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A THEORY OF THE CYCLICAL PRODUCTION OF LAWS AND DECREES

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Abstract

This paper provides a theory explaining the observed cyclical pattern of the approbation of laws and decrees through a legislature. We study an environment with three (sets of) agents, an incumbent government, unorganized voters and special interest groups. Special interest groups differ from voters in that they are better informed and can transfer private resources to the government. In return from votes and resources, the government provides two types of goods that differ in terms of their redistributive profile, a general public good and a targeted club good. To produce these goods the government must approve legislation either in the form of laws visible to all agents or decrees visible only to special interest groups. We show that the legislator generates an electoral cycle of the general public good at the end of the legislature by distorting upwards the production of laws to increase his probability of being re-elected. To signal his competence and collect the resources for the electoral campaign from the special interest groups, he also generates a pre-electoral cycle of the targeted good by distorting upwards the production of decrees. The theoretical results match the findings of the empirical literature, that detects a decree cycle at the beginning of the legislature and a law cycle at its the end.

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1. *Introduction*

Public choice and political economics theories start from the presupposition that politicians take decisions to maximize their probability of being re-elected. These decisions usually take the form of legislative acts of various types, according to the legislative procedures of each country. Surprisingly, however, very few papers have studied how legislators choose among the various types of legislative instruments at their disposal to take a given political decision. Nor more attention has been devoted to the issue of how they distribute the production of legislative acts through time. In this paper, we advance the claim that the re-election goal of legislators makes these two choices - which type of legislative instrument to adopt and when to implement it - intrinsically interdependent.

To demonstrate this point, we develop a theoretical model with three (sets of) agents: an incumbent government that seeks re-election, unorganized voters and special interest groups. On the demand side of the political market, special interest groups differ from unorganized voters in that they are better informed about political decisions and can transfer private resources to the incumbent government. In return of votes from unorganized voters, and of votes and resources from interest groups, the government supplies two types of goods, characterized by different redistributive profiles: a general public good and a targeted club good. Consistently with the logic of collective action (Olson, 1970; Denzau and Munger, 1986; Bavetta and Padovano, 2000), unorganized voters demand the former while special interest groups the latter. The production of these goods requires the government to use resources and approve legislation. To this end, the government can choose among two alternative (and equally available) legislative acts: laws that require the approbation of the majority of the parliament, and by that are assumed to be visible to all agents; and decrees, which do not require a parliamentary vote and are therefore supposed to be visible only to the better informed special interest groups. The different information costs of the two sets of agents leads the re-election seeking incumbent to use laws in the supply of the general purpose public good to the benefit of unorganized voters, and decrees in the supply of the targeted good for the special interest group.

The model also shows that, to signal his competence and maximize the amount of votes from unorganized voters, the incumbent government generates an electoral cycle of the general public good at the end of the legislature, and concentrates at that time the approbation of laws. This in turn forces the incumbent to gather private resources from special interest groups beforehand; to obtain these resources, the incumbent government must generate a pre-electoral cycle of the targeted good and an upwards distortion of the production of decrees before the end of the legislature. The model thus predicts two opposite cycles in the production of decrees and of laws, in that the approbation of less visible decrees tend to be concentrated at the beginning of the legislature and the approbation of laws towards its end.

This model of the choice of legislative instruments and the timing of legislative production is consistent with the logic of the political legislation cycles literature. Although the number of contributions to this research strand are still few and are mainly empirical (Lagona and Padovano, 2007; Lagona et al., 2012), there is robust evidence of the strategic use of legislation before elections. On the theoretical side, Padovano (1995) and Lagona and Padovano (2007) develop models of legislative production that predict a higher than average output of laws towards the end of the legislature as a strategy to keep government coalitions together and to maximize their re-election probabilities. On the empirical side, Lagona and Padovano (2007) find evidence of pre-electoral cycles of laws in Italian legislatures; Brechler and Gersl (2011) reach similar conclusions on data drawn from the legislative production of the Czech Republic during the post-Communist period. Some evidence of political legislation cycles is found also in France (Padovano and Gavoille, 2012). Quite interestingly, Lagona et al. (2012) find that the production of laws and decrees by Italian governments is characterized by opposite cycles, with laws being concentrated at the end of the tenure of the government and decrees more at the beginning of their activity.

The literature of the political legislation cycle is of course close to the (much larger) one on political budget cycles, where the distortion in the provision of public goods advantages the incumbent running for re-election (Rogoff, 1990; Aidt et al., 2011). The two

phenomena, however, seem to warrant different theoretical explanations, as many categorical differences seem to distinguish one from the other. On the one hand, the political budget cycle literature focuses on the outcome of the production of public goods which are, by and large, non-redistributive in nature – or whose redistributive potential is not the focus of the PBC models. Legislation is, on the other hand, essentially a redistributive tool (Weingast and Marshall, 1988; McCormick and Tollison, 1981); moreover, different types of legislation entail different redistributive profiles depending on the democratic requirements for their approbation - the larger the necessary parliamentary consensus, the smaller the redistributive potential. Furthermore, while models of political budget cycles are generally conceived in a principal-agent relationship between voters and incumbent politicians, the evidence of the opposite cycles of laws and decrees seem to require a three-way explanatory structure, where a re-election seeking incumbent legislator arbitrages the interests of voters and lobbies by means of a sequential timing in the approbation of different legislative instruments. Finally, the political legislation cycles appears to be sensitive to the institutional features that characterize the production of laws (Lagona and Padovano, 2007).

The process determining the timing of legislative production and the choice of legislative acts has not been yet formalized in a model, however; this not only deprives the findings of the empirical literature on political legislation cycles of sound theoretical underpinnings, but it also leaves the differences of the theoretical structures generating a political legislation and a political budget cycle not well specified. The present study aims at filling this theoretical gap by studying the equilibrium legislative allocation during the whole legislature and deriving empirical predictions to compare with the empirical evidence.

The rest of the paper is organized as follows. Section 2 presents the setup of the model and section 3 its timing. Section 4 shows the electoral allocation of laws and resources and section 5 the pre-electoral one. Section 6 characterizes the equilibrium of the game and the empirical predictions. Section 7 concludes.

2. The setup of the model

This model is a variation of Aidt et al., (2011), but adapts the environment of that theoretical structure to the (quite different) legislative game hereby under investigation. We consider an economy in a three-periods sequence of events ($t = t, t+1, t+2$). There are three agents: a 'legislator' *P*, unorganized voters *V* and voters organized in a special interest group *SIG*, that are representative of the behavior of all lobbies. The legislator can be thought of as a self-motivated incumbent government elected by majority rule every $t+2$ periods. He is in charge to provide public goods and enact legislation through decrees (*D*) and laws (*L*). As we shall see more precisely later on, decrees are assumed not to require a parliamentary vote to be approved, while laws do. Decrees are therefore less visible than laws. The utility of the legislator derives from the office rent from being in office, *m*:

$$U^P = f(m) \quad (1)$$

Voters (*V*) are not organized and they have general welfare interests while the specific interests group (*SIG*) is an organized lobby protecting specific interests of the members. The individual $i=1,...,n$ is a *V* and $i=n+1,...,N$ is *SIG*. *SIG* have an informational advantage over *V*; in particular, as they are organized in a lobby and have a more restricted set of interests than unorganized voters, their cost of being informed is lower than that of voters (Denzau and Munger, 1986). As a result the *SIG*'s information set is larger than the voters' one in that the *SIG* observe the production of both decrees and laws while *V* observe only the current production of laws:

$$I^V_t \in \{L_t\} < I^{SIG}_t \in \{L_t, D_t\} \quad (2)$$

The total welfare is defined as a utilitaristic function of the population's aggregate utility:

$$W = W^V + W^{SIG} \quad (3)$$

The two-period utility of unorganized voters *V* and of the *SIG* at time *t* are specified as:

$$U_{it}^V = c_{it} + lnG_t + ln\, g_{1,it} + \beta\,[c_{it+1} + lnG_{t+1} + lng_{1,it+1}] \quad (4)$$

$$U_{it}^{SIG} = c_{it} + lnG_t + ln\, g_{2,it} + \beta\,[c_{it+1} + lnG_{t+1} + ln\, g_{2,it+1}] \quad (5)$$

where $0<\beta<1$ is the time discount factor, private consumption is defined as $c_{i,t} = y_{i,t} - ty_{i,t}$, *G* represents the observed current expenditure on public goods, g_1 and g_2 are additional public goods realized with one period lag. The good g_1 can be thought of as a general

purpose public good that increases the utility of voters at large (e.g., pension reforms, health care, taxation) while g_2 is a club good that benefits only the members of the *SIG* (like provisions in favor of a specific group of workers, *1/n* or pork-barrel legislation etc.) As a consequence, g_2 shows a more pronounced redistributive profile than g_1. Both the goods are consumed during the current period and do not enter *G* in the next period.

In order to produce g_1 and g_2, legislation must be approved. Because of the utility functions of *V* and *SIG* described in (4) and (5) and their information sets described in (2), the legislator will resort to laws in order to supply g_1 and to decrees in the supply of g_2, according to the following processes:

$$g_{1,t+1} = \alpha L_t \quad (6)$$

$$g_{2,t+1} = \alpha' D_t \quad (7)$$

where $\alpha \geq 0$ and $\alpha' \geq 0$ are parameters specifying the factor augmenting technology of production. Both the goods are long term public goods because they are the realization of past policy decisions and their cost is incurred with one period lag.

Laws and decrees are not usually produced in the same amount, because their marginal cost differs. In particular, the approval before enactment determines this cost. The enactment of a law requires the consensus of the majority of the legislative assembly; the marginal cost decreases with the size of the majority of the government, increases with its fragmentation and decreases with the efficiency of the legislator to transform laws into public goods:

$$MC_L = g(M/2+k, \theta, e_P) \quad (8)$$

where *M* is the size of the legislative assembly, $k>1$, $0<\theta<1$ is an index of fragmentation and e_P is the legislator's competence, with $g_k'>0$, $g_\theta'>0$ and $g_e'>0$. The incumbent may be one of two types, depending on his competence level: more or less competent. Competence, e_P, is a measure of both productivity in providing public goods and rent seeking, and is individual specific. For simplicity, $e_H > e_L > 0$. Larger majorities guarantee larger consensus inside the government party or government coalition over policy platforms that might motivate the legislative act; larger fragmentation of the government, on the contrary, increases the marginal cost of the law by increasing the cost of obtaining consensus; lower

competence, finally, is associated with a positive degree of inefficiency in producing laws that increases the marginal cost of its production.

The decree, on the contrary, is an administrative act and its implementation is assumed to require only the interest of one member of the legislative assembly – possibly, a minister of the government - and his competence:

$$MC_D=f(1/M,e_P) \quad (9)$$

with $f_e'>0$. Of course, some political support is still usually needed to implement. Given that laws are more expensive than decrees, a unit of the budget will finance them according to the parameter ψ:

$$1= \psi D+L \quad (10)$$

where $\psi=MC_L/MC_D>1$.

The total public production of goods and services is financed with public and private resources according to the equation:

$$G_t + g_{1t+1} + g_{2t+1} = ty_t + e_P + r_t \quad (11)$$

Due to asymmetric information, the agents do not observe all the components of the budget: tax revenues ty and the less redistributive good g_1 are observed by the voters while the *SIG* observes also g_2 and private resources r; finally, e_P is observed only by the legislator and it represents the major source of asymmetric information in the model. To keep the discussion as simple as possible, no debt issuance is allowed. The private resources in the economy, r, are retained by the *SIG* that allocate them to their preferred candidate at the beginning of the legislature. The amount of private resources is bounded between zero and R, an upper bound determined by the *SIG*'s budget constraint[2]:

$$0<r<R \quad (12)$$

The private resources, however, are available in the public budget only if *SIG* supports the incumbent legislator, that is if the *SIG* believe that *P* is more competent than any possible challenger in satisfying their preferences for g_2. The *ex ante* probability that a randomly selected incumbent *P* is the goods type is $0<p<1$. For the purpose of the signaling game,

[2] Padovano and Lagona (2007) generate R endogenously. Here we assume an upper bound for simplicity, but the results are qualitatively the same.

both the *SIG* and *V* do not observe e_P but just the signal that *P* sends; the allocation (g_1, g_2), is perfectly observed by *SIG* and imperfectly observed by *V*. Finally, voters *P* care also about the ideology of the *P*. The ideological advantage (or disadvantage) of *P* at time *t* for either V or SIG is defined as:

$$\gamma^{V}_{t} = \mu^{V} + \sigma v_t \quad (13)$$

$$\gamma^{SIG}_{t} = \mu^{SIG} + \sigma v_t \quad (14)$$

where μ is a parameter specifying the electoral advantage (disadvantage), and v_t is a popularity shock, distributed according to a unimodal symmetric distribution $F \sim(0,1)$, with density *f*.

3. The timing of the model

The temporal sequence of events that the model describes is as follows:

1. At time *t* a legislator *P* is in office; he observes his competence level e_P and chooses the legislative allocation (L_t, D_t);

2. At time *t+1 SIG* observe $(g_{1,t+1}, g_{2,t+1})$ and they choose whether to support the electoral campaign of the politician with private resources $r_{t+1}>0$; *P* chooses the legislative allocation (L_{t+1}, D_{t+1});

3. At time *t+2 V* observe $(g_{1,t+2})$, *SIG* observe $(g_{1,t+2}, g_{2,t+2})$ and they update their electoral beliefs. At the end of the period an election is held and the candidate who obtains the majority of the votes is elected;

4. If *P* has been re-elected he supplies (L_{t+3}, D_{t+3}); if the challenger (*CH*) has been elected, he observes his competence level $e_{CH}=(e_L, e_H)$ and then sets $(L^{CH}_{t+3}, D^{CH}_{t+3})$.

Figure 1 illustrates the sequence of events.

Fig.1 Timing of the model

t	*t+1*	*t+2*	*t+3*
The legislator *P* is in office; *P* observes his competence level and chooses (L_t,D_t).	*SIG* observe (L_t, D_t) and the realization of ($g_{1,t+1}$, $g_{2,t+1}$); then, *SIG* allocate $r(g_{1,t+1}$, $g_{2,+1t})$; *P* chooses (L_{t+1}, D_{t+1}) and spends $r(g_{1,t+1}$, $g_{2,t+1})$.	*V* observe L_{t+1} and the realization of $g_{1,t+2}$; *SIG* observe (L_{t+1}, D_{t+1}) and the realization of ($g_{1,t+2}$, $g_{2,t+2}$); then, voters update their electoral beliefs; an election is held.	If *P* has been re-elected, he chooses (L_{t+3},D_{t+3}); if the challenger has been elected, he observes his competence level and then sets (L^{CH}_{t+3},D^{CH}_{t+3}).

The timing describes a sequential game of imperfect information in two stages, whose natural equilibrium definition is a Perfect Bayesian Equilibrium (PBE). A PBE is a pair of sequential allocations of [(g_{1t+1}, g_{2t+1}), (g_{1t+2}, g_{2t+2})] and [(D_t,L_t), (D_{t+1},L_{t+1})], one for each type of legislator (depending on his competence), and a re-election rule for unorganized voters such that the legislator chooses the optimal allocation given the re-election rule. The re-election rule, in turn, is optimal given the voters' beliefs on type of legislator. These beliefs are updated whenever possible according to the Bayes'rule. The set of equilibria are narrowed down by further imposing below some restrictions on out-of-sample equilibria.

4. The electoral allocation

As it is standard in this class of models (Aidt et al. 2011; Rogoff, 1990), the legislator's problem is solved backwards. At time t+2 the legislator enacts decrees or laws according to their optimal allocation, solving the following problem:

$$\text{Max } W=W^V+W^{SIG} \text{ s.t } G_{t+2}+g_{1,t+3}+g_{2,t+3}=e_P+ty_{t+2} \quad (15)$$

where $r_{t+2}=0$ because private resources, if received, have entirely been spent during the electoral campaign. Solving via a Lagrangian function:

$$\ell=c^V_{t+2}+lnG_{t+2}+lng_{1t+2}+\beta[c^V_{t+3}+lnG_{t+3}+lng_{1t+3}]+c^{SIG}_{t+2}+lng_{2t+2}+\beta[c^{SIG}_{t+3}+lng_{2t+3}]+\lambda[G_{t+2}+g_{1,t+3}+g_{2,t+3}-e_P-ty_{t+2}]$$

The first order conditions are:

$$d\ell/d\, g_{1t+3}:\beta/\, g_{1t+3}+\lambda=0 \quad (16.1)$$

$d\ell/d\ g_{2t+3}: \beta/\ g_{2t+3} + \lambda = 0$ (16.2)

$d\ell/d\ \lambda: + G_{t+2} + g_{1,t+3} + g_{2,t+3} = e_P + ty_{t+2}$ (16.3)

which yields:

$\beta/\ g_{1t+3} = \beta/\ g_{2t+3}$

$g_{1t+3} = g_{2t+3}$

Since: $g_{1,t+3} = e_P + ty_{t+2} - g_{2,t+3} - G_{t+2}$, the optimal allocation is:

$g^*_{1,t+3} = (e_P + ty_{t+2} - G_{t+2})/2$ (17)

$g^*_{2,t+3} = (e_P + ty_{t+2} - G_{t+2})/2$ (18)

that in terms of legislative production is equal to:

$L^*_{t+2} = (e_P + ty_{t+2} - G_{t+2})/2\alpha$

$D^*_{t+2} = (e_P + ty_{t+2} - G_{t+2})/2\alpha'$

The optimal allocation implies, in terms of the budget constraint:

$\alpha L^* MC_L = \alpha' D^* MC_D$

Since $MC_L / MC_D = \psi$,

$L^*_{t+2} = (e_P + ty_{t+2} - G_{t+2})/2\alpha\psi$ (19)

$D^*_{t+2} = (e_P + ty_{t+2} - G_{t+2})/2\alpha'$ (20)

Given the additive specification of the utility function, the same weight is attached to the utility of the two agents. Hence the same amount of g_1 and g_2 will be provided in equilibrium. The factors α and α' may differ due to technological constraints, and $\psi > 1$ because at the margin laws are more costly than the decrees. As a result, L^*_{t+2} is larger than D^*_{t+2} if $\psi < \alpha'/\alpha$.

When elections are close, the incumbent has incentive to manipulate the legislative production to maximize his probability of being re-elected. The unorganized voters V's belief on the competence of the legislator depends on the observed production of $g_{1,t+2}$ and it is updated by the Bayes' rule:

$\rho\ \square^V = \text{prob}(e_P = e_H) \mid g_{1,t+2} = \text{prob}(e_P = e_H) \mid g_{1,t+2} + \text{prob}(e_P = e_L) \mid g_{1,t+2.}$ (21)

An uninformed voter votes for P at $t+2$ if:

$\rho\ \square^V\ WP^V + (1 - \rho\ \square^V) WL^V - WCH^V - \gamma \geq 0$

(22)

where WP^V and WCH^V are the expected utility of a voter at time $t+3$ conditional on the competence of the re-elected incumbent:

$$WP^V = c_{t+3} + \ln G_{t+3} + \ln(ty_{t+3} + e_P - G_{t+3} - g_{2,t+3}) \quad (23)$$

$$WCH^V = c_{t+3} + \ln G_{t+3} + \rho^V \ln(ty_{t+3} + e_H - G_{t+3} - g_{2,t+3}) + (1-\rho^V)\ln(ty_{t+3} + e_L - G_{t+3} - g_{2,t+3}) \quad (24)$$

The *SIG*'s belief on the competence of the legislator depends on the observed production of $g_{2,t+2}$ and it is updated with the Bayes' rule:

$$\rho^{SIG} = \text{prob}(e_P = e_H) \mid g_{2,t+2} = \text{prob}(e_P = e_H) \mid g_{2,t+2} + \text{prob}(e_P = e_L) \mid g_{2,t+2}. \quad (25)$$

An informed voter votes for *P* at $t+2$ if:

$$\rho\,\square^{SIG} WP^{SIG} + (1-\rho\,\square^{SIG}) WL^{SIG} - WCH^{SIG} - \gamma \geq 0 \quad (26)$$

where WP^{SIG} and WCH^{SIG} are the expected utility of a member of the lobby at time $t+3$ conditional on the competence of the re-elected incumbent:

$$WP^{SIG} = c_{t+3} + \ln G_{t+3} + \ln(ty_{t+3} + e_P - G_{t+3} - g_{1,t+3}) \quad (27)$$

$$WCH^{SIG} = c_{t+3} + \ln G_{t+3} + \rho^{SIG} \ln(ty_{t+3} + e_H - G_{t+3} - g_{1,t+3}) + (1-\varrho\,\square^{SIG})\ln(ty_{t+3} + e_L - G_{t+3} - g_{1,t+3}) \quad (28)$$

For the legislator *P*, who chooses (D_{t+1}, L_{t+1}) before the realization of the popularity shock v_{t+2}, the probability of being re-elected by *V* and *SIG* at $t+2$ is:

$$\pi^V(\varrho\,\square^V(L_{t+1})) = T(\mu^V/\sigma + (\varrho\,\square^V WH^V + (1-\varrho\,\square^V) WL^V - WCH^V/\sigma) \quad (29)$$

$$\pi^{SIG}(\varrho\,\square^{SIG}(D_{t+1})) = H(\mu^{SIG}/\sigma + (\varrho\,\square^{SIG} WH^{SIG} + (1-\varrho\,\square^{SIG}) WL^{SIG} - WCH^{SIG}/\sigma)) \quad (30)$$

Both the functions are increasing in the agents' beliefs that the incumbent legislator is indeed competent.

The realization of $g_{1,t+2}$ and $g_{2,t+2}$ depends on the legislative production at $t+1$. A legislator running for re-election should therefore distort the allocation of decrees and laws at $t+1$ to maximize his final payoff, the expected future office rent:

$$\pi m + (1-\pi) m \quad (31)$$

Since *m* is fixed, *P* maximizes the probability of being re-elected:

$$\pi = \phi\pi^V + (1-\phi)\pi^{SIG} \quad (32)$$

where ϕ is the share of uninformed voters casting a ballot. If the electorate is entirely composed of uninformed voters (ϕ=1), the incumbent only needs to maximize the probability of being re-elected by *V*. In what follows 1/2<ϕ<1, that is most of the population consists of uninformed voters, but given that the lobby mobilizes its members to support its preferred candidate P cannot ignore the share of votes from the *SIG*. If *P* marginally raises the provision of $g_{1,t+2}$, however, he increases the probability of winning π by a factor $d\pi/d\pi^{V}= \phi$; if he marginally increases the provision of g_2 he increases the probability of winning π by a factor $d\pi/d\pi^{SIG}= 1-\phi$. By assumption $\phi>1-\phi$ and to maximize π the legislator should signal good competence to both unorganized voters *V* and to special interest groups *SIG*. The budget constraint, however, does not allow the simultaneous distortion of D_{t+1} and L_{t+1} and, faced with a decision, *P* will signal only to *V*.

If the legislator chooses to signal to *V*, his continuation value is:

$$V(g_{1,t+2})=\phi\beta m \quad (33)$$

because he increases his probability of being re-elected only in the share ϕ of the electorate. The cost of signaling to uninformed voters, on the other hand, is the difference between the utility gain of *V* and the utility loss of *SIG*:

$$C(g_{1,t+2},e_P)= [\ln g^*_{1,t+2} + \beta\ln g^*_{1,t+3} - \ln g_{1,t+2} - \beta\ln g_{1,t+3}] - [\ln g^*_{2,t+2} + \beta\ln g^*_{2,t+3} - \ln g_{2,t+2} - \beta\ln g_{2,t+3}] \quad (34)$$

The competent legislator distorts $g_{1,t+2}$ until:

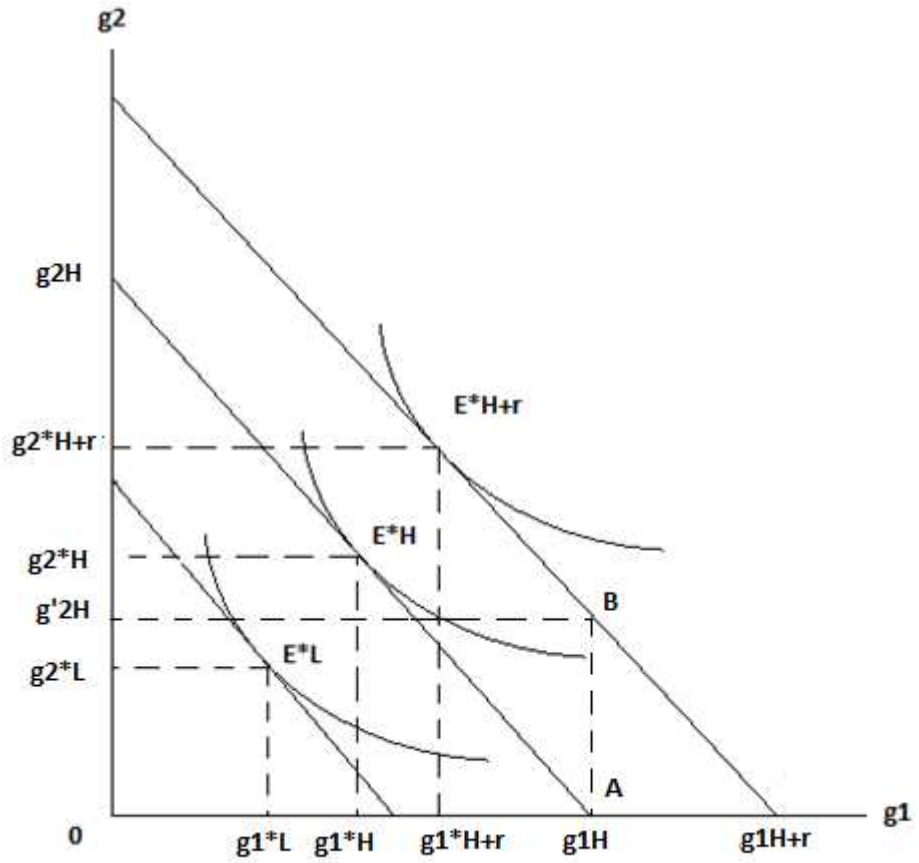
$$V(g_{1,t+2})>C(g_{1,t+2},e_H) \quad (35)$$

The incompetent legislator, instead, does not find it worthwhile to distort $g_{2,t+2}$ if:

$$V(g_{1,t+2})\leq C(g_{1,t+2},e_L) \quad (36)$$

As Figure 2 illustrates, these two intervals overlap.

Figure 2. Electoral allocations



The negatively sloped lines represent the budget constraint for a competent and an incompetent type of legislator. The inner line is the budget constraint for an incompetent type without private resources, while the most external one the budget for a competent type with private resources. The intermediate line is the budget constraint for both a competent type without resources and an incompetent type with resources, under the hypothesis that $r = e_H - e_L > 0$. Assuming that during the electoral period $t+2$ the incumbent legislator P has private resources to spend, the competent type chooses a level between g^*_{1H+r} and g_{1H+r}, while the incompetent type chooses an allocation between g^*_{1H} and g_{1H}. Any

level of g_1 within the interval (g^*_{1H+r},g^*_{1H+r}) is a PBE. Assuming that voters hold the out-of-equilibrium belief that the incumbent is good if they observe a level of public provision of the universalistic good within that interval, g_{1H} is the minimum amount necessary to signal good competence, and since the more competent P is worse off the further away from that level, g_{1H} dominates any $g_1>g_{1H}$. The level g_{1H} cannot be mimicked by a bad legislator with private resources because the competent type would always be able to increase the level of g_1 conditional on the level of g_2 provided by the less competent type, namely zero (Cho and Kreps, 1987).

The uninformed voters, however, do not observe the amount of private resources r_{t+2} and, in case the less competent type received $r_{t+2}=e_H-e_L$ while the good type did not, the unobserved component $e_H=e_L+rt_{+2}$ makes the budget constraints of the two types overlap. The less competent type would thus mimic the decision of the competent type and increase his probability of being re-elected. The resulting possible distorted allocations at $t+2$ then are:

point A: (g_{1t+2}, g_{2t+2}) = (g_{1H}, 0) for the less competent incumbent *P* without resources from the *SIG*;

point B: (g_{1t+2}, g_{2t+2}) = (g_{1H}, g'_{2H}) for the competent *P* without resources or for the less competent *P* with resources.

According to the uninformed voters *V*:

$$WP^V = c_{t+3} + \ln G_{t+3} + \ln(ty_{t+3} + e_P - G_{t+3} - g_{2,t+3}) \quad (37)$$

$$WCH^V = c_{t+3} + \ln G_{t+3} + \rho\,\square^V \ln(ty_{t+3} + e_H - G_{t+3} - g_{2,t+3}) + (1 - \rho\,\square^V)\ln(ty_{t+3} + e_L - G_{t+3} - g_{2,t+3}) \quad (38)$$

where the updated beliefs are : $\rho\,\square^V=1$ if $g_1 \geq g_{1H}$; and $\rho\,\square^V=0$ otherwise. The re-election rule is:

$$\pi^V(\varrho\,\square^V(g_{1,t+2})) = \mathrm{T}(\mu^V/\sigma + (\varrho\,\square^V WH^V + (1 - \varrho\,\square^V)WL^V - WCH^V/\sigma). \quad (39)$$

The probability π^V is maximized by choosing a level of $g_{1t+2}=g_{1H}$; this level, however, is observed also by the *SIG* together with the level of g_{2t+2}. Given their larger information set they update their beliefs as:

$$WP^{SIG} = c + \ln G + \ln(ty + e_P - g_{1H})$$

$WCH^{SIG} = c + \ln G + \rho\,\square^{SIG}\ln(ty+e_P-g_{1H}) + (1-\rho\,\square^{SIG})\ln(ty+e_P-g_{1H})$ (40)

where $g_{2,t+2} = ty + e_P - g_{1H} = (0, g_{2H})$.

The *SIG*'s updated beliefs are: $\rho^{SIG}=1$ if $g_1 \geq g_{1H}$ and $g_2>0$, $\rho\,\square^{SIG}=0$ otherwise, and the re-election rule is:

$\pi^{SIG}(\varrho\,\square^{SIG}(D_{t+1})) = H(\mu^{SIG}/\sigma+(\varrho\,\square^{SIG}WH^{SIG}+ (1-\varrho\,\square^{SIG})WL^{SIG}-WCH^{SIG}/\sigma)))$

(41)

As a conclusion, the signal sent to unobserved voters *V* at *t+2* is informative for the *SIG* as well because they observe the levels of both g_{1t+2}, g_{2t+2} and *r*, which allows them to infer the true type of the incumbent legislator *P*.

Proposition 1. (Sub-game equilibrium at t+2)

The unique intuitive PBE in non-dominated strategies is a separating equilibrium and it is characterized by the following strategies and beliefs:

- a less competent type without resources chooses an allocation $(g_{1t+2}, g_{2t+2}) = (g^*_{1t+2}, g^*_{2t+2})$, corresponding to the legislative allocation $(L_{t+1}, D_{t+1}) = ((e_L+ty_{t+2}-G_{t+2})(\psi-\alpha')/\alpha\psi-\alpha', (e_L+ty_{t+2}-G_{t+2}))(\alpha-1)/\alpha\psi-\alpha')$
- a less competent type with resources (or a good type without resources) chooses an allocation $(g_{1t+2}, g_{2t+2})=(g_{1H}, 0)$, corresponding to the legislative allocation $(L_{t+1}, D_{t+1})=(g_{1H}/\alpha, 0)$
- a good type with resources chooses an allocation $(g_{1t+2}, g_{2t+2})=(g_{1H}, g_{2H})$ for the good *P*, corresponding to the legislative allocation $(L_{t+1}, D_{t+1}) = (g_{1H}/\alpha, g_{2H}/\alpha')$
- the beliefs updated with the Bayes' rule are:
  - $\rho\,\square^{V}=1$ if $g_1 \geq g_{1H}$, $\rho\,\square^{V}=0$ otherwise,
  - $\rho\,\square^{SIG}=1$ if $g_1 \geq g_{1H}$ and $g_2>0$, $\rho\,\square^{SIG}=0$ otherwise;
- and the re-election rule is: $\pi = \phi\pi^{V} + (1-\phi)\pi^{SIG}$, where:
  - $\pi^{V}(\rho\,\square^{V}(g_{1,t+2})) = F(\mu^{V}/\sigma+(\rho\,\square^{V}WH^{V}+ (1-\rho\,\square^{V})WL^{V}-WCH^{V}/\sigma)$,
  - $\pi^{SIG}(\varrho\,\square^{SIG}(D_{t+1}) = H(\mu^{SIG}/\sigma+(\rho\,\square^{SIG}WH^{SIG}+ (1-\rho\,\square^{SIG})WL^{SIG}-WCH^{SIG}/\sigma)$

Given the updated beliefs above and the probability of being re-elected, if private resources are available the competent legislator *P* has a larger probability of being re-elected than the less competent P:

$\pi_H > \pi_L$

but still the bad incumbent can choose a pooling level of g_{1t+2}.

The next section analyzes the equilibrium allocation of goods at *t+1* and the legislative allocation at *t*, showing that the competent type can increase his probability of being supported by special interest groups by signaling his type.

5. The pre-electoral allocation

The resources r_{t+1} are given from the *SIG* to the incumbent legislator *P* at time *t+1*. The strategic legislator allocates decrees and laws to produce a level of g_{2t+2} that maximizes the probability of obtaining private resources from SIG, ρ □^{SIG}. At *t+1* the legislator does not find it worthwhile to signal to unorganized voters *V* because they do not observe the outcome; furthermore, they cannot reward his distortion with votes because no election is held at *t+1*. The value of signaling for *P* is not the future office rent, but the expected size of his budget during the electoral campaign at *t+1*. If private resources are obtained, in fact, *P* can increase his probability of being re-elected above the maximum level he would reach without resources. In fact, if the *SIG* do not allocate private resources to *P* the allocation at *t+2* will decrease to:

$(g_{1t+2}, g_{2t+2}) = (g_{1L}, 0)$ for the bad *P* without resources;

$(g_{1t+2}, g_{2t+2}) = (g_{1L}, g'_2)$ for the good *P* without resources or the bad *P* with resources.

Since in this case the associated welfare level is lower than with that with resources, the probability of being re-elected is not maximized. The aim of the legislator at *t+1*, then, is to increase the probability of obtaining r_{t+1}. Recall the optimal allocation of goods is:

$g^*_{1,t+1} = (e_P + ty_t - G_t)/2$

$g^*_{2,t+1} = (e_P + ty_t - G_t)/2$

that in legislative production terms equals:

$L^*_{t+2} = (e_P + ty_{t+2} - G_{t+2})/2\alpha$

$D^*_{t+2} = (e_P + ty_{t+2} - G_{t+2})/2\alpha'$

If the legislator signals to *SIG*, his continuation value is:

$$V(g_{2,t+1})=(1-\phi)\beta m \quad (42)$$

The cost of signaling to informed voters is the difference between the utility gain of *SIG* and the utility loss of *V*:

$$C(g_{2,t+1},e_P)= [\ln g^*_{2,t+1} + \beta \ln g^*_{2,t+2} - \ln g_{2,t+1} - \beta \ln g_{2,t+2}] - [\ln g^*_{1,t+1} + \beta \ln g^*_{1,t+2} - \ln g_{1,t+1} - \beta \ln g_{1,t+2}] \quad (43)$$

The good legislator distorts $g_{2,t+1}$ until:

$$V(g_{2,t+1})>C(g_{2,t+1},e_H) \quad (44)$$

The bad legislator does not find it worthwhile to distort $g_{2,t+1}$ if:

$$V(g_{2,t+1})\leq C(g_{2,t+1},e_L) \quad (45)$$

Figure 3 illustrates the possible allocations. The competent incumbent legislator *P* chooses a level between g^*_{2H} and g_{2H}, while the less competent *P* chooses an allocation between g^*_{2L} and g_{2L}. The point g_{2L} could be reached by both the competent and the less competent type, but it is not an equilibrium strategy for the less competent legislator because, conditional on $g_1=0$, the good type can always provide a larger amount of g_2. According to the *SIG*:

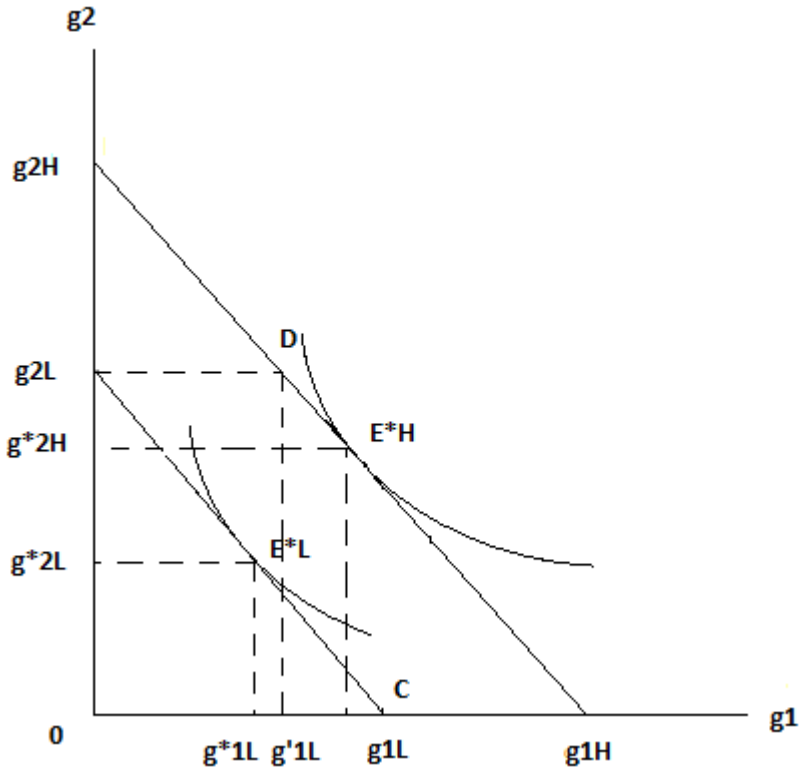
$$WP^{SIG} = c + \ln G + \ln(ty+e_P-g_{1,t+1}) \quad (46)$$

$$WCH^{SIG} = c + \ln G + \rho\,\square^{SIG} \ln(ty+e_L-g'_{1L}) + (1-\rho\,\square^{SIG})\ln(ty+e_H-g^*_{1L}) \quad (47)$$

where updated beliefs: $\rho\,\square^{SIG}=1$ if $g_1 \geq g_{2L}$, $\rho\,\square^{SIG}=0$ otherwise, and the re-election rule is:

$$\pi^{SIG}(\rho\,\square^{SIG}(g_{2,t+1})) = \pi^{SIG}(\rho\,\square^{SIG}(D_t)) = F(\mu^{SIG}/\sigma + (\rho\,\square^{SIG} WH^{SIG} + (1-\rho\,\square^{SIG}) WL^{SIG} - WCH^{SIG}/\sigma). \quad (48)$$

Figure 3. Pre-electoral allocations



Proposition 2. (Sub-game equilibrium at t+1)

The unique intuitive PBE in non-dominated strategies is a separating equilibrium and it is characterized by the following strategies and beliefs:

- a less competent type of incumbent legislator P chooses the allocation (g^*_{1t+1}, g^*_{2t+1}) corresponding to the legislative production $(L_t, D_t) = ((e_P+ty_{t+2}-G_{t+2})(\psi-\alpha')/\alpha\psi-\alpha', (e_P+ty_{t+2}-G_{t+2})(\alpha-1)/\alpha\psi-\alpha')$
- a competent type of P chooses the allocation (g'_{1L}, g_{2L}) corresponding to the legislative production: $(L_t, D_t) = (g'_{1L}/\alpha, g_{2L}/\alpha')$;
- The beliefs updated with the Bayes' rule are: $\rho\,\square^{SIG}=1$ if $g_1 \geq g_{2L}$, $\rho\,\square^{SIG}=0$ otherwise.

6. Equilibrium of the game and empirical predictions

The equilibrium PBE of the full game is described in Proposition 3:

Proposition 3. (Equilibrium of the game)

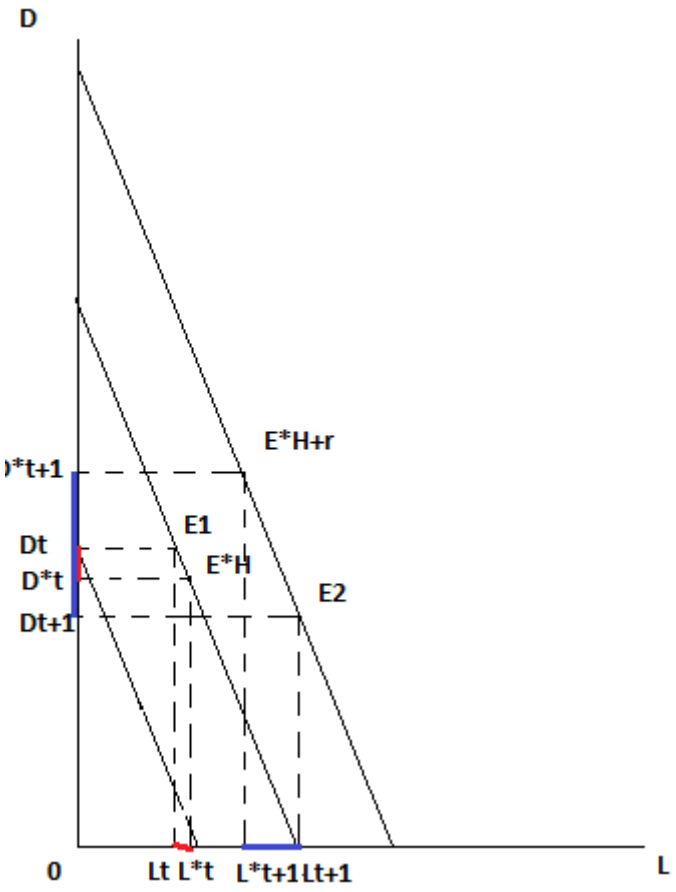
The unique intuitive PBE in non-dominated strategies is a separating equilibrium and it is characterized by the following strategies and beliefs:

- a less competent type of incumbent legislator *P* chooses the sequence of allocations $[(g^*_{1t+1}, g^*_{2t+1}), (g^*_{1t+2}, g^*_{2t+2}), (g^*_{1t+3}, g^*_{2t+3})]$ corresponding to the sequence of legislative production: $[(g^*_{1t}/\alpha, g^*_{2t}/\alpha')\ (g^*_{1t+1}/\alpha, g^*_{2t+1}/\alpha')\ (g^*_{1t+2}/\alpha, g^*_{2t+2}/\alpha')]$;
- a competent type of incumbent legislator *P* chooses the sequence of allocations $[(g'_1, g_{2L}), (g_{1H}, g'_{2H}), (g^*_{1t+3}, g^*_{2t+3})]$ corresponding to the sequence of legislative production: $[(g'_1/\alpha, g_{2L}/\alpha')\ (g_{1H}/\alpha, g'_{2H}/\alpha')\ (g^*_{1t+2}/\alpha, g^*_{2t+2}/\alpha')]$;
- The beliefs updated with the Bayes' rule are:
  - beliefs of the *SIG* at *t+1*: $\rho\ \square^{SIG}=1$ if $g_1 \geq g_{2L}$, $\rho\ \square^{SIG}=0$ otherwise,
  - beliefs of the *V* at *t+1*: $\rho\ \square^{V}=1$ if $g_1 \geq g_{1H}$, $\rho\ \square^{V}=0$ otherwise,
  - beliefs of the *SIG* at *t+2*: $\rho\ \square^{SIG}=1$ if $g_1 \geq g_{1H}$ and $g_2>0$, $\rho\ \square^{SIG}=0$ otherwise;
- and the re-election rule at *t+2* is: $\pi = \phi\pi^V + (1-\phi)\pi^{SIG}$, where:
  - $\pi^V(\rho\ \square^V(g_{1,t+2})) = F(\mu^V/\sigma + (\rho\ \square^V WH^V + (1-\rho\ \square^V)WL^V - WCH^V/\sigma)$,
  - $\pi^{SIG}(\rho\ \square^{SIG}(D_{t+1}) = H(\mu^{SIG}/\sigma + (\varrho\ \square^{SIG} WH^{SIG} + (1-\rho\ \square^{SIG})WL^{SIG} - WCH^{SIG}/\sigma)$.

Proposition 3 predicts that the competent incumbent legislator *P* can separate himself from the less competent rival by distorting the production of both general purpose and targeted public goods during every period. At *t+1* he increases the production of the good g_2 while at *t+2* he increases the production of g_1.

In terms of legislative production, the empirical implications of the equilibrium of the full game are illustrated in Figure 4. Any point on the budget constraint, negatively sloped according to the ratio ψ, represents the efficient allocation between decrees (*D*) and laws (*L*). The optimal sequence of allocations is (*E*H*, *E*H+r*), but the strategic legislator chooses in equilibrium the allocations (*E1*, *E2*).

Figure 4.



The distortion in the legislative production at time *t+1* is represented by the blue segments: a decrease in the decree production of (D^*_{t+1}-D_{t+1}) and an increase in the law production of (L_{t+1}-L^*_{t+1}). The distortion in the legislative production at time *t*, on the other hand, is represented by the red segments: a decrease in the law production of (L^*_t-L_t) and an increase in the decree production of (D_t -D^*_t). These distorted allocations generate, as expected, different redistribution profiles towards the groups in time determined by two opposite cycles of legislation: a decree cycle at the beginning of the legislature and a law cycle at its end.

7. Conclusions

This paper studies the legislative equilibrium behavior of a rational legislator aiming at being re-elected. The legislator faces two types of voters that differ among each other with respect to the size of their information set, and he is endowed with a public budget that may be incremented by private resources retained by a lobby. The model

formalizes a three-way explanatory structure in which the legislator increases his probability of being re-elected by manipulating the approbation of laws and decrees to produce, respectively, more general purpose and more targeted redistributive goods. The public budget constraint faced by the legislator cannot finance two simultaneous signals - directed to either informed and uninformed voters - during the electoral year; therefore, the legislator aims to obtaining also additional private resources to spend during the electoral campaign. The equilibrium strategy resulting from the model suggests a two-step signaling activity of the legislator: at the beginning of the term he manipulates the legislative production at the benefit of informed voters to increase the probability of gaining private resources; at the end of the term he uses the additional resources to benefit the uninformed voters through universal redistribution - keeping the utility of the lobby at the first-period high-competence level.

The theoretical results suggests a pattern of cyclical production of laws and decrees characterized by the upward distortion of decrees at the beginning of the legislature and an upward distortion of laws at its end. These predictions are consistent with the empirical results obtained by the literature on political legislative cycles (Lagona et al., 2011), and for the first time provide them with a theoretical support. This study represents in fact the first formalization of how do legislators choose among the various type of legislative instruments at their disposal to take a given political decision, and suggests a path of development of this field of research.

First, the model draws several empirical predictions well suited for comparative analyses. The empirical literature, on the contrary, has so far focused on time series datasets of European countries. This approach exploits the institutional and social homogeneity inside each country, but it disregards a variety of country-specific factors that affect the cyclical production of laws and decrees; among them, the degree of awareness of the voters, the composition of the population between unorganized citizens and lobbies, the cost of legislative consensus in each country and the process of approbation of laws and decrees. A comparative analyses would exploit both the cross

country and the time variation of the pattern of cycling, providing more general and more robust results.

From a theoretical perspective this study proposes a simple framework of analyses that can be enriched by future research. Natural extensions of the model include stressing the non-benevolent nature of the legislator by introducing discretionary "ego rent"; the analysis of the generation of reputational effects by observing the repetition of the game in time; the possibility that private resources are retained by more than one lobby; the introduction of the possibility of *ex-post* public reimbursement.

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