while the second term is increasing in ϵ. Thus, there is, in general, a critical value of the shock ϵ

that maximizes μ_R^j. This value ($\bar{\epsilon}$) is such that $\mathrm{d}\mu_R^j/\mathrm{d}\epsilon = 0$ and $\mathrm{d}^2\mu_R^j/\mathrm{d}\epsilon^2 \leq 0$ and is implicitly determined by the following relation : $(g_1 - \bar{\epsilon}q_R^j e_R^j)\Pi'(\bar{\epsilon}q_R^j e_R^j) = \frac{\Delta_R}{q_R^g - q_R^b} + \Pi(\bar{\epsilon}q_R^j e_R^j)$, where, in accordance with our previous assumptions : $\Pi'(\cdot) \geq 0$ and $\frac{\Delta_R}{q_R^g - q_R^b} + \Pi(\cdot) \geq 0$. □

Figure 2: A Goldilocks Theorem



A "good" economic or political context (namely, $\epsilon >> \bar{\epsilon}$) gives rise to a "involuntary" high amount of reform that weakens the electoral advantage of the incumbent Politician (for an unchanged level of reform effort e_R^j). Conversely, a "bad" context ($\epsilon << \bar{\epsilon}$) generates a low amount of reforms which reduce the incumbent Politicians "reputation" to be competent. In both cases, the probability of reelection will be low. Thus the chances of success of the Government in office are maximized when the shock on the possibility to reduce public spending is neither "too bad" nor "too good".

The same type of argument can be found for Government's incentive to reform. Effectively, the impact of reforms (which result in an effective amount of liquidation l_{1R}^j) on the probability of reelection of the incumbent Government can be obtained by the following derivative of relation (27):

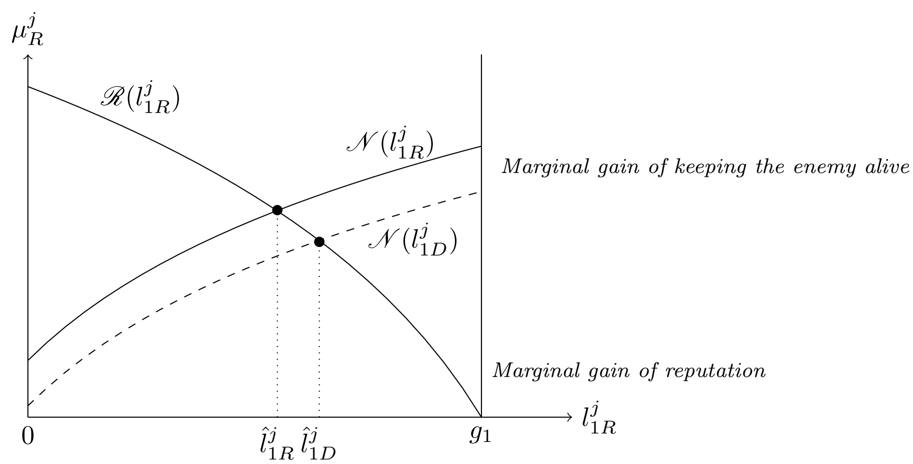
$$\frac{1}{\mu_0}\frac{\mathrm{d}\mu_R^j}{\mathrm{d}l_{1R}^j} = (g_1 - l_{1R}^j)(q_R^g - q_R^b)\Pi'(l_{1R}^j) - [\Delta_R + (q_R^g - q_R^b)\Pi(l_{1R}^j)]. \qquad (29)$$

The first term in the RHS of relation (29) represents the marginal gain of "reputation" on the probability to be renewed: $\mathscr{R}(l_{1R}^j) := (g_1 - l_{1R}^j)(q_R^g - q_R^b)\Pi'(l_{1R}^j) \geq 0$. This gain positively depends on the marginal effect of reforms on the probability that agents assign to the fact that the Government is competent ($\Pi'(l_{1R}^j)$) and to the skill gap of the incumbent Politician ($q_R^g - q_R^b$).[14] In addition, this gain is the higher the lower liquidation has been in the first period. Effectively, if the amount of reforms before the election has been important, public debt will be low, and the interest burden that can be alleviated by reforms in the second period will be relatively small. In this case, "reputation" to be very competent in reforming will not significantly improves the chances of success in the election.

The second term in the RHS of relation (29) represents the marginal gain of "keeping the enemy alive": $\mathscr{N}(l_{1R}^j) := [\Delta_R + (q_R^g - q_R^b)\Pi(l_{1R}^j)] \geq 0$. By not reforming in the first period, the incumbent Government takes advantage of his initial reputation to be, in average, more competent than his challenger (Δ_R). But this gain also positively depends on the amount of liquidation undertaken before the election, since the signal of liquidation improves the reputation of the incumbent Government: the more the Government is perceived as competent, the higher the benefits of "keeping the public debt alive" will be. This "need for public debt" is positively related to competence gap between a skilled and a unskilled incumbent Government ($q_R^g - q_R^b$). Figure 3 illustrates the trade-off between the "need for enemies" and "reputation":

[14] In this Subsection, we consider that the functional form $\Pi(\cdot)$ is invariant to changes in parameters. This hypothesis will be relaxed in Section 5 below.

