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Cosimo Scagliusi

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Political Economy of Mass Media: Public Good, News and Voting Behaviour

Cosimo Scagliusi*
Dipartimento di Scienze Economiche
Universita' di Bari
and
Department of Economics
University of Exeter

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Abstract

In every democracy mass media play a crucial role in assuring the effective working of the political system. In this paper I focus on the role of media as "watchdog". In an agency relationship between politician and citizens, media perform the function of an informed supervisor. Previous works have assumed that all the information available to citizens about the incumbent politician is channelled through mass media only. This work investigates how citizen's voting decision and collusion between media and politicians change if two pieces of information about the politician are available: media information and a good publicly supplied. My findings are: i) by employing both the two signals, citizens manage to sort out honest politicians from dishonest ones more often than if they were relying on media information only; ii) collusion is harder to take place than in the case of one signal only; iii) the presence of media is not always welfare improving, contrary to previous literature findings. Finally, I argue that when rules at the constitutional level are not possible and citizens cannot commit to have less information, then collusion between media and politician can be welfare improving for citizens.

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Keywords Mass Media, Corruption, Selection and Discipline of Politicians,

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1 Introduction

One actor in politics whose analysis has been relatively neglected by political economy is mass media. While the literature is extensive in political science, cultural studies or sociology, in political economy there have been very few attempts to model the role of mass media. Outside economics, the role of media has been interpreted broadly in two different ways. The first sees media as shaping the public opinion, either by setting the agenda in the public discourse or by "persuading"or "brainwashing" the public who watch TV or read newspapers. While this view is held by many sociologists and/or political scientists[1]it lacks substantial microfoundation and it is difficult to reconcile with the paradigm of the self-interested and rational economic agent. The second view regards the media as the "watchdogs" of the citizens. Citizens are seen as largely uninformed about the quality and/or the performance of politicians. Media (and especially political journalists) think of themselves as acting on behalf of these citizens in order to control public officers and check their performance and quality. In the system of checks and balances which constitutes politics mass media is the Fourth Estate, together with Parliament, Executive and Judiciary.

This last approach can easily fit into a political economy framework. Provided that there is a principal-agent relationship between politicians and polity and that the citizens are less informed than the politicians, the former have an interest in evaluating the performance and/or the quality of the latter. By assessing it, the citizens will be able to make an effective choice when deciding whether to re-elect or vote out the current incumbents. However, verifying the government quality can be too costly for the single citizen. Moreover the public good characteristic of the supervising activity would lead to a free-rider problem: the information on the ability and/or performance of the politician will be costly to collect for a single citizen, but valuable only if disseminated so that everybody will know and use it in the electoral process. As a result the relevant information could never be produced and released. To overcome this possible failure, a supervisor could appear assuming the role of collecting and spreading this information. This role of an informed supervisor is performed by mass media. Of course, to carry out this task mass media need the right incentives. If media spread informative news on the ability of politicians and/or their performance the audience will increase. If more citizens buy the newspapers or watch the news, media revenues increase both directly and indirectly (through revenues from advertising, for example).

The need for supervising activity in this context is quite clear. The job performed by politicians is highly discretional; moreover it is hard if

[1]Not to quote the late Sir Karl Popper, who calls for a control over TV programs and for censorship, although for different reasons than political ones.

not impossible to link the performance of a politician to a monetary reward scheme like the ones available for private sector managers. For these reasons politicians may be largely unconstrained and may take advantage of this unaccountability by committing acts of corruption.[2] They, for instance, could deliver policies favourable to special interests or companies in exchange of several kind of favours: financing their own electoral campaign, bribes, supplying business to firms where politicians have a financial interest, and promising future employment in private sector. Examples abound: among many others, the case of Enron or the diversion of IMF funds in Russia under the previous Yeltsin's presidency spoke for themselves.[3] In the Enron's case, along with the company's many failures to assure good business conduct, there was also an example of a typical regulatory capture between the firm and the USA government. Enron was one of the biggest power companies in USA and it is believed the national energy plan to reform the power market was heavily influenced by Enron's consultants in order to favour the company's market position.[4]Another case of politicians' misbehaviour was the scandal of the financial contributions to Clinton's second presidential campaign. During the reelection campaign several Chinese businessmen gave non-registered electoral funds to Clinton in exchange for a stronger support for China joining the WTO. In all the cases above, the case for media as watchdogs is clear: the media inquire, supervise and discover the cases of possible corruption or bribery. If they are successful, they spread their findings and, given their reliability and success, they will have more citizens buying newspapers or watching the news on TV and being informed on the quality of their politicians. Several media compete for this role and for the revenues generated in the media market and the adjacent advertising one. In support of this view of the role of media, notice how some of the cases reported above regard examples of media successfully acting as watchdogs: the case of Enron was brought to public attention by The Wall Street Journal, while The New York Times and Corriere della Sera discovered the Russia scandals.[5]

In this paper I focus on the the role of media as a "watchdog". In a formal agency relationship between politicians and citizens, media perform the function of an informed supervisor. Since a three tier hierarchy is configured, the possibility of collusion between supervisor and supervisee (agent), i.e. the incumbent politician, cannot be ruled out.

[2] Among many definitions of corruption, we choose the IMF one: "the diversion by public officials of society's resources for personal benefit".

[3] To be more precise, in the Enron case there was a lack of control on managerial conduct on part of shareholders, board of directors and auditing firms.

[4] To make clear the extent of connections of politics and business, the former Vice - President of USA was previously in the Board of Directors of Enron.

[5] The Washington Post in the Watergate scandal is another famous example of journalism as watchdog of citizens. In that case the scandal did not regard financial corruption, but illegal behaviour in the electoral competition.

Previous works (among the others (Besley and Prat, 2006)) have already analysed the role of mass media as an informed supervisor. These works have assumed that all the information available to citizens about the incumbent politician is channelled uniquely through mass media. However, another strand of literature has examined how the quality and quantity of public good supplied by the incumbent could be informative of his ability or honesty and can help the citizens to decide whether to reelect the incumbent or not.

This work investigates how citizen's voting decision and collusion between media and politicians change if two pieces of information about politician's type are available: media information and public good. By not relying exclusively on the media, citizens may be able to infer with more precision a politician's type without being subjected to manipulation or the concealing of information through media capture on the part of politician. My findings are that by employing both the signals available, citizens manage to sort honest politicians from dishonest ones more often than if they were relying on media information only. Moreover, the existence of both signals makes collusion harder to take place than in the case of one signal only.

In addition, this paper constitutes one of the first attempts at endogenising the acquisition of information on the part of citizens through mass media. In previous works voters have quite a passive role towards information: they might receive and use information even when this might cause a decrease in expected welfare.In this work this is not the case. I show that, by using media in an active and strategic way, the voter might decide whether to use information if and only if this would cause her expected utility to increase. I prove that this decision on the part of the citizen depends critically on the time discount factor between the two periods the game consists of: when the time discount factor is larger than a certain threshold, it is optimal for her to recur to media as this maximises her expected utility. When the time discount factor is lower than the threshold, her optimal decision is to commit not to getting information.

Finally, it is a well known result in these voting games that there is a tension between optimality ex-ante and optimality ex-post. Even though for the voter it may be optimal ex-ante to commit not to use any information, once the new information is available, it is optimal for her to use it. This argument might break the equilibria where the voter commits ex-ante to a sort of "rational and strategic ignorance". However, if collusion is possible and as a result informative signals are concealed, I show that there is a certain range of parameters where collusion makes this "ignorance strategy" credible. In this case, making collusion easier is optimal from the voter's utility viewpoint. This is a surprising result which contradicts most of the literature in this field which sees decreasing collusion between media and government as a positive measure of public policy. The conclusion is that sometimes easing collusion via a decreasing of the transaction cost of corruption or through a shrinking in the media market may be welfare enhancing

for the citizen.

My work relates to different strands of the literature on political economy, and in particular, political economy of mass media. The seminal paper in the latter field is (Besley and Prat, 2006). They employ a simple model of supervision activity in a context of hard information, where several media outlets compete in order to provide informative news to citizens. Given that news can only be hidden, the possible form of collusion between incumbent politician and media is such that the latter could conceal the bad news regarding the former, in exchange for monetary bribes. In this way media can influence voter's beliefs on the incumbent's ability: as a result media could help him to disguise his type and to be reelected. The authors find that collusion between media and politicians is more difficult when the number of competing media is large and when the market for news is big.

Another important contribution is (Stromberg, 2004a). In his model mass media has the role of informing citizens about the policies delivered by the government. If media supply most of the information citizens use in voting decisions and there are several groups of voters to compete for, politicians will find optimal to deliver policies to the largest groups of citizens that can be reached by media, with the lