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ABSTRACT

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An incumbent government seeking reelection allocates a fixed budget among several unionized sectors. Strikes are costly and transmit information to voters about the quality of the government. The politician may have interest to distort the budget allocation away from the efficient one in order to maximize his/her probability of reelection. In most cases a hostile receive receives more than a neutral/friendly one.

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Should we really expect more from our friends ?

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March 20, 2007

Abstract

In the present paper, we analyze an original channel of interaction between politicians and lobbies i.e. the nuisance power of a lobby. Some lobbies are influencing public policies just because they are able to impact negatively the image of a politician. More particularly, we develop a setting in which unions may transmit some information *to the voters* about *the quality of the government* via a costly signal i.e. a strike. In our setting unions represent sectors of the economy.

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1 Introduction

Scholars have up to now analyzed the influence of interest groups on policy determination in basically two different ways. The first approach relies on common agency theory such as developed for instance by Bernheim and Whinston (1986): the interest groups, or at least some of them, are supposed

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to transfer money to an incumbent government conditionally on the policy selected (see for instance Helpman and Grossman (1994) for an application to trade policy). In other words the lobbies are supposed to *buy* the politicians. The second approach builds on Crawford and Sobel (1982) analysis of strategic communication in signaling games. Interest groups influence policy decisions by providing relevant informations to the decision maker. This potential influence is an incentive to acquire information even if it is costly (see, among others, Austen-Smith (1995), Lohmann (1994) , Laffont (1999) and Bennedsen and Feldmann (2002)). More recently Bennedsen and Feldmann (2006) analyze the interaction between the two types of instruments, i.e. contributions and information transmission. These approaches do not really take into account voters' behavior. Either the politician maximizes a weighted sum of the contributions and the social welfare, or voting behavior is analyzed via a reduced form i.e. it is simply assumed that campaign spending and the probability of election are positively linked.

Grossman and Helpman (1999) approach is rather original. They have analyzed political endorsements as a mean of transmitting information from *interest groups leaders to interest groups members* and subsequently studied the competition between parties for endorsements.

Finally Prat (2002a and 2002b) are the papers which the closest to our approach. Prat explicitly studies how lobbies' contributions influence voters' behaviors via campaign spending in political advertising. He builds on Milgrom and Roberts (1986) IO theory on commercial advertising. Political advertising is a credible signal of the "valence" or quality of a politician. Prat assumes that high valence political candidates, everything else being equal, have a higher probability of being elected. Therefore, if the lobbies are able to observe the quality of a candidate, they are more prone to contribute to high valence candidates. Uninformed voters take political advertising as a credible signal of quality. Politicians "burn" money to show to the uninformed voters that lobbies have identified them as high quality candidates.

In the present paper, we analyze an other channel of interaction between politicians and lobbies i.e. the nuisance power of a lobby. Some lobbies are influencing public policies just because they are able to impact negatively the image of a politician. More particularly, we develop a setting in which unions may transmit some information *to the voters* about *the quality of the government* via a costly signal i.e. a strike. In our setting unions represent sectors of the economy

Typically a group of interest wants to extract some budget in order to improve the welfare of its members or of the society. For instance, the teachers or students' unions recurrently ask for an increase of the budget for education in order to improve the working conditions in the schools. Medical doctors and nurses unions urge for an increase of the budgets of the hospitals to improve the quality of the cares. Facing unlimited demands, governments have to make some arbitrage. Their probability of reelection depends on the way they settle the allocation of the public funds. Social peace allows a maximal production of the public good but reveals little information about the quality θ of the government while social unrest may reveal some information but at the cost of a lower production of public good. When the unions are unbiased, i.e. have no exogenous hostility against or sympathy for the incumbent government, strikes may occur only when the government is "bad" and are unambiguously informative: the existence of unions is potentially welfare improving. This is not necessarily the case when some or all unions are biased against the incumbent government: a good government may be overthrown as a consequence of a strike since the occurrence of a strike against a bad government is more likely than against a good one. Even more interesting is the case where some unions are biased against the government while the others are neutral or even friendly: the government may well have to distort the budget allocation away from the efficient one in order to maximize its probability of reelection. This paper analyses the interaction between an incumbent government and supporting lobbies like unions. Do lobbies always buy politicians as suggested by the economic literature ? Couldn't there be cases where an incumbent government is willing to give more to a lobby to avoid strikes or other manifestations of discontent ? Should we expect more from our friends or from our enemies ?

Several examples where governments rule in favor of their political enemy have been observed.

Clinton's decision in favor of the NAFTA was clearly a cost for the labor unions, one of his important political supports. The president of the 1.3-million-member American Federation of State County and Municipal Employees, Gerald W. McEntee declared to the NYT of the 16th of September 1993 "NAFTA hits the hot button. Health care is important. Reducing the deficit is important. But No. 1 is still jobs, and Nafta has a direct relationship to jobs. People understand that. They see a real possibility their companies will go south." Clinton expected that this would not alienate the support of the labor unions for its reelection. Donald R. Sweitzer, political director of the Democratic National Committee, said to the NYT February 21, 1994 "There are some scars left over from Nafta, some of which will never heal. But these are pragmatic people. We want to move on to things we can agree on." An other US example of the type of paradox explained by our model is that it is a Republican President who managed to withdraw from the Vietnamese war while the anti war lobby was clearly left wing.

In Europe, the attitude of the Spanish socialist party in 1982 toward the

NATO falls in the same category. The anti NATO lobby was clearly close to the socialist party. Nevertheless, Gonzalez never organized the referendum against NATO and is still member of NATO. In France, Mitterrand, as a newly elected president in 1981, deeply modified the status of university teachers despite the important support teachers unions provided him. Among others, the reform doubled the teaching load. More recently, during the preparation of the 2007 budget law, the Italian finance Ministry proposed a draft budget with heavy cuts to teachers' salary bill. Although the Italian coalition government in 2006 was a leftist one, having on board all leftist parties, including two extreme left post-communist parties, teachers have always been a typical electoral basin for the left, and teachers' unions are aligned to the left of the political spectrum. The Italian 2007 budget law in its final form did not include the planned cuts in the teachers' salary bill, but the story is indicative that a government may find it convenient to go against its traditional allies.

In section 2 we set up the model. In Section 3 we analyze the case when one union is exogenously biased against the incumbent government while the other one is neutral or even friendly. In section 4 we present concluding remark and discuss some possible extensions.

2 The model

We analyze here the interaction between rational voters, office seeking politicians and strategic lobbies/unions. We consider a two period model. In each period the government allocates a fixed budget between the n public sectors of the economy, each of them producing a public good such as education, health, police,... Each of these sectors is represented by an union which wants to maximize the output in its sector. Teachers, medical doctors, nurses or the police unions for instance recurrently want to get more money for the sectors they represent. In the first period the lobbies/unions are playing a game with the incumbent government which will apply for a second term at the end of the period. Each lobby decides whether to go on strike or not. Since strikes are costly a strike is potentially a signal about the quality of the government. Therefore strategies of the lobbies are quite different from what is assumed in the traditional political contributions literature and incumbent governments may distort the public budget allocation in order to maximize their probability of reelection.

2.1 The production of the public goods

The production of the public goods depends on the budget allocated to that sector and the conjuncture which is a random variable ε distributed according to a density function $f(\varepsilon) > 0$, $\forall\ \varepsilon \in [\underline{\varepsilon}, \overline{\varepsilon}]$, where we denote by $\hat{\varepsilon} = E(\varepsilon)$.

The production of the public good by a lobby i when it is endowed with b_i units of public money and given a conjuncture ε, is

$$I_i = \varepsilon\sqrt{b_i S_i}$$

where $S_i = 0$ (resp.$S_i = 1$) when lobby i goes (resp. doesn't go) on strike. We note $\mathbf{S}$ =$(S_1, S_2, .., S_n)$ and $\mathbf{S} = \mathbf{0}$ when there is no strike. Social welfare $I = \sum_{i=1}^{n} I_i$.

2.2 The government

The incumbent government is assumed to be office oriented. More precisely any politician, whether the incumbent or a challenger, has lexicographical preferences, namely he/she first cares about his/her reelection and, everything else equal, he/she prefers a higher social welfare to a lower one. This means that, in the second period which is the last one, any government maximizes the overall production of public good, i.e. social welfare.

We shall assume that government are of two types, able and unable ones. An able government makes more out of its budget. With a budget B, an able government manages to distribute $\overline{\theta}B$ to the different sectors. An unable government is less efficient and therefore distributes only $\underline{\theta}B$ with $\underline{\theta} <.\overline{\theta}$

Ex ante, the ability of the government (and of potential challengers) is perceived by the voters as a random variable. With probability p the government (or a potential challenger) is unable. We denote the expected governmental efficiency by $\hat{\theta} = p\underline{\theta} + (1-p)\overline{\theta}$.

The strategy space of the government is the sharing rule it uses to allocate its budget i.e. $\mathbf{b}(\boldsymbol{\theta})$ =$(b_1, b_2, ..., b_n)$ with $\theta B = \sum_{i=1}^{3} b_i$[1]. The incumbent government chooses $\mathbf{b}(\boldsymbol{\theta})$ in order to maximize its probability of reelection. In the second period the government chooses $\mathbf{b}(\boldsymbol{\theta})$ in order to maximize social welfare[2]. We denote by $\mathbf{b}^*(\theta)$.the socially optimal allocation of the budget which, given our assumptions, is egalitarian, i.e. $\mathbf{b}^*(\theta) = \left(\frac{\theta}{n}, \frac{\theta}{n}, .., \frac{\theta}{n}\right)$.

[1] In the following we set $B = 1$ without any loss of generality.

[2] This end of the game assumption helps us to get simple analytical results. Adding other period would not change the analysis as long as this is a last period.

2.3 The lobbies/unions

We assume that a lobby cares about two things : its sectorial output in both periods[3] and its bias for or against the government. We say that a lobby i is biased against (resp. for) the government when it derives an exogenous benefit (resp. bears an exogenous cost) k_i from getting rid of the government.

As the second period budget allocation is egalitarian, i.e. lobby i receives a budget $\frac{\theta}{n}$ from a type $\theta-$government, the lobbies know that in the second period their budgets depend only on the quality of the government. If the government is reelected, the expected utility of a lobby which gets a budget b_i in the first period is given by

$$\varepsilon\sqrt{b_i} + \hat{\varepsilon}\sqrt{\frac{\theta}{n}}$$

If, following a strike, the government is turned down, the lobby gets

$$k_i + \hat{\varepsilon}\sqrt{\frac{\widehat{\theta}}{n}}$$

It is clear from here that a strike is costly and that an union goes on strike only when this is necessary to turn down the incumbent government.

Therefore, **if a lobby i expects its decision to be critical in the reelection of the government**, it will go on strike only iff

$$\varepsilon\sqrt{b_i(\theta)} + \hat{\varepsilon}\sqrt{b_i^*(\theta)} < k_i + \hat{\varepsilon}\sqrt{b_i^*(\hat{\theta})}$$

i.e. iff $\varepsilon < \varepsilon^U(b_i, k_i, \theta)$ where

$$\varepsilon^U(b_i(\theta), k_i, \theta) = \frac{k_i + \hat{\varepsilon}(\sqrt{\frac{\widehat{\theta}}{n}} - \sqrt{\frac{\theta}{n}})}{\sqrt{b_i(\theta)}}$$

In equilibrium there is never more than one union which goes on strike. Given the budget allocation $\mathbf{b}(\theta)$and the state of nature ε the unions play a non-cooperative game which determines which of those which would benefit from the overthrowing of the government will go on strike. Of course this game has as many equilibria as there are unions i for which the inequality $\varepsilon < \varepsilon^U(b_i, k_i, \theta)$ holds. Notice that we have a problem of collective action when there is more than one union. The unions when deciding whether or not to go on strike do not account for the benefits which the strike would bring to the other unions.

[3]We could interprete ε as measuring the need for public intervention, unions ouput as the level of "social peace". As ε is larger it is easier to obtain more "social peace".

2.4 Voters

This is a common value model. Voters are assumed to be identical i.e. to share the same preferences. They do not observe directly the type of the government nor the conjuncture but only the aggregate amount of public good $I = \sum_{i=1}^{n} I_i$. They see if one or several unions go on strike, i.e. they observe $\mathbf{S}$. They rationally expect the allocation of the budget $\mathbf{b}(\theta)$ which is selected by a type $\theta-$government.

Given the ongoing strikes represented by $\mathbf{S} = (S_1, S_2, .., S_n)$ the government is detected as bad if the overall output is lower than the lowest output which can be expected under a "good" government, i.e. iff $I < \underline{\varepsilon} \sum_{i=1}^{n} \sqrt{S_i b_i(\overline{\theta})}$ or, equivalently, iff $\varepsilon < \varepsilon^V(\mathbf{b}(\overline{\theta}), \mathbf{b}(\underline{\theta}), \underline{\varepsilon})$ where

$$\varepsilon^V(\mathbf{b}(\overline{\theta}), \mathbf{b}(\underline{\theta}), \underline{\varepsilon}, \mathbf{S}) = \underline{\varepsilon} \left(\frac{\sum_{i=1}^{n} \sqrt{S_i b_i(\overline{\theta})}}{\sum_{i=1}^{n} \sqrt{S_i b_i(\underline{\theta})}} \right)$$

Despite the ongoing strikes the government is detected as "good" iff the overall output is larger than the largest output which can be obtained under a "bad" government, i.e. iff $I > \overline{\varepsilon} \sum_{i=1}^{n} \sqrt{S_i b_i(\underline{\theta})}$ or, equivalently, if $\varepsilon > e^V(\mathbf{b}(\overline{\theta}), \mathbf{b}(\underline{\theta}), \overline{\varepsilon}, \mathbf{S})$ where

$$e^V(\mathbf{b}(\overline{\theta}), \mathbf{b}(\underline{\theta}), \overline{\varepsilon}, \mathbf{S}) = \overline{\varepsilon} \left(\frac{\sum_{i=1}^{n} \sqrt{S_i b_i(\underline{\theta})}}{\sum_{i=1}^{n} \sqrt{S_i b_i(\overline{\theta})}} \right)$$

We shall deal in this paper with the non trivial case where the largest output under a bad government is larger than the lowest output under a good government. In this case the voters do not obtain any information about the government's type whenever $\varepsilon^V(\mathbf{b}(\overline{\theta}), \mathbf{b}(\underline{\theta}), \underline{\varepsilon}, \mathbf{S}) \leq \varepsilon \leq e^V(\mathbf{b}(\overline{\theta}), \mathbf{b}(\underline{\theta}), \overline{\varepsilon}, \mathbf{S})$. In the trivial case (i) a bad (resp. good) government is always detected as bad (resp. good) since $\varepsilon^V(\mathbf{b}(\overline{\theta}), \mathbf{b}(\underline{\theta}), \underline{\varepsilon}) \geq \overline{\varepsilon}$ (resp. $e^V(\mathbf{b}(\overline{\theta}), \mathbf{b}(\underline{\theta}), \overline{\varepsilon}, \mathbf{S}) \leq \underline{\varepsilon}$), (ii) whatever the conjuncture, no union goes on strike and (iii) the government always chooses the socially optimal allocation since this has no influence on its probability of reelection.

Assumption 1: $\left(\frac{\overline{\varepsilon}}{\underline{\varepsilon}}\right)^2 \in \left[\frac{\overline{\theta}}{\underline{\theta}}, 2\frac{\overline{\theta}}{\underline{\theta}}\right]$

This assumption states that the best output under a bad government is larger than the worst output under a good government (without this assumption our problem becomes trivial) but lower than twice this output (a quite reasonable assumption which will guarantee that a good government can always ensure its reelection). For further use we denote $d = \frac{\overline{\theta}}{\underline{\theta}} \frac{\underline{\varepsilon}^2}{\overline{\varepsilon}^2}$ the "detectability index" which is the square of the ratio between the worst output under a good government and the best output under a bad government. From Assumption 1 this index is lower than 1 but larger 0.5.

In the following we suppose that the voters reelect the government iff it is not detected as a bad one.

2.5 Timing of the game

The timing of the game is as follows :

- In the first period a type $\theta-$government is randomly chosen..

Before the realization of the conjuncture variable, the government allocates its budget θ among the different sectors[4], offering $b_i(\theta)$ to sector i. The union i takes it or leaves it. The conjuncture random variable realizes. The sectors taking the offer produce and the others are on strike. Voters enjoy I and observe the number of unions on strike but do not observe directly the quality of the government nor the realization of ε.

At the end of the first period, voters vote.

- In the second period, either the government is reelected or a new government is randomly chosen.

As usual this game will be solved backward. We concentrate in the following on the case where there exist two different unions, the first one being hostile to the incumbent government while the second is neutral or even friendly. The case of identical unions is left to the readers[5].

3 One hostile and one neutral/friendly union

We now specialize our model by assuming that one of the unions, say Union 1, is biased against the government, i.e. $k_1 > 0$, while the other is unbiased or biased in favor of the government, i.e. $k_2 \leq 0$[6]. The government has here to decide how it allocates its budget between the unions: union i receives θ_i from a type θ government and $\theta_1 + \theta_2 = \theta$. The voters anticipate when

[4] B is normalized to 1 without loss of generality.

[5] Very intuitively when the unions are identical the government always chooses an efficient (egalitarian) budget allocation.

[6] With n unions all we need is that there is at least one union which is not biased against the gouvernment and will never go on strike against a good government. This condition ensures that the voters always have an opportunity to detect a good government.

voting in order to reelect or to overthrow the government how the budget is allocated by a type θ government. They use this and the observation of a strike by one or the other union in order to infer the quality of the incumbent government.

When the voters anticipate that a good (resp. bad) government gives $\overline{\theta}_i$ (resp. $\underline{\theta}_i$) to union i, $i = 1, 2$, they conclude, despite a possible strike by union 1[7], that the government is good if $I > \overline{I} = \overline{\varepsilon}\sqrt{\underline{\theta}_2}$. Equivalently

$$\varepsilon > \ e^V(\mathbf{b}(\overline{\theta}), \mathbf{b}(\underline{\theta}), \overline{\varepsilon}, (1, 0)) = \overline{\varepsilon}\frac{\sqrt{\underline{\theta}_2}}{\sqrt{\overline{\theta}_2}}.$$

The conclude, absent any strike, that it is bad if $I < \underline{I} = \underline{\varepsilon}\ (\sqrt{\overline{\theta}_1} + \sqrt{\overline{\theta}_2})^8$. Equivalently

$$\varepsilon < \varepsilon^V(\mathbf{b}(\overline{\theta}), \mathbf{b}(\underline{\theta}), \underline{\varepsilon}, (0, 0) = \underline{\varepsilon}\frac{\sqrt{\overline{\theta}_1} + \sqrt{\overline{\theta}_2}}{\sqrt{\underline{\theta}_1} + \sqrt{\underline{\theta}_2}}.$$

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A good government when choosing how to allocate its budget $\overline{\theta}$ between $\overline{\theta}_1$ and $\overline{\theta}_2$ accounts for the fact that its probability of being reelected *despite a strike by hostile Union 1* is equal to $1 - F(\overline{\varepsilon}\frac{\sqrt{\underline{\theta}_2}}{\sqrt{\overline{\theta}_2}})$. A bad government when choosing how to allocate its budget $\underline{\theta}$ between $\underline{\theta}_1$ and $\underline{\theta}_2$ accounts for the fact that its probability of being overthrown *in the absence of any strike* equals $F\left(\underline{\varepsilon}\left(\frac{\sqrt{\overline{\theta}_1}+\sqrt{\overline{\theta}_2}}{\sqrt{\underline{\theta}_1}+\sqrt{\underline{\theta}_2}}\right)\right)$.

The government has also to account for the influence of the budget allocation on the probability of a strike. Since a strike is costly (and even all the more costly as the conjuncture is better) a union will go on strike only if this leads to an overthrowing of the incumbent government. In order for a strike to prevent the reelection of the government the voters should expect that the probability of a strike is larger when the government is bad than when it is good.

If it expects that this will lead to an overthrowing of the government Union 1[9] will go on strike against a good government if

[7] Union 2 never goes on strike when the government is good.

[8] We assume of course that $\overline{I} > \underline{I}$: this condition is necessary for our problem to be meaningful. If this condition were not to be satisfied the best which a bad government could do would be less than the worst which a good government coud achieve and the voters would always be able to identify the government's type.

[9] As explained above Union 2 never seeks to overthrow a good government.

$$\varepsilon < \varepsilon^U(\overline{\theta}_1, k_1, \overline{\theta}) = \frac{k_1 + \hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}} - \sqrt{\frac{\overline{\theta}}{2}}\right)}{\sqrt{\overline{\theta}_1}}.$$

This occurs with a positive probability only if $\varepsilon^U(\overline{\theta}_1, k_1, \overline{\theta}) > \underline{\varepsilon}$, or, equivalently, if Union 1 is sufficiently hostile to the government and/or does not receive a too large share of the budget. Obviously Union 2 *never* goes on strike against a good government. Remember that Union 1 will not go on strike if the government would despite this strike be detected as good.

Mutatis mutandis Union i goes on strike against a bad government if

$$\varepsilon < \varepsilon^U(\underline{\theta}_i, k_i, \underline{\theta}) = \frac{k_i + \hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}} - \sqrt{\frac{\underline{\theta}}{2}}\right)}{\sqrt{\underline{\theta}_i}}$$

Provided that $\varepsilon^U(\overline{\theta}_1, k_1, \overline{\theta}) < \varepsilon^U(\underline{\theta}_1, k_1, \underline{\theta})$ [10] and $\varepsilon^U(\overline{\theta}_1, k_1, \overline{\theta}) < \overline{\varepsilon}$ or that $\underline{\varepsilon} \geq \overline{\varepsilon}\frac{\sqrt{\underline{\theta}_2}}{\sqrt{\overline{\theta}_2}}$ Union 1 will more often go on strike against a bad government than against a good one.

Would one of the above conditions not be respected, a good government is always reelected as Union 1 would never go on strike. Either because a strike would not convey any information about the quality of the government as Union 1 would always go on strike if this could overthrow the government i.e when $\varepsilon^U(\overline{\theta}_1, k_1, \overline{\theta}) > \overline{\varepsilon}$. Or because, a strike of Union 1 would convey the information that the government is good: when $\varepsilon^U(\overline{\theta}_1, k_1, \overline{\theta}) \geq \varepsilon^U(\underline{\theta}_1, k_1, \underline{\theta})$ Union 1 would go more often on strike against a good government than against a bad one. Or simply because the government would be detected as good even if Union 1 went on strike.

For expositional simplification, we shall assume that even if the bad government allocates all its budget to hostile union, it is not sure that the union

[10] Notice that $\varepsilon^U(\overline{\theta}_1, k_1, \overline{\theta}) < \varepsilon^U(\underline{\theta}_1, k_1, \underline{\theta})$ is equivalent to the condition

$$\frac{\overline{\theta}_1}{\underline{\theta}_1} > \left(\frac{k_1 + \hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}} - \sqrt{\frac{\overline{\theta}}{2}}\right)}{k_1 + \hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}} - \sqrt{\frac{\underline{\theta}}{2}}\right)}\right)^2$$

will not go on strike $i.e : \varepsilon^U(\underline{\theta}, k_1, \underline{\theta}) > \underline{\varepsilon}$ which is equivalent to[11]

$$k_1 > \underline{k} = \underline{\varepsilon}\sqrt{\underline{\theta}} - \hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}} - \sqrt{\frac{\underline{\theta}}{2}}\right)$$

The government, whatever its type, allocates its budget between the two unions in order to maximize its probability of being reelected.

3.1 The bad government

A bad government is overthrown if it is detected as being indeed a bad one, i.e. if $\varepsilon < \varepsilon^V(\mathbf{b}(\overline{\theta}), \mathbf{b}(\underline{\theta}), \underline{\varepsilon}, \mathbf{0}) = \underline{\varepsilon}\left(\frac{\sqrt{\overline{\theta}_1}+\sqrt{\overline{\theta}_2}}{\sqrt{\underline{\theta}_1}+\sqrt{\underline{\theta}_2}}\right)$ **or** if one union goes credibly on strike, i.e. if $\varepsilon < \max[\varepsilon^U(\underline{\theta}_1, k_1, \underline{\theta}), \varepsilon^U(\underline{\theta}_2, k_2, \underline{\theta})]$. It follows that the bad government willing to maximize its probability of reelection wants to minimize the **largest** of these values. Figure 1 below depicts the different possible cases. Given the budget allocation $\mathbf{b}(\overline{\theta})$ which is rationally expected by the good government ε^V is a U-shaped function of $\underline{\theta}_1$ which takes its minimum value at $\underline{\theta}_1 = \frac{\underline{\theta}}{2}$. On the other hand $\varepsilon^U(\underline{\theta}_1, k_1, \underline{\theta})$ is a decreasing function of $\underline{\theta}_1$ while $\varepsilon^U(\overline{\theta} - \underline{\theta}_1, k_2, \underline{\theta})$ is an increasing function of $\underline{\theta}_1$. Moreover two of these curves intersect only once as it is straightforward to show. Geometrically speaking the bad government's problem is to allocate its budget in order to reach the lower point on the upper envelope of the three curves. Under our assumptions there are only three possible cases (as formally shown in Lemma 1 below). In Case (a) of Lemma 1 the equilibrium allocation is the one which gives its minimum value to ε^V, i.e. the egalitarian allocation. In case (b) it corresponds to the point where $\varepsilon^U(\underline{\theta}_1, k_1, \underline{\theta})$ and ε^V intersect (i.e. the probabilities of the government being detected as bad and of Union 1 going on strike are equalized) : the hostile union 1 receives a larger share of the budget. Finally in Case (c) of Lemma 1 the equilibrium allocation corresponds to the point where $\varepsilon^U(\underline{\theta}_1, k_1, \underline{\theta})$ and $\varepsilon^U(\overline{\theta} - \underline{\theta}_1, k_2, \underline{\theta})$ (i.e. the probabilities of Union 1 and Union 2 going on strike are equalized): the hostile union gets an even larger share of the budget.

In the following we define $\underline{\tilde{\theta}}_1$ by the equality $\varepsilon^U(\underline{\tilde{\theta}}_1, k_1, \underline{\theta}) = \varepsilon^U(\underline{\theta} - \underline{\tilde{\theta}}_1, k_2, \underline{\theta}) = \frac{\sqrt{\left[k_1+\hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}}-\sqrt{\frac{\underline{\theta}}{2}}\right)\right]^2+\left[k_2+\hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}}-\sqrt{\frac{\underline{\theta}}{2}}\right)\right]^2}}{\sqrt{\underline{\theta}}}$. It follows that

[11] This assumption enables us to reduce drastically the number of cases to be discussed. Nevertheless, note that this assumption doesn't influence the conclusion of the paper.

$$\tilde{\underline{\theta}}_1 = \underline{\theta}\frac{\left[k_1 + \hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}} - \sqrt{\frac{\underline{\theta}}{2}}\right)\right]^2}{\left[k_1 + \hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}} - \sqrt{\frac{\underline{\theta}}{2}}\right)\right]^2 + \left[k_2 + \hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}} - \sqrt{\frac{\underline{\theta}}{2}}\right)\right]^2} > \frac{\theta}{2}. \tag{1}$$

On the other hand we define $\tilde{\underline{\theta}}_1^*$ by the equality $\varepsilon^U(\tilde{\underline{\theta}}_1^*, k_1, \underline{\theta}) = \varepsilon^V(\mathbf{b}(\overline{\theta}), \tilde{\underline{\theta}}_1^*, \underline{\varepsilon}, \mathbf{0})$. It follows that

$$\tilde{\underline{\theta}}_1^* = \underline{\theta}\frac{\left[k_1 + \hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}} - \sqrt{\frac{\underline{\theta}}{2}}\right)\right]^2}{\left[k_1 + \hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}} - \sqrt{\frac{\underline{\theta}}{2}}\right)\right]^2 + \left[(\sqrt{\overline{\theta}_1} + \sqrt{\overline{\theta}_2})\underline{\varepsilon} - k_1 - \hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}} - \sqrt{\frac{\underline{\theta}}{2}}\right)\right]^2}. \tag{2}$$

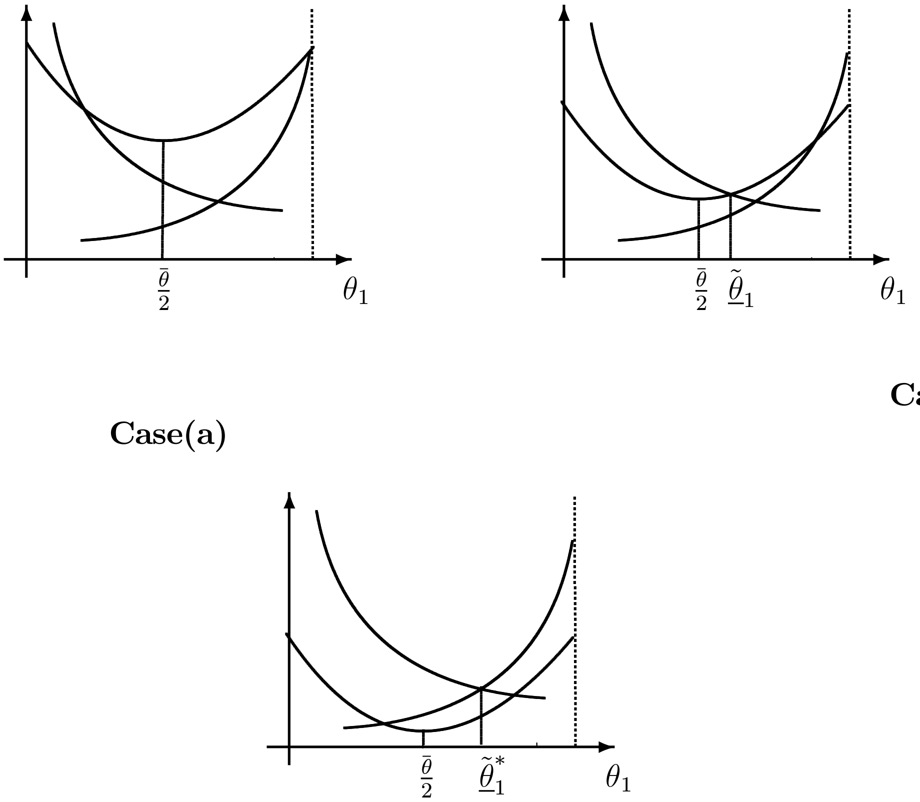
The decision of the bad government depends on what a good government would do, i.e. on $\sqrt{\overline{\theta}_1} + \sqrt{\overline{\theta}_2}$. When this value is large, ε^V is large and therefore, the focus of the bad government is on not to be identified as bad and it is the egalitarian allocation which minimizes this probability. When $\sqrt{\overline{\theta}_1} + \sqrt{\overline{\theta}_2}$ is intermediate the bad government not only fears to be identified as a bad one but is also afraid that the biased union goes on strike, it is $\tilde{\underline{\theta}}_1^*$ which minimizes that probability. When $\sqrt{\overline{\theta}_1} + \sqrt{\overline{\theta}_2}$ is small, ε^V is low, being directly identified as a bad government is no more a concern, the government therefore minimizes the probability that one of the union goes on strike by choosing $\tilde{\underline{\theta}}_1$. One can easily check that as soon as $\sqrt{\overline{\theta}_1} + \sqrt{\overline{\theta}_2}$ is not too large, the bad government gives to the biased union $\min[\tilde{\underline{\theta}}_1, \tilde{\underline{\theta}}_1^*]$.

All this is summarized in the following lemma:

Lemma 1 *(a) If* $\sqrt{\overline{\theta}_1} + \sqrt{\overline{\theta}_2} \geq 2\frac{k_1 + \hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}} - \sqrt{\frac{\underline{\theta}}{2}}\right)}{\underline{\varepsilon}}$ *the bad government selects the egalitarian allocation* $\underline{\theta}_2 = \underline{\theta}_1 = \frac{\underline{\theta}}{2}$;

(b) If $2\frac{k_1 + \hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}} - \sqrt{\frac{\underline{\theta}}{2}}\right)}{\underline{\varepsilon}} \geq \sqrt{\overline{\theta}_1} + \sqrt{\overline{\theta}_2} \geq \frac{k_2 + k_1 + 2\hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}} - \sqrt{\frac{\underline{\theta}}{2}}\right)}{\underline{\varepsilon}}$ *the bad government selects* $\underline{\theta}_1 = \tilde{\underline{\theta}}_1^*$;

(c) If $\frac{k_2 + k_1 + 2\hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}} - \sqrt{\frac{\underline{\theta}}{2}}\right)}{\underline{\varepsilon}} \geq \sqrt{\overline{\theta}_1} + \sqrt{\overline{\theta}_2}$ *the bad government selects* $\underline{\theta}_1 = \tilde{\underline{\theta}}_1$



Case(a)

Case(b)

Case(c)

Figure 1: Bad government optimal budget sharing

3.2 The good government

Given the budget allocation which it has selected a good government is reelected iff $\varepsilon \geq \min\{\varepsilon^U(\overline{\theta}_1, k_1, \overline{\theta}), \overline{\varepsilon}\frac{\sqrt{\underline{\theta}_2}}{\sqrt{\overline{\theta}_2}}\}$, i.e. it is overthrown if the hostile Union is willing to on strike **and** it is not detected as good. This corresponds to two different cases. If $\varepsilon^U(\overline{\theta}_1, k_1, \overline{\theta}) < \overline{\varepsilon}\ \frac{\sqrt{\underline{\theta}_2}}{\sqrt{\overline{\theta}_2}}$ it is reelected because the "hostile" Union 1 has no incentive to go on strike even when the conjuncture is such that a strike would overthrow the government[12]. If $\varepsilon^U(\overline{\theta}_1, k_1, \overline{\theta}) > \overline{\varepsilon}\frac{\sqrt{\underline{\theta}_2}}{\sqrt{\overline{\theta}_2}}$ a strike, though possibly profitable for Union 1 if it could overthrow the government, would be ineffective: the government would be detected as a good

[12]This is the case when $\varepsilon \in [\varepsilon^U(\overline{\theta}_1, k_1, \overline{\theta}), \overline{\varepsilon}\frac{\sqrt{\underline{\theta}_2}}{\sqrt{\overline{\theta}_2}}]$.

one despite the strike. Obviously if there is a budget allocation such that $\min\{\varepsilon^U(\overline{\theta}_1, k_1, \overline{\theta}), \overline{\varepsilon}\frac{\sqrt{\underline{\theta}_2}}{\sqrt{\theta_2}}\} \leq \underline{\varepsilon}$ the good government is reelected for sure. We are now going to analyze the two possible strategies which a good government can use in order to maximize its probability of being reelected: trying to be detected as good or trying to avoid a strike. We will subsequently analyze which is the precise strategy selected by the good government.

3.2.1 Trying to be detected as good

The first possible strategy is to maximize the probability of being identified as good even when Union 1[13] goes on strike. The first case to consider is when there exists a feasible budget allocation (θ_1, θ_2) which ensures that the government is always detected as a good one despite a strike, i.e. which is such that $e^V(\theta_2, \underline{\theta}_2, \overline{\varepsilon}, (1,0)) \leq \underline{\varepsilon}$ where $e^V(\theta_2, \underline{\theta}_2, \overline{\varepsilon}, (1,0)) = \overline{\varepsilon}\frac{\sqrt{\underline{\theta}_2}}{\sqrt{\theta_2}}$. This is equivalent to the existence of a couple $\left(\bar{\theta}_1^s, \bar{\theta}_2^s\right) \in \{(\theta_1, \theta_2) \in \left[0, \overline{\theta}\right]^2 : \theta_1 + \theta_2 \leq \overline{\theta}\}$ such that $e^V(\theta_2^s, \underline{\theta}_2, \overline{\varepsilon}, (1,0)) = \underline{\varepsilon}$. The candidate values are obtained as

$$\begin{aligned} \bar{\theta}_2^s &= \left(\frac{\overline{\varepsilon}}{\underline{\varepsilon}}\right)^2 \underline{\theta}_2 \\ \bar{\theta}_1^s &= \bar{\theta} - \left(\frac{\overline{\varepsilon}}{\underline{\varepsilon}}\right)^2 \underline{\theta}_2 \end{aligned}$$

The second case of interest is when for all feasible budget allocations there is a positive probability of the government not being detected as a good one, i.e; $e^V(\theta_2, \underline{\theta}_2, \overline{\varepsilon}, (1,0)) > \underline{\varepsilon}$. In this case maximizing the probability of being detected as good implies to give all the budget to the neutral/friendly union.

We then obtain a priori three distinct possibilities, depending on what a bad government is expected to decide:

1. when $\bar{\theta}_2^s < \frac{\bar{\theta}}{2} \Leftrightarrow \sqrt{\underline{\theta}_2} \leq \frac{\underline{\varepsilon}}{\overline{\varepsilon}}\frac{\sqrt{\bar{\theta}}}{\sqrt{2}}$, by implementing the egalitarian budget allocation $(\frac{\bar{\theta}}{2}, \frac{\bar{\theta}}{2})$ the good government secures its reelection.

2. when $\left(\frac{\underline{\varepsilon}}{\overline{\varepsilon}}\right)^2 \frac{\bar{\theta}}{2} \leq \underline{\theta}_2 \leq \left(\frac{\underline{\varepsilon}}{\overline{\varepsilon}}\right)^2 \bar{\theta}$, the government can secure its reelection by announcing the budget allocation $\left(\bar{\theta}_1^s, \bar{\theta}_2^s\right)$ which is such that $\overline{\theta} \geq \bar{\theta}_2^s \geq \frac{\bar{\theta}}{2}$.

3. when $\underline{\theta}_2 > \left(\frac{\underline{\varepsilon}}{\overline{\varepsilon}}\right)^2 \bar{\theta}$, $\left(\bar{\theta}_1^s, \bar{\theta}_2^s\right)$ is not a feasible allocation and the government, which cannot secure this way its reelection, has to give all

[13] Union 2 never goes on strike against a good government.

its budget to the unbiased union to maximize its probability of being reelected despite a strike.

However we know from Lemma 1 that the equilibrium value of $\underline{\theta}_2$ is bounded above by $\frac{\underline{\theta}}{2}$. It follows that the third case never appears since this would imply that $\frac{\underline{\theta}}{2} \geq \underline{\theta}_2 > \left(\frac{\underline{\varepsilon}}{\overline{\varepsilon}}\right)^2 \overline{\theta}$ and then $\left(\frac{\overline{\varepsilon}}{\underline{\varepsilon}}\right)^2 > 2\frac{\overline{\theta}}{\underline{\theta}}$, contradicting our Assumption 1. Under this assumption **a good government can always secure its own reelection** by selecting a budget allocation such that it is detected as good.

We finally define $\theta_2^* = \max\{\frac{\overline{\theta}}{2},\ \overline{\theta}_2^s\}$. We define as k^* the value[14] of k_1 which is such that $\frac{\overline{\theta}}{2} =\ \overline{\theta}_2^s$.

3.2.2 Trying to avoid a strike

A, possibly alternative, strategy is to minimize the probability of a strike. A first case is when there is a feasible budget allocation which ensures that Union 1 never goes on strike, i.e. which is such that $\varepsilon^U(\overline{\theta}_1, k_1, \overline{\theta}) = \frac{k_1 + \hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}} - \sqrt{\frac{\overline{\theta}}{2}}\right)}{\sqrt{\overline{\theta}_1}} \leq \underline{\varepsilon}$. A second case is when there is no such allocation, i.e. when $\varepsilon^U(\overline{\theta}, k_1, \overline{\theta}) > \underline{\varepsilon}$.

Let us define $\tilde{k}$ such that $\varepsilon^U(\frac{\overline{\theta}}{2}, \tilde{k}, \overline{\theta}) = \underline{\varepsilon}$. We obtain

$$\tilde{k} = \frac{\underline{\varepsilon}}{\sqrt{2}}\sqrt{\overline{\theta}} + \frac{\hat{\varepsilon}}{\sqrt{2}}(\sqrt{\overline{\theta}} - \sqrt{\widehat{\theta}}). \tag{3}$$

On the other hand let us define $\tilde{\tilde{k}}$ such that $\varepsilon^U(\overline{\theta}, \tilde{k}, \overline{\theta}) = \underline{\varepsilon}$. We obtain

$$\tilde{\tilde{k}} = \underline{\varepsilon}\sqrt{\overline{\theta}} + \frac{\hat{\varepsilon}}{\sqrt{2}}(\sqrt{\overline{\theta}} - \sqrt{\widehat{\theta}}). \tag{4}$$

Let us finally denote $\overline{\theta}_1^{ns}$ the value of θ_1 which solves $\varepsilon^U(\theta_1, k_1, \overline{\theta}) = \underline{\varepsilon}$. We obtain

$$\overline{\theta}_1^{ns} = \left(\frac{k_1 + \hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}} - \sqrt{\frac{\overline{\theta}}{2}}\right)}{\underline{\varepsilon}}\right)^2 \tag{5}$$

Let us on the other hand define $\theta_1^* = \min\{\frac{\overline{\theta}}{2}, \overline{\theta}_1^{ns}\}$.

There are three distinct possibilities:

[14] We will show below that this value is unique.

1. when $k_1 \leq \tilde{k}$ the good government secures its reelection by implementing the efficient (egalitarian) budget allocation $(\frac{\bar{\theta}}{2}, \frac{\bar{\theta}}{2})$

2. when $\tilde{k} \leq k_1 \leq \tilde{\tilde{k}}$, the good government can secure its reelection by announcing a budget allocation such that $\bar{\theta}_1 = \bar{\theta}_1^{ns}$.