Figure 3: The trade-off between “reputation” and “the need for enemies”



To maximize the probability of reelection, the Politician in office should chose the amount of reform $\hat{l}_R^j$ which cancels relation (29), at the interSection of relations $\mathscr{R}(l_{1R}^j)$ and $\mathscr{N}(l_{1R}^j)$. Since $\mathscr{N}(l_{1R}^j)$ is increasing in l_{1R}^j while $\mathscr{R}(l_{1R}^j)$ is decreasing[15] in l_{1R}^j, there is, in general one interior solution $\hat{l}_R^j \in [0, g_1]$.

Notice that we have assumed so far that the incumbent Government is of type R. If the Government in office is of type D, with a challenger of type R, the analysis is unchanged, with the subscript D replacing the subscript R. The only change in is that the initial gap of reputation becomes: $\Delta_D = -\Delta_R \leq 0$. Thus, for a given gap of competence of the incumbent Government (namely: $q_D^g - q_D^b = q_R^g - q_R^b$), the marginal benefit of “keeping the enemy alive” is less for a type-D incumbent Government than for a type-R one ($\mathscr{N}(l_{1D}^j) \leq \mathscr{N}(l_{1R}^j)$), while the marginal benefit of reputation is unchanged ($\mathscr{R}(l_{1R}^j) = \mathscr{R}(l_{1R}^j)$). Therefore, the amount of reform that maximizes the probability of reelection of a type-D Government is higher than those of a type-R Government: if the Politician in office is less competent than his challenger, he will implement more reform

[15] Notice that: $\Pi''(\cdot) = 0$ in the linearized definition of reputation in Lemma 4.

($\hat{l}^j_D \geq \hat{l}^j_R$) to maximizes the probability of reelection (see Figure 3).[16]

However, the incumbent Government whatever his type i, $i \in \{D, R\}$, cannot choose the effective amount of liquidation l^j_{1i}, which depends on the random shock that hits the probability of success of reforms. He can only choose the reform effort e^j_i, which depends on his own level of competence $j \in \{b, g\}$. Let us now turn our attention to the optimal choice of effort.

4.3. The optimal choice of reform effort

In what follows, we suppose that the reform effort is costly for the incumbent Government. Indeed, reforms require embarking on a negotiation process that generates costs, whether the increased workload of the Government, or psychological or political costs. Thus, for a liquidation effort e^j_i, we define the cost function $c(e^j_i)$, where $c(\cdot)$ is an increasing and convex function, and we suppose that the incumbent Politician (or type R) seeks to maximize his probability of reelection net of the cost of effort. As a consequence, the optimal effort of liquidation should satisfy in equilibrium:

$$e^{j*}_R = \underset{e^j_R}{\text{argmax}}\{\mu^j_R - c(e^j_R)\}. \tag{30}$$

The solution of this program is characterized in the following Proposition.

Proposition 2. *(Optimal reform effort)*
The optimal amount of reform l^{j*}_R corresponding to the optimal choice of effort e^{j*}_R of the incumbent (type-R) Government of competence j, $j \in \{b, g\}$, satisfies the following relation:

$$(g_1 - l^{j*}_{1R})(q^g_R - q^b_R)\Pi'(l^{j*}_{1R}) = \Delta_R + (q^g_R - q^b_R)\Pi(l^{j*}_{1R}) + \frac{1}{\mu_0 \epsilon q^j_R} c'(\frac{1}{\epsilon q^j_R} l^{j*}_{1R}). \tag{31}$$

PROOF. See Appendix B.

[16]This property can be likened to the argument of Cukierman and Tommasi (1998), that Governments do not always do what is expected of them.

Corollary 3. *For* $(l_{1R}^{j*}, \epsilon q_R^j)$ *verifying the optimal condition* (31)*, there is a function* $\varphi \in C^1(\mathbb{R}_*^+)$*, defined on* $\mathbb{R}_*^+ \rightarrow \mathbb{R}_*^+$*, such that the optimal amount of reforms can be written:*

$$l_{1R}^{j*} = \varphi(\epsilon q_R^j), \tag{32}$$

where, $\varphi'(\cdot) \geq 0$*.*

Proof. See Appendix B.

In relation (31), the optimal decision on liquidation comes from the trade-off between "reputation" and the "need for enemies" on the reelection probability that we have analyzed in Subsection 4.1, but also on the cost of reforming. Relation (31) shows that the result of the optimal liquidation positively depends on the "economic or political context" (ϵ) and on the competence of the incumbent Government (q_R^j). It is also positively associated to the skill-gap of type-R Politicians ($q_R^g - q_R^b$) and negatively associated to the average initial reputation gap between type-R and type-D Politicians (Δ_R).[17]

When the competence gap between a skilled and an unskilled incumbent Government ($q_R^g - q_R^b$) increases, the marginal gain of reputation $\mathscr{R}(l_{1R}^j)$ increases while the marginal gain of the "need for enemies" $\mathscr{N}(l_{1R}^j)$ may increase or decrease, depending on the sign of $\Pi(l_{1R}^j)$. In any case, as we can verify in relation (29), $\mathscr{R}(l_{1R}^j)$ increases more than proportionally with respect to $\mathscr{N}(l_{1R}^j)$, thus inducing the incumbent Government to further liquidate public spending. This effect is independent of the incumbent Politician's intrinsic competence, $j \in \{b, g\}$. Effectively, even an unskilled Politician can take advantage of the fact that if he launched more reforms, his reputation to be competent will increase.

Conversely, the higher the initial reputation-gap between type-R and type-D Politicians (Δ_R), the higher the success probability of the incumbent Government, independently of his actions to enhance its reputation. Therefore, when

[17] Effectively, from the implicit function theorem, it is straightforward to show from equation (31) that: $l_{1R}^{j*} = \varphi(\epsilon q_R^j, \Delta_R, q_R^g - q_R^b)$, where: $\partial_1\varphi \geq 0$, $\partial_2\varphi \leq 0$, and $\partial_3\varphi \geq 0$.

Δ_R increases, it is in the interest of the Government in office to liquidate less in order to take advantage of the "need for enemies" mechanism.

5. Identification and some numerical results

By using linear functions of effort and reputation, such that: $c(e_R^j) = ce_R^j$ and $\Pi(l_{1R}) = \phi_0 + \phi_1 l_{1R}$, we can obtain an explicit solution for the amount of liquidation. Effectively, substituting $q_R^g - q_R^b$ with $2\tilde{q}_R q_R$, it follows from (31) (we focus on interior solutions):

$$l_{1R}^{j*} = \frac{1}{2}[g_1 - \frac{\phi_0}{\phi_1} - \frac{1}{2\tilde{q}_R q_R \phi_1}(\Delta_R + \frac{c}{\mu_0 \epsilon q_R^j})] =: \varphi(\epsilon q_R^j), \tag{33}$$

where ϕ_0 and ϕ_1 depend on the parameters a and b of Households guess function (8). As in Lemma 4 of Section 3, we can use a linear approximation of $1/\epsilon q_R^j$ in the neighborhood of $\epsilon = \hat{\epsilon} := h^{-1}(g_1/2)/q_R$, since for small values of $\tilde{q}_R$, the equilibrium amount of liquidation in (33) will be close to $g_1/2$. Thus, with: $\frac{1}{\epsilon q_R^j} \approx \frac{2}{\hat{\epsilon} q_R} - \frac{\epsilon q_R^j}{(\hat{\epsilon} q_R)^2}$, we obtain:

$$l_{1R}^{j*} = A(a,b) + B(a,b) q_R^j \epsilon, \tag{34}$$

where $A(\cdot)$ and $B(\cdot)$ are positive parameters depending on a and b.

The final step of the resolution is to identify parameters of relations (8) and (34) to prove that a rational expectation equilibrium exists that verifies the initial guess of Households on the form of Government signal.

Proposition 3. *(Identification)*
The rational expectation equilibrium is established for the couple (a^*, b^*) such that: $A(a^*, b^*) = a^*$ and $B(a^*, b^*) = b^*$. Thus, the two following relations ensure identification:

$$A(a,b) := \frac{1}{2}[g_1 - \frac{\phi_0(a,b)}{\phi_1(a,b)} - \frac{1}{2\tilde{q}_R q_R \phi_1(a,b)}(\frac{\Delta_R}{2} + \frac{c}{\mu_0 \hat{\epsilon} q_R})] = a, \tag{35}$$

$$B(a,b) := \frac{c}{4\mu_0 \tilde{q}_R q_R \phi_1(a,b)(\hat{\epsilon} q_R)^2} = b. \tag{36}$$

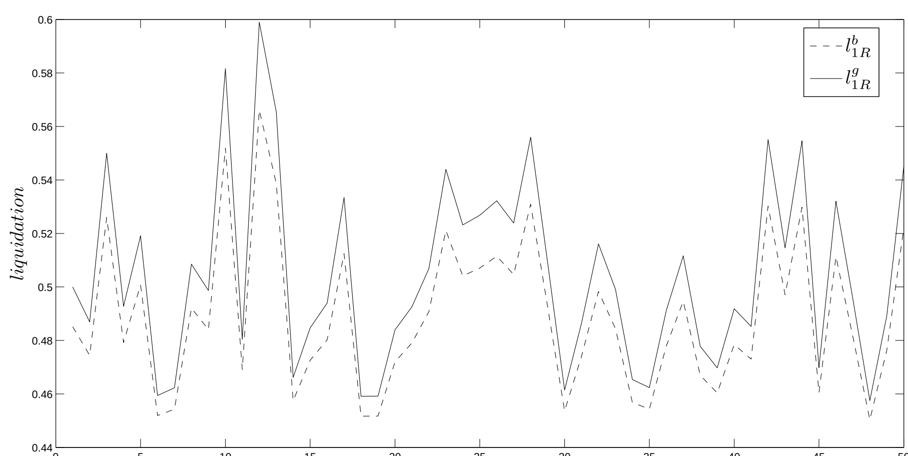
In general one can find one couple (a^*, b^*) that verifies these two relations.

Proof. See Appendix C.

Let us now present some numerical results. Simulations are operated from the following benchmark calibration: $\alpha = \delta = \Delta_R = 0.5$, $g_1 = q_R = \mu_0 = 1$, $\sigma^2 = \tilde{q}_R = 0.1$ and $c = 0.05$. For this calibration, $a^* = 0.4182$ and $b^* = 0.1370$. Results are robust to change in parameters, as we will show.

Figure 4 presents the equilibrium amount of liquidation implemented by a skilled (continuous line) or an unskilled (dashed line) Government, as a function of shocks on the macroeconomic or political context ϵ. To this end, we conduct 50 random draws of the shock $\epsilon \geq \alpha/2$ from a truncated Normal distribution $N(\alpha, \sigma^2)$. Thus, the optimal liquidation follows the stochastic behavior of ϵ, but, of course, for the same shock ϵ, the liquidation implemented by a skilled Government is always higher than the one implemented by an unskilled Politician.[18]

Figure 4: Optimal liquidation as a function of the "economic or political context".



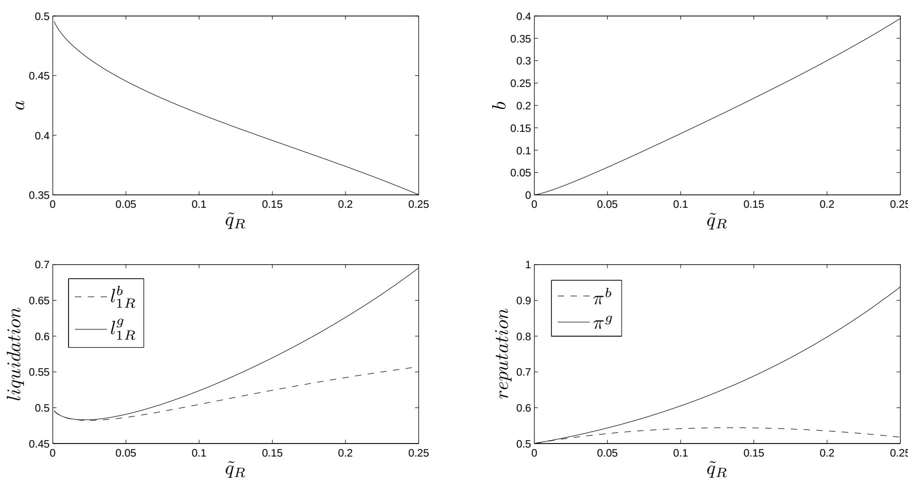
To implement some robustness checks, we depict the effect of changes in $\tilde{q}_R$

[18]In addition, we can notice that the mean of the optimal liquidation is close to 0.50 (which corresponds to a liquidation of 50% of public spending g_1), justifying our previous assumption on linearization in the neighborhood of $g_1/2$.

and Δ_R on the equilibrium amount of liquidation, respectively in Figure 5 and Figure 6, for a given shock ϵ.[19]

If the competence-gap between the type-R Politicians ($\tilde{q}_R$) increases, coefficient a^* decreases while coefficient b^* increases, as Figure 5 shows. After a slight decline for very low values of $\tilde{q}_R$, the optimal amount of liquidation increases with $\tilde{q}_R$, both for a skilled and for an unskilled Government, but in a much more significant extent if the Government is skilled. As a result, the reputation of the skilled Government rises quite rapidly, while the reputation of the unskilled Government improves only slightly.

Figure 5: Effect of changes in the competence gap of the incumbent Government.



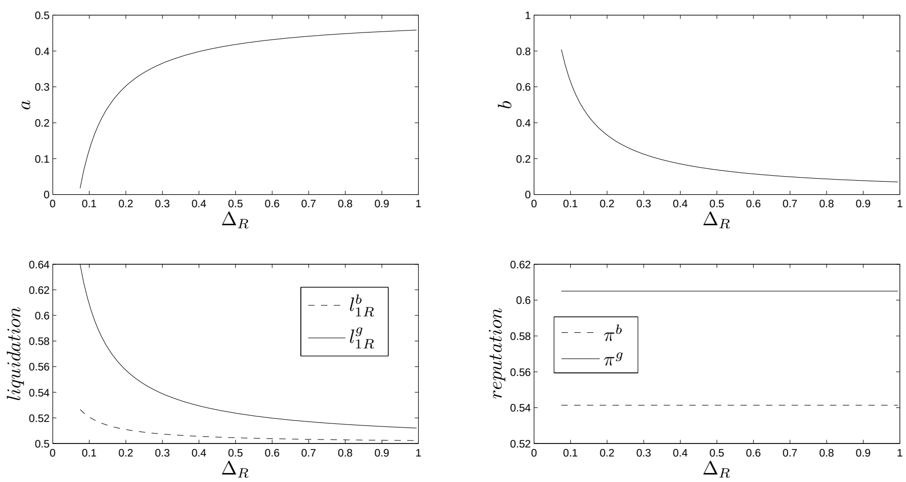
Essentially, these results can be explained in the same manner as in the previous Section. When the skill gap increases, the incumbent Government, if he is the skilled one, must take advantage of this gap by undertaking many reforms to enhance his reputation. The same is true or the unskilled Government, but he will reform only to a lesser extent, precisely because of his incompetence, so his reputational gains will be lower.[20]

[19] In Figures 5 and 6, $\epsilon = 0.7$.

[20] The difference between Section 4 is that, once coefficients a and b are endogenous, liqui-

If the initial competence gap between the incumbent type-R Government and his type-D challenger (Δ_R) increases, results are, broadly, reversed. Coefficient a^* increases while coefficient b^* decreases, as in Figure 6. As a result, the optimal amount of liquidation implemented by both skilled and unskilled Governments decreases. According to the previous Section, this reduction comes from the need for enemies mechanism: the more the incumbent Government is competent relative to his challenger, the less he is induced to reform, because he seeks to benefit from his electoral advantage. Therefore, as Δ_R increases, the necessity to keep the enemy alive outweighs the reputational mechanisms, and the amount of actual reform weakens.

Figure 6: Effect of changes in the competence gap between the incumbent Government and his challenger.



This is even more true that the reputation does not change with Δ_R, as shows

dation can be decreasing in $\tilde{q}_R$ for very low values of $\tilde{q}_R$. Effectively, the equilibrium amount of liquidation is, from equation (34): $l^{g*}_{1R} = a^* + (1+\tilde{q}_R)b^*\epsilon q_R$ or $l^{b*}_{1R} = a^* + (1-\tilde{q}_R)b^*\epsilon q_R$. Thus the impact of $\tilde{q}_R$ on l^{j*}_{1R}, $j \in \{b, g\}$, depends on the behavior of a^* and b^*. As shows Figure 5, for very low values of $\tilde{q}_R$, b^* is close to zero, so that the negative impact of $\tilde{q}_R$ on coefficient a^* outweighs the positive effect of b^*. In other words, for very low values of $\tilde{q}_R$, reputational forces are insufficient to offset the need for enemies.

Figure 6.[21] In other words, rational voters know that a change in liquidation associated to a change in the competence gap between type-R Politicians and type-D Politicians does not affect the probability that the incumbent type-R Government is competent or not.

6. Conclusion

In this paper we have shown that the trade-off between "Reputation" and the "Need for enemies" may generate an incomplete set of reforms, because, in our set up, the liquidation of the public debt is made endogenous within the political process. One important question raised by this perspective is whether Governments use public debt, or other state variables, to manipulate voters, and especially if they are Machiavellian enough to let persist a problem in spite of their competence to liquidate this problem. In this respect, our paper joins a number of results in political economy literature in which Governments use public debt strategically to manipulate the choices of voters or of future policymakers (see, e.g. Persson and Svensson (1989), Alesina and Cukierman (1990) and Milesi-Ferretti and Spolaore (1994)). Furthermore, in our framework, reforms are uncompleted because: i) Governments are incompetent, ii) Governments are competent but act strategically, or iii) the economic or political context is bad.

Therefore a competent Government may be removed in two cases: if he has implemented too much reform or if economy has been hit by a strong adverse shock. The latter case may correspond to numerous examples studied in political science. A famous illustration is Prime Minister Raymond Barre in France (1976-1981), who was considered as "*the best economist of France*" and who set up austerity policies to struggle against the fiscal deficit. However, his Government was confronted with the stagflation resulting from the oil crises. Therefore, in spite of his skill, he was a victim of the economic context, so in

[21] Effectively, reputation depends on the term $h^{-1}(l_{1R}^{j*})$ in relation (14). Yet, in equilibrium: $h^{-1}(l_{1R}^{j*}) = (l_{1R}^{j*} - a^*)/b^* = q_R q_R^j \epsilon$ is independent of Δ_R.

1981, the incumbent President, Valery Giscard dEstaing, lost the presidential election. The former case is closer to the episode of Claudio Monti in Italy (2011-2013), cited in the Introduction. In this occasion, a skilled "technocratic" Government has been formed to implement reforms, but has been removed after having done "the job". In this case, postponing reforms (namely "keeping the enemy alive") might have helped to their acceptance. Such a case is likely to occur when reforms are imposed from outside, as it is the case in European and Monetary Union, for example.[22] As Monti said on February, 28, 2013: "*If you do the right policies, but you dont get the recognition, then there may be a backlash against the right policies and the coming-up of political forces that oppose the right policies.*"

These examples lead to interesting prospects for future research. First, the trade-off between "Reputation" and the "Need for enemies" might be studied in other contexts, specifically microeconomic ones, in order to examine how to implement optimally incentives in a job contract, for example. Second, our model, like much of existent literature, describes a non-repeated game. Several indices lead us to believe it would be interesting to introduce the trade-off between "Reputation" and the "Need for enemies" in a repeated-game framework.

First, in link with usual reputational analyses, in a repeated game, an incompetent Government might invest in reputation, by reforming during some time, so as to pretend to be competent (following the lines Backus and Driffll (1985) and Barro (1986), for example). This literature has been criticized on the basis that, by launching initially a sufficient amount of reforms, a competent Government can signal his true identity and discourage the incompetent Government to "cheat" (Vickers (1986) applies the same argument to policies for fighting inflation conducted by Central Banks). Our framework is immunized against this criticism. Effectively, on the one hand, the competent Government

[22] In the wake of its failure, Monti said he paid a political price caused by European Commission's refusal to give Italy some extra time to reduce budget deficit, time that had been granted to countries such as Spain and Portugal.

has no interest in "large" reform effort, because of the incentive to "keep the enemy alive". On the other hand, even if the competent Government would seek to reveal its skill by implementing a large reform effort, he is far from certain to succeed in this revelation mechanism, because of the uncertainty on the result of reforms (the shock on the economic or political context). Indeed, the exercise of power is a risky game: if the context is "too bad", the incumbent Government will be perceived as incompetent, even if the effort of liquidation is strong.

Second, in an intertemporal framework, an incumbent Government who has a good chance of losing the election can seek to worsen the situation of his successor, to increase its chances in a subsequent election. By bequeathing a high debt burden to his possible successor, the incumbent Government can force its newly elected challenger to "*pay the bill*" (Alesina and Cukierman, 1990). Thus, a bad electoral context would be an additional inducement to not to reform, if the incumbent Politician has a chance to return to power in the future.

It would be particularly interesting to study the interplay between the electoral process and Citizens welfare in such intertemporel frameworks, in the context of Dynamic Stochastic General Equilibrium Models augmented with electoral cycles, in the lines of M. and Coate (2008), for example.

References

Aghion, P., Bolton, P.P., 1990. Government domestic debt and the risk of default: A political-economic model of the strategic role of government debt, in: Public Debt Management: Theory and History. NY: Cambridge University Press.

Alesina, A., Cukierman, A., 1990. The politics of ambiguity. Quarterly Journal of Economics 105, 829–850.

Alesina, A., Drazen, A., 1991. Why are stabilizations delayed ? American Economic Review 81, 1170–1188.

Backus, D.K., Driffll, J., 1985. Inflation and reputation. American Economic Review 75(3), 530–538.

Bailey, F.G., 1969. Stratagem and Spoils. A Social Anthropology of Politics. Oxford: Basic Blackwell.

Bailey, F.G., 1998. The Need for Enemies : a bestiary of political forms. Ithaca: Cornell University Press.

Barash, D.P., 1994. Beloved enemies: Our need for opponents. Amherst: Prometheus Books.

Barro, R.J., 1986. Reputation in a model of monetary policy with incomplete information. Journal of Monetary Economics 17(1), 3–20.

Battaglini, M., Coate, S., 2008. A dynamic theory of public spending, taxation and debt. American Economic Review 98, 201–236.

Besley, T., Coate, S.S., 1998. Sources of inefficiency in a representative democracy : A dynamic analysis. American Economic Review 88(1), 139–156.

Cukierman, A., Meltzer, A.H., 1986. A positive theory of discretionary policy, the cost of democratic government and the benefits of a constitution. Economic Inquiry 24(3), 367–388.

Cukierman, A., Tommasi, M., 1998. When does it take a nixon to go to china ? American Economic Review 88, 180–197.

Drazen, A., Grilli, V., 1993. The benefit of crisis for economic reforms. American Economic Review 83, 598–607.

Drazen, A., Masson, P., 1994. Credibility of policies vs credibility of policymakers. Quarterly Journal of Economics 109(3), 735–754.

Fergusson, L., Robinson, J.A., Torvik, R., Vargas, J., 2012. The need for enemies. NBER Working Paper 18313, August.

Finlay, D.J., Holsti, O., Fagen, R., 1967. Enemies in politics. Chicago: Rand McNally.

Lindbeck, A., Weibull, J., 1987. Balanced-budget redistribution as the outcome of political competition. Public Choice 52, 273–297.

Milesi-Ferretti, G., Spolaore, E., 1994. How cynical can an incumbent be ? strategic policy in a model of government spending. Journal of Public Economics 55(1), 121–140.

Murray, S., Meyers, J., 1999. Do people need foreign enemies? american leaders' beliefs after the soviet demise. Journal of Conflict Resolution 43(5), 555–569.

Persson, T., Svensson, L., 1989. Why a stubborn conservative would run a deficit: Policy with time-inconsistent preferences. Quarterly Journal of Economics 104(2), 325–346.

Persson, T., Tabellini, G., 2000. Political Economics: Explaining Economic Policy. MA: MIT Press.

Rogoff, K., 1985. The optimal degree of commitment to an intermediate target. Quarterly Journal of Economics 100, 1169–1190.

Rogoff, K., 1990. Equilibrium political budget cycles. American Economic Review 80(1), 21–36.

Rogoff, K., Sibert, A., 1988. Elections and macroeconomic policy cycles. Review of Economic Studies 55(1), 1–16.

Vickers, J., 1986. Signalling in a model of monetary policy with incomplete information. Oxford Economic Papers 38(3), 443–455.

Volkan, V., 1985. The need to have enemies and allies: A developmental approach. Political Psychology 6(2), 219–247.

Wolfe, A., 1983. The rise and fall of the Soviet threat: Domestic sources of the cold war consensus. Washington DC: Institute for Policy Studies.

Appendix A

Proof of Lemma 1.

Step 1. We proof the following result:

$$\lim_{n\to+\infty}\frac{n}{2}\mathrm{P}\{\epsilon^j-\frac{1}{n}\leq\epsilon\leq\epsilon^j+\frac{1}{n}\}=f(\epsilon^j),\forall j\in\{b,g\},\forall l_{1R}\geq 0. \tag{A1}$$

To this end, we define the functions' sequence $(\psi_n)_{n\geq 1}$ by:

$$\psi_n : s\mapsto\begin{cases} n/2 & \text{if } \epsilon^j-1/n\leq s\leq\epsilon^j+1/n,\\ 0 & \text{else.}\end{cases} \tag{A2}$$

Therefore, $\frac{n}{2}\mathrm{P}\{\epsilon^j-\frac{1}{n}\leq\epsilon\leq\epsilon^j+\frac{1}{n}\}=\mathrm{P}\{\psi_n(\epsilon)\}=\int_{\mathbb{R}}\psi_n(s)\ f(s)ds.$[23] According to definition (A2), we can write:

$$\int_{\mathbb{R}}\psi_n(s)\ f(s)ds=\int_{\epsilon^j-1/n}^{\epsilon^j+1/n}\frac{n}{2}\ f(s)ds.$$

Yet, f is continuous. Thus, there is $\zeta\in[\epsilon^j-1/n;\epsilon^j+1/n]$, such that:

$$\int_{\epsilon^j-1/n}^{\epsilon^j+1/n}\frac{n}{2}\ f(s)ds=f(\zeta)\int_{\epsilon^j-1/n}^{\epsilon^j+1/n}\frac{n}{2}\ ds=f(\zeta).$$

Furthermore, $\epsilon^j-1/n\leq\zeta\leq\epsilon^j+1/n.$, so, by taking the limit:

$$\epsilon^j-\lim_{n\to+\infty}\frac{1}{n}\leq\zeta\leq\epsilon^j+\lim_{n\to+\infty}\frac{1}{n}\Rightarrow\epsilon^j\leq\zeta\leq\epsilon^j.$$

Consequently $\zeta=\epsilon^g$ and since f is continuous, $f(\zeta)=f(\epsilon^j)$. Finally we obtain equation (A1) :

$$\lim_{n\to+\infty}\frac{n}{2}\mathrm{P}\{\epsilon^g-\frac{1}{n}\leq\epsilon\leq\epsilon^g+\frac{1}{n}\}=f(\zeta)=f(\epsilon^j).$$

Step 2. We can write:

$$\mathrm{P}\{\epsilon=\epsilon^j\}=\lim_{n\to+\infty}\mathrm{P}\{\epsilon^j-\frac{1}{n}\leq\epsilon\leq\epsilon^j+\frac{1}{n}\}=\lim_{n\to+\infty}S_n^j, \tag{A3}$$

[23] $\int_{\mathbb{R}}\psi_n(s)\ f(s)ds<+\infty$. Indeed, $\psi_n\in L^1,\forall n\geq 1$, since $||\psi_n||_{L^1}=1<+\infty$. And, $f\in L^1$, since f is a probability density function. Finally, $x\mapsto\psi_n(x)f(x)\in L^1$, $\forall n\geq 1$.

where, $S_n^j := \sum_{k=[\epsilon^j-1/n]}^{[\epsilon^j+1/n]} \mathrm{P}\{\epsilon = k\}$ and, $[\cdot]$ is the floor. Therefore, according to equation (A3), and the definition (12), we can write:

$$p_R = \frac{\delta \mathrm{P}\{\epsilon = \epsilon^g\}}{\delta \mathrm{P}\{\epsilon = \epsilon^g\} + (1-\delta)\mathrm{P}\{\epsilon = \epsilon^b\}} = \frac{\delta \lim_{n\to+\infty} S_n^g}{\delta \lim_{n\to+\infty} S_n^g + (1-\delta)\lim_{n\to+\infty} S_n^b}. \tag{A4}$$

In addition, $S_n^j = \mathrm{P}\{\epsilon^j - 1/n \leq \epsilon \leq \epsilon^j + 1/n\}$. So, according to equation (A1), $\lim_{n\to+\infty}(n/2)S_n^j = f(\epsilon^j)$. Finally, multiplying (A4) by $n/2$, we obtain:

$$p_R = \frac{\delta \lim_{n\to+\infty}(n/2)S_n^g}{\delta \lim_{n\to+\infty}(n/2)S_n^g + (1-\delta)\lim_{n\to+\infty}(n/2)S_n^b} = \frac{\delta f(\epsilon^g)}{\delta f(\epsilon^g) + (1-\delta) f(\epsilon^b)}.$$

□

Appendix B

Proof of Proposition 2.

The first order condition for the maximization of Government's program (30) implies, from (28):

$$\frac{\mathrm{d}\{\mu_R^j - c(e_R^j)\}}{\mathrm{d}e_R^j} = \epsilon q_R^j \mu_0 \{(q_R^g - q_R^b)[(g_1 - l_{1R}^j)\Pi'(l_{1R}^j) - \Pi(l_{1R}^j)] - \Delta_R\} - c'(e_R^j) = 0.$$

Since $\epsilon q_R^j e_R^j = l_R^j$, this equation immediately results in (31).

The second order condition implies:

$$\frac{\mathrm{d}^2\{\mu_R^j - c(e_R^j)\}}{\mathrm{d}{e_R^j}^2} = \mu_0(\epsilon q_R^j)^2 (q_R^g - q_R^b)[(g_1 - l_{1R}^j)\Pi''(l_{1R}^j) - 2\Pi'(l_{1R}^j)] - c''(e_R^j) < 0.$$

Effectively, by hypothesis we have: $c'(\cdot) \geq 0$, $c''(\cdot) \geq 0$, $\Pi'(\cdot) \geq 0$, and $\Pi''(\cdot) = 0$, according to Lemma 2. Consequently, the amount of liquidation l_{1R}^j verifying the first order condition (31) is a maximum and solution of the problem (30), which we will note $l_{1R}^j = l_{1R}^{j*}$. □

Proof of Corollary 3.

The optimal amount of liquidation l_{1R}^{j*} is defined by the relation $\psi(l_{1R}^{j*}, \epsilon q_R^j) = 0$, where, according to equation (31):

$$\psi(l_{1R}^{j*}, \epsilon q_R^j) = (q_R^g - q_R^b)[(g_1 - l_{1R}^{j*})\Pi'(l_{1R}^{j*}) - \Pi(l_{1R}^{j*})] - \Delta_R - \frac{1}{\mu_0 \epsilon q_R^j} c'\left(\frac{l_{1R}^{j*}}{\epsilon q_R^j}\right).$$

For an interior solution to exist, it is necessary that $\Pi'(\cdot) > 0$ (because if $\Pi'(\cdot) = 0$, then $l_R^{j*} = 0$). Consequently, since: $c'(\cdot) \geq 0, c''(\cdot) \geq 0$, and $\Pi''(\cdot) = 0$, we have:

$$\partial_1 \psi(l_{1R}^{j*}, \epsilon q_R^j) = -2(q_R^g - q_R^b)\Pi'(l_{1R}^{j*}) - (\frac{1}{\mu_0 \epsilon q_R^j})^2 c''(\frac{l_{1R}^{j*}}{\epsilon q_R^j}) < 0,$$

$$\partial_2 \psi(l_{1R}^{j*}, \epsilon q_R^j) = \frac{1}{\mu_0}(\frac{1}{\epsilon q_R^j})^2 [c'(\frac{l_{1R}^{j*}}{\epsilon q_R^j}) + \frac{l_{1R}^{j*}}{\epsilon q_R^j} c''(\frac{l_{1R}^{j*}}{\epsilon q_R^j})] \geq 0.$$

Therefore:

$$\frac{\mathrm{d}l_{1R}^{j*}}{\mathrm{d}\epsilon q_R^j} = -\frac{\partial_2 \psi(l_{1R}^{j*}, \epsilon q_R^j)}{\partial_1 \psi(l_{1R}^{j*}, \epsilon q_R^j)} \geq 0.$$

In addition, according to the implicit function theorem, there is an application $\varphi \in \mathrm{C}^1$, defined on $\mathbb{R}_*^+$ in values in $\mathbb{R}_*^+$ such that: $l_{1R}^{j*} = \varphi(\epsilon q_R^j)$, $\varphi'(\cdot) \geq 0$, $\forall (l_{1R}^{j*}, \epsilon q_R^j) \in \mathbb{R}_*^+ \times \mathbb{R}_*^+$. □

Appendix C: Identification

From Lemma 2 of Section 3 and equation (8), we obtain: $\Pi(l_{1R}) \approx \phi_0 + \phi_1 l_{1R}$, where: $\phi_0 := \Pi(\hat{\epsilon}) - \hat{\epsilon}\Pi'(\hat{\epsilon}) - \frac{a}{bq_R}\Pi'(\hat{\epsilon})$, and $\phi_1 := \frac{1}{bq_R}\Pi'(\hat{\epsilon})$. Namely:

$$\begin{cases} \phi_0 = \dfrac{\omega}{4(q_R)^2}[(\dfrac{g_1 - 2a}{b})^2 - 2\alpha q_R(\dfrac{g_1 - 2a}{b})] - \dfrac{g_1}{2}\phi_1, \\ \\ \phi_1 = \dfrac{\omega}{b(q_R)^2}[(\dfrac{g_1 - 2a}{b}) - \alpha q_R], \end{cases}$$

where $\omega := \frac{2\delta(1-\delta)\tilde{q}_R}{(1-\tilde{q}_R)(1+\tilde{q}_R)\sigma^2}$. Let us now define: $x := a/b$ and $y := (g_1 - 2a)/b$, it follows that:

$$\begin{cases} \phi_0 = \dfrac{-\omega}{4(q_R)^2}[y^2 + 4x(y - \alpha q_R)] \\ \\ \phi_1 = \dfrac{\omega}{b(q_R)^2}[y - \alpha q_R]. \end{cases}$$

Therefore, the identification restrictions (35)-(36) become:

$$\begin{cases} y + \dfrac{y^2 + 4x(y - \alpha q_R)}{4(y - \alpha q_R)} - \dfrac{(q_R)^2}{2\tilde{q}_R q_R \omega (y - \alpha q_R)}[\dfrac{\Delta_R}{2} + \dfrac{c}{\mu_0 \epsilon \hat{q}_R}] = 0, & \text{(C1)} \\ \\ \dfrac{c(q_R)^2}{4\mu_0 \tilde{q}_R q_R \omega (y - \alpha q_R)(\hat{\epsilon} q_R)^2} = 1. & \text{(C2)} \end{cases}$$

Since $\hat{\epsilon} = \dfrac{g_1 - 2a}{2bq_R} = \dfrac{y}{2q_R}$, system (C1)-(C2) rewrites:

$$\begin{cases} x = \dfrac{q_R}{2\tilde{q}_R\omega(y-\alpha q_R)}[\dfrac{\Delta_R}{2} + \dfrac{2c}{\mu_0 y}] - y - \dfrac{y^2}{4(y-\alpha q_R)}, & \text{(C3)} \\ \\ \dfrac{cq_R}{\mu_0\tilde{q}_R\omega(y-\alpha q_R)y^2} = 1. & \text{(C4)} \end{cases}$$

We first solve equation (C4), using Cardan's method. Let us rewrite (C4) as:

$$y^3 - \alpha q_R y^2 - \frac{cq_R}{\mu_0\tilde{q}_R\omega} = 0,$$

by changing variables: $y = z + \alpha q_R/3$, we obtain the following polynomial:

$$z^3 + pz + q = 0,$$

where: $p := -\dfrac{(\alpha q_R)^2}{3}$ and $q := -\dfrac{2(\alpha q_R)^2}{27} - \dfrac{cq_R}{\mu_0\tilde{q}_R\omega}$. Since: $\Delta = q^2 + 4p^3/27 > 0$, there is only one real solution of this polynomial, namely: $z = [\dfrac{-q+\sqrt{\Delta}}{2}]^{1/3} + [\dfrac{-q-\sqrt{\Delta}}{2}]^{1/3}$. Finally, we obtain $y = z + \alpha q_R/3$ and x comes from equation (A3). Identification is ensured for: $a^* = xg_1/(y+2x)$ and: $b^* = g_1/(y+2x)$.

□