3. When $k_1 > \tilde{\tilde{k}}$, it is not possible to avoid for sure the strike from the biased union.

We may conclude from the study of the strategies of the good government that it can always reach its first goal which is to ensure its own reelection. When the two strategies just described (trying to be detected as good or to avoid a strike) are available it will select the one which yields the maximum overall output. Put otherwise it will select the s strategy iff $\theta_2^* \leq \theta_1^*$ and the ns strategy when $\theta_2^* \geq \theta_1^*$.

3.3 Equilibria

The equilibrium behavior of a bad government has been characterized by Lemma 1, given what the good government is expected to do (i.e. depending on $\sqrt{\bar{\theta}_1} + \bar{\theta}_2$). As we just saw the results about the good government' s behavior depended in turn, through $\underline{\theta}_2$, on what the bad government is expected to do. It is time now to characterize the bad and good governments' optimal policies$\sqrt{\bar{\theta}_1} + \sqrt{\bar{\theta}_2}$ as an only function of the parameters of the model. It turns out that there are two different cases depending on the parameters values and especially on the "detectability index".

We begin by the more tractable case: when the detectability index is large enough the good government always selects the efficient allocation so that the bad government' behavior can be characterized very neatly.

Proposition 1 *Iff the detectability index* $d \geq \widehat{d}$, *where*

$$\widehat{d} = \frac{\widehat{\varepsilon}^2(\sqrt{\widehat{\theta}} - \sqrt{\underline{\theta}})^2}{\widehat{\varepsilon}^2((\sqrt{\widehat{\theta}} - \sqrt{\underline{\theta}})^2 + (\sqrt{\bar{\theta}} - \sqrt{\underline{\theta}})^2) + 2\underline{\varepsilon}\sqrt{\bar{\theta}}(\underline{\varepsilon}\sqrt{\bar{\theta}} + 2\widehat{\varepsilon}(\sqrt{\bar{\theta}} - \sqrt{\underline{\theta}}))} \quad if\, \widehat{\theta} \geq 4\underline{\theta} \; or\, \bar{\theta} \geq (\frac{\widehat{\varepsilon}(2\sqrt{\underline{\theta}} - \sqrt{\widehat{\theta}})}{\widehat{\varepsilon} - \underline{\varepsilon}})^2$$

and $\widehat{d} = \frac{\left(\underline{\varepsilon}\sqrt{\bar{\theta}} + \widehat{\varepsilon}(\sqrt{\underline{\theta}} - \sqrt{\bar{\theta}})\right)^2}{\underline{\varepsilon}^2\bar{\theta} + \widehat{\varepsilon}^2\left(\sqrt{\bar{\theta}} - \sqrt{\underline{\theta}}\right)^2}$ *otherwise*[15], *there exists an equilibrium such that*

(a) the good government selects the efficient budget allocation for all $k_1 \geq 0$;

[15] Notice that in any case $\widehat{d} < 1$.

(b) the bad government selects the efficient budget allocation when $k_1 \in \left[0, \frac{1}{\sqrt{2}}(\underline{\varepsilon}\sqrt{\overline{\theta}} - \widehat{\varepsilon}(\sqrt{\widehat{\theta}} - \sqrt{\underline{\theta}})\right]$;

(c) the bad government chooses $\underline{\theta}_1 = \tilde{\underline{\theta}}_1^{*}$[16] *when*
$k_1 \in \left[\frac{1}{\sqrt{2}}(\underline{\varepsilon}\sqrt{\overline{\theta}} - \widehat{\varepsilon}(\sqrt{\theta} - \sqrt{\underline{\theta}}), \sqrt{2}(\underline{\varepsilon}\sqrt{\overline{\theta}} - \widehat{\varepsilon}(\sqrt{\widehat{\theta}} - \sqrt{\underline{\theta}})\right]$;

(d) the bad government chooses $\underline{\theta}_1 = \tilde{\underline{\theta}}_1$[17] *when* $k_1 \geq \sqrt{2}(\underline{\varepsilon}\sqrt{\overline{\theta}} - \widehat{\varepsilon}(\sqrt{\widehat{\theta}} - \sqrt{\underline{\theta}})$.

Proof. see Appendix. ■

In order to characterize the good government's behavior in the complementary case where the detectability index is low enough we need some preliminary results and definitions. We show in Appendix that (a) $\bar{\theta}_1^*$ is an increasing function of k_1 (Claim 1), (b) $\bar{\theta}_2^*$ is a decreasing function of k_1 (Claim 2) and (c) there exists a k^{**} such that $\bar{\theta}_1^*(k^{**}) = \bar{\theta}_2^*(k^{**})$ and that the good government's equilibrium budget allocation is given by $(\bar{\theta}_1^*, \bar{\theta} - \bar{\theta}_1^*)$ when $k_1 \leq k^{**}$ and by $(\bar{\theta} - \bar{\theta}_2^*, \bar{\theta}_2^*)$ when $k_1 \geq k^{**}$ (Claim 3).

Proposition 2 *ff the detectability index* $d \geq \widehat{d}$

(a) when the union is not too biased, i.e. $k \leq k^*$*, the good government shares the budget in such a way that the hostile union is not willing to go on strike. The biased union never gets* less *than half the budget, i.e.* $\overline{\theta}_1 \geq \overline{\theta}/2$*. Moreover, the larger the bias the larger the biased union's share.*

(b) when the union's bias is large, $k \geq k^*$*, the good government shares the budget in such a way that, even if the biased union goes on strike, the ability of the government is revealed. The biased union never gets more than half the budget, i.e.* $\overline{\theta}_1 \leq \overline{\theta}/2$*. Nevertheless, the larger the bias the larger the budget share of the biased union.*

Proof. see Appendix.

■

In Case (a) of Proposition 2 the government buys its political enemy. In Case (b) it favors its friends. In order to reduce Union 1's incentive to go on strike, the bad government distorts the budget allocation by giving it a larger share when the union's bias k_1 becomes larger than a critical value. This share is subsequently an increasing function of k_1 so that the more hostile Union 1 is, the larger budget share it will receive from the bad government. A contrario when the detectability index is large enough the good government selects the efficient budget allocation: when k_1 is low (moderately hostile

[16] where $\tilde{\underline{\theta}}_1^*$ is given by equation (2) where $2\sqrt{\theta}$ has been substituted for $(\sqrt{\theta_1} + \sqrt{\theta_2})$.

[17] $\tilde{\underline{\theta}}_1$ is given by equation (1).

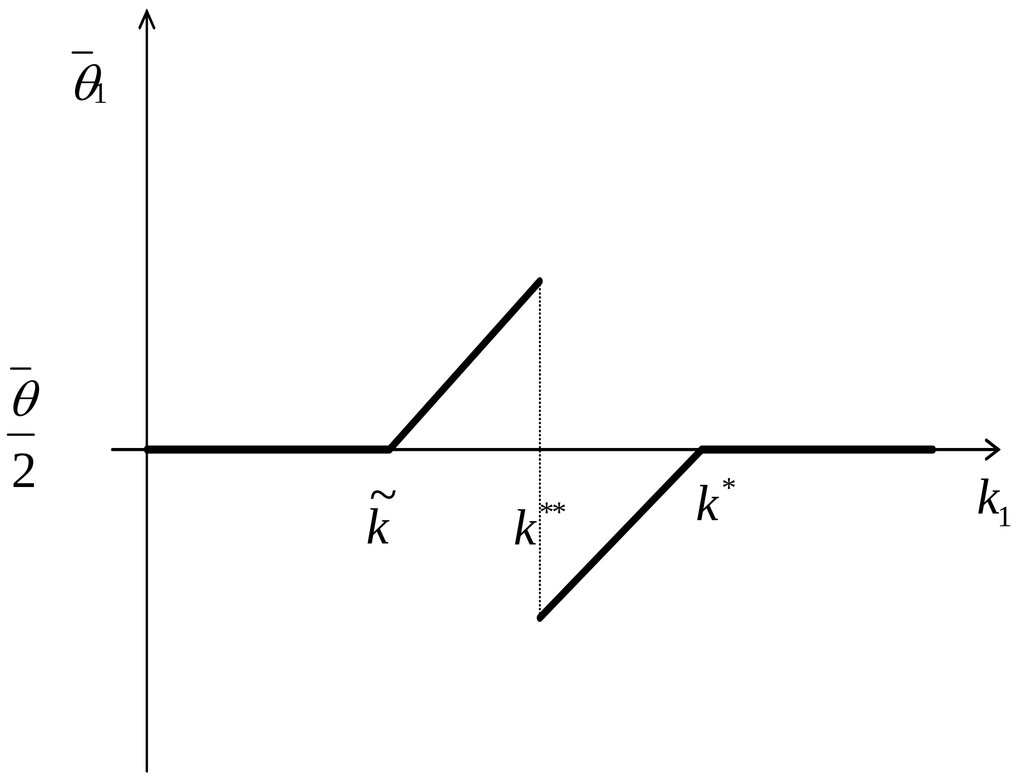


Figure 2: The good government's budget allocation

Union 1) the hostile union has no incentive to go on strike and when k_1 would be such that Union 1 would otherwise go on strike the egalitarian budget sharing is become sufficient to signal that the government is good[18]. Notice that in the two cases examined above and under Assumption 1 (a detectability index larger than 1/2) the good government is always reelected.

4 Concluding remarks

The main conclusion which we reached in this paper is that, in most cases, an incumbent government seeking reelection favors its ennemies, i.e. gives a larger share of the budget to the hostile union in order to reduce its incentives to go on strike. This is always the case when the government is inefficient. This is equally the case when the government is efficient but the hostile union's bias is not too large. Only when the government is good and the hostile union's bias large does the government favor its friends, trying by doing so to be detected as good despite any possible strike. Extending the model in order to include several hostile unions would be rather cumbersome but would not modify substantially our results, at least when detectability is above the critical value which ensures that the good government chooses the efficient budget allocation: a bad government would favor more the more hostile unions. .

Appendix

Proof of Lemma 1:

(a) It is sufficient to see that $\sqrt{\overline{\theta}_1}+\sqrt{\overline{\theta}_2} \geq 2\frac{k_1+\hat{\varepsilon}\left(\sqrt{\frac{\hat{\theta}}{2}}-\sqrt{\frac{\underline{\theta}}{2}}\right)}{\underline{\varepsilon}} \Leftrightarrow \varepsilon^V(\mathbf{b}(\overline{\theta}), \frac{\theta}{2}, \underline{\varepsilon}, \mathbf{0}) \geq \varepsilon^U(\frac{\theta}{2}, k_1, \underline{\theta})$ (as a consequence we also have that $\varepsilon^V(\mathbf{b}(\overline{\theta}), \frac{\theta}{2}, \underline{\varepsilon}, \mathbf{0}) > \varepsilon^U(\frac{\theta}{2}, k_2, \underline{\theta})$). Hence the condition in (a) means that at the egalitarian allocation the probability of a strike is lower than the probability of the government being detected as bad.

(b) It is enough to notice that $2\frac{k_1+\hat{\varepsilon}\left(\sqrt{\frac{\hat{\theta}}{2}}-\sqrt{\frac{\underline{\theta}}{2}}\right)}{\underline{\varepsilon}} \geq \sqrt{\overline{\theta}_1}+\sqrt{\overline{\theta}_2} \Leftrightarrow \varepsilon^V(\mathbf{b}(\overline{\theta}), \frac{\theta}{2}, \underline{\varepsilon}, \mathbf{0}) \leq \varepsilon^U(\frac{\theta}{2}, k_1, \underline{\theta})$ (equivalently $\tilde{\underline{\theta}}_1^* \geq \frac{\theta}{2}$) and $\sqrt{\overline{\theta}_1}+\sqrt{\overline{\theta}_2} \geq \frac{k_2+k_1+2\hat{\varepsilon}\left(\sqrt{\frac{\hat{\theta}}{2}}-\sqrt{\frac{\underline{\theta}}{2}}\right)}{\underline{\varepsilon}} \Leftrightarrow \tilde{\underline{\theta}}_1^* \leq \tilde{\underline{\theta}}_1$. At this equilibrium the probability of Union 1 going on strike and

[18] This is simply because the budget share of the neutral union under the bad government is a decreasing function of k_1.

of the government being detected as bad are equalized and larger than the probability of Union 2 going on strike.

(c) Straightforward (see above). The probabilities of Union 1 and of Union 2 going on strike are equalized are larger than the probability of the government being detected as bad. ■

Proof of Proposition 1:

We already know that, whenever $k_1 \leq \tilde{k}$, Union 1 has no incentive to go on strike against a good government which has selected the efficient budget sharing . Iff, when selecting the efficient budget allocation, it is detected as good for values of k_1 larger than some $k^* \leq \widetilde{k}$ then the equilibrium strategy of a good government is to select the efficient allocation for all values of k_1. This condition is equivalent to having $\overline{\theta}_2^s \leq \frac{\overline{\theta}}{2}$ for $k_1 = \tilde{k}$. At this point $\sqrt{\overline{\theta}_1} + \sqrt{\overline{\theta}_2} = \sqrt{2\overline{\theta}}$ and we can substitute this $\sqrt{2\overline{\theta}}$ for $\sqrt{\overline{\theta}_1} + \sqrt{\overline{\theta}_2}$ in Lemma 1 and in the equation (2) which defines $\underline{\tilde{\theta}}_1^*$. We then compute $\overline{\theta}_2^s(\tilde{k})$ in the two possible cases which correspond to (b) and (c) of Lemma 1[19]. Notice that Case (c) occurs iff $\tilde{k} \geq \sqrt{2}(\underline{\varepsilon}\sqrt{\overline{\theta}} - \widehat{\varepsilon}(\sqrt{\widehat{\theta}} - \sqrt{\underline{\theta}})$ (or equivalently iff $\widehat{\theta} \geq 4\underline{\theta}$ or $\overline{\theta} \geq (\frac{\widehat{\varepsilon}(2\sqrt{\underline{\theta}}-\sqrt{\widehat{\theta}})}{\widehat{\varepsilon}-\underline{\varepsilon}})^2$) while case (b) occurs iff $\tilde{k} \leq \sqrt{2}(\underline{\varepsilon}\sqrt{\overline{\theta}} - \widehat{\varepsilon}(\sqrt{\widehat{\theta}} - \sqrt{\underline{\theta}})$ ($\Leftrightarrow .\widehat{\theta} < 4\underline{\theta}$ and $\overline{\theta} \leq (\frac{\widehat{\varepsilon}(2\sqrt{\underline{\theta}}-\sqrt{\widehat{\theta}})}{\widehat{\varepsilon}-\underline{\varepsilon}})^2$). It is then easy to see that $\overline{\theta}_2^s \leq \frac{\overline{\theta}}{2} \Leftrightarrow \widehat{d} \geq \frac{\left(\underline{\varepsilon}\sqrt{\overline{\theta}}+\widehat{\varepsilon}\sqrt{\underline{\theta}}-\sqrt{\widehat{\theta}})\right)^2}{\underline{\varepsilon}^2\overline{\theta}+\widehat{\varepsilon}^2\left(\sqrt{\overline{\theta}}-\sqrt{\underline{\theta}}\right)^2}$ in case (b) and $\overline{\theta}_2^s \leq \frac{\overline{\theta}}{2} \Leftrightarrow$

$\widehat{d} \geq \frac{\widehat{\varepsilon}^2(\sqrt{\widehat{\theta}}-\sqrt{\underline{\theta}})^2}{\widehat{\varepsilon}^2((\sqrt{\widehat{\theta}}-\sqrt{\underline{\theta}})^2+(\sqrt{\overline{\theta}}-\sqrt{\underline{\theta}})^2)+2\underline{\varepsilon}\sqrt{\overline{\theta}}(\underline{\varepsilon}\sqrt{\overline{\theta}}+2\widehat{\varepsilon}(\sqrt{\overline{\theta}}-\sqrt{\underline{\theta}}))}$ in case (c). ■

Proof of Proposition 2:

We will first show that $\overline{\theta}_2^*$ is a decreasing function of k_1 and that $\overline{\theta}_1^*$ is an increasing function of k_1.

We will then show that the equilibrium budget sharing of the good government is defined by $(\overline{\theta}_1^*, \overline{\theta} - \overline{\theta}_1^*)$ when $k_1 < k^{**}$ and by $(\overline{\theta} - \overline{\theta}_2^*, \overline{\theta}_2^*)$ otherwise.

Claim 1 *$\overline{\theta}_1^*$ is an increasing function of k_1.*
Proof. *It directly follows from the definition of $\overline{\theta}_1^*$* ■

$$\overline{\theta}_1^* = \begin{cases} \frac{\overline{\theta}}{2} & \text{when } \quad k_1 < \tilde{k} \\ \left(\frac{k_1+\hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}}-\sqrt{\frac{\overline{\theta}}{2}}\right)}{\underline{\varepsilon}}\right)^2 & \text{when } \quad \tilde{k} < k_1 \end{cases}$$

[19] Notice that $\tilde{k} > \frac{1}{\sqrt{2}}(\underline{\varepsilon}\sqrt{\overline{\theta}} - \widehat{\varepsilon}(\sqrt{\widehat{\theta}} - \sqrt{\underline{\theta}})$ so that case (a) is irrelevant.

Claim 2 $\bar{\theta}_2^*$ *is a decreasing function of* k_1

Proof. $\bar{\theta}_2^* = \max\{\frac{\bar{\theta}}{2}, \bar{\theta}_2^s\}$, *its therefore enough to show that* $\bar{\theta}_2^s$ *is a decreasing function of* k_1 *when* $\bar{\theta}_2^s > \frac{\bar{\theta}}{2}$. *As we showed in lemma 1 that* $\underline{\theta}_2$ *is a continuous function defined by part, it is enough to show that for each part of the function* $\underline{\theta}_2$, $\bar{\theta}_2^s$ *is decreasing function of* k_1. *It is therefore enough to show that the* $\bar{\theta}_2$ *implicitly defined by each of the following system is decreasing in* k_1

$$\begin{cases} \bar{\theta}_2 = \left(\frac{\bar{\varepsilon}}{\underline{\varepsilon}}\right)^2 \underline{\theta}_2 \\ \underline{\theta}_2 = \frac{\underline{\theta}}{2} \end{cases}$$

$$\begin{cases} \bar{\theta}_2 = \left(\frac{\bar{\varepsilon}}{\underline{\varepsilon}}\right)^2 \underline{\theta}_2 \\ \underline{\theta}_2 = \underline{\theta} - \tilde{\underline{\theta}}_1 \end{cases}$$

$$\begin{cases} \bar{\theta}_2 = \left(\frac{\bar{\varepsilon}}{\underline{\varepsilon}}\right)^2 \underline{\theta}_2 \\ \underline{\theta}_2 = \underline{\theta} - \tilde{\underline{\theta}}_1^* \end{cases}$$

For the two first cases, $\bar{\theta}_2^s$ *is clearly a decreasing function of* k_1 *as* $\underline{\theta}_2$ *is defined independently from the* $\bar{\theta}_2$ *and is decreasing in* k_1. *For the third case one have to rely on the implicit function theorem:*

$$\underline{\theta}_2 = \underline{\theta} - \tilde{\underline{\theta}}_1^* = \underline{\theta} \frac{\left[(\sqrt{\overline{\theta}_1} + \sqrt{\overline{\theta}_2})\underline{\varepsilon} - k_1 - \hat{\varepsilon}\left(\sqrt{\frac{\hat{\theta}}{2}} - \sqrt{\frac{\underline{\theta}}{2}}\right)\right]^2}{\left[k_1 + \hat{\varepsilon}\left(\sqrt{\frac{\hat{\theta}}{2}} - \sqrt{\frac{\underline{\theta}}{2}}\right)\right]^2 + \left[(\sqrt{\overline{\theta}_1} + \sqrt{\overline{\theta}_2})\underline{\varepsilon} - k_1 - \hat{\varepsilon}\left(\sqrt{\frac{\hat{\theta}}{2}} - \sqrt{\frac{\underline{\theta}}{2}}\right)\right]^2}$$

In the first case, $\underline{\theta}_2$ *is defined independently from the strategy of the good government and is clearly decreasing in* k_1 *implying that* $\overline{\theta}_1^*$ *is increasing in* k_1. *In the second case, it is a system of equation that implicitly defines* $\underline{\theta}_2$ *and* $\overline{\theta}_2$

$$\begin{cases} \underline{\theta}_2 = \underline{\theta} \frac{\left[(\sqrt{\overline{\theta}_1} + \sqrt{\overline{\theta}_2})\underline{\varepsilon} - k_1 - \hat{\varepsilon}\left(\sqrt{\frac{\hat{\theta}}{2}} - \sqrt{\frac{\underline{\theta}}{2}}\right)\right]^2}{\left[k_1 + \hat{\varepsilon}\left(\sqrt{\frac{\hat{\theta}}{2}} - \sqrt{\frac{\underline{\theta}}{2}}\right)\right]^2 + \left[(\sqrt{\overline{\theta} - \overline{\theta}_2} + \sqrt{\overline{\theta}_2})\underline{\varepsilon} - k_1 - \hat{\varepsilon}\left(\sqrt{\frac{\hat{\theta}}{2}} - \sqrt{\frac{\underline{\theta}}{2}}\right)\right]^2} \\ \overline{\theta}_2 = \left(\frac{\bar{\varepsilon}}{\underline{\varepsilon}}\right)^2 \underline{\theta}_2 \end{cases}$$

One can therefore study $\overline{\theta}_2$ *as a function of* k_1 *by implicitly deriving the following function:*

$$G(\overline{\theta}_2, k_1) = \overline{\theta}_2 \left(\frac{\overline{\varepsilon}}{\underline{\varepsilon}}\right)^2 - \underline{\theta} \frac{\left[(\sqrt{\overline{\theta} - \overline{\theta}_2} + \sqrt{\overline{\theta}_2})\underline{\varepsilon} - k_1 - \hat{\varepsilon}\left(\sqrt{\frac{\hat{\theta}}{2}} - \sqrt{\frac{\underline{\theta}}{2}}\right)\right]^2}{\left[k_1 + \hat{\varepsilon}\left(\sqrt{\frac{\hat{\theta}}{2}} - \sqrt{\frac{\underline{\theta}}{2}}\right)\right]^2 + \left[(\sqrt{\overline{\theta} - \overline{\theta}_2} + \sqrt{\overline{\theta}_2})\underline{\varepsilon} - k_1 - \hat{\varepsilon}\left(\sqrt{\frac{\hat{\theta}}{2}} - \sqrt{\frac{\underline{\theta}}{2}}\right)\right]^2}$$

Since $\overline{\theta}_2 > \frac{\overline{\theta}}{2}$, $(\sqrt{\overline{\theta}-\overline{\theta}_2}+\sqrt{\overline{\theta}_2})$ *is decreasing in* $\overline{\theta}_2$. *One therefore easily check that* G *is increasing in* $\overline{\theta}_2$.

$$\frac{dG}{dk_1} = -2\frac{\left(k_1+\hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}}-\sqrt{\frac{\underline{\theta}}{2}}\right)\right)(\sqrt{\overline{\theta}-\overline{\theta}_2}+\sqrt{\overline{\theta}_2})\underline{\varepsilon}}{\left(\left[k_1+\hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}}-\sqrt{\frac{\underline{\theta}}{2}}\right)\right]^2+\left[(\sqrt{\overline{\theta}-\overline{\theta}_2}+\sqrt{\overline{\theta}_2})\underline{\varepsilon}-k_1-\hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}}-\sqrt{\frac{\underline{\theta}}{2}}\right)\right]^2\right)^2} < 0$$

Therefore

$$\frac{d\overline{\theta}_2}{dk_1} = -\frac{dG/dk_1}{dG/d\overline{\theta}_2} < 0$$

which also insures that

$$\frac{d\underline{\theta}_2}{dk_1} = -\frac{dG/dk_1}{dG/d\overline{\theta}_2} < 0$$

cqfd ■

Claim 3 *There exists a* k^{**} *such that the equilibrium budget sharing of the good government is defined by* $(\bar{\theta}_1^*, \bar{\theta}-\bar{\theta}_1^*)$ *when* $k_1 < k^{**}$ *and by* $(\bar{\theta}-\bar{\theta}_2^*, \bar{\theta}_2^*)$ *otherwise.*

Proof. *For a given probability of reelection, the government chooses the policy that maximizes social welfare. As* $\bar{\theta}_2^*$ *and* $\bar{\theta}_1^*$ *are larger than* $\bar{\theta}/2$, *the government chooses* $\min[\bar{\theta}_2^*, \bar{\theta}_1^*]$. *As* $\left(\frac{k_1+\hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}}-\sqrt{\frac{\underline{\theta}}{2}}\right)}{\underline{\varepsilon}}\right)^2$ *is strictly increasing in* k_1 *and* $\bar{\theta}_2^s$ *is strictly decreasing in* k_1, *there exists a* k^{**} *such that* $\bar{\theta}_2^*(k^{**}) = \left(\frac{k^{**}+\hat{\varepsilon}\left(\sqrt{\frac{\widehat{\theta}}{2}}-\sqrt{\frac{\underline{\theta}}{2}}\right)}{\underline{\varepsilon}}\right)^2$.

When $k_1 < (>) k^{**}$, $(\bar{\theta}_1^*, \bar{\theta}-\bar{\theta}_1^*)$ *is more(less) efficient than* $(\bar{\theta}-\bar{\theta}_2^*, \bar{\theta}_2^*)$. ■

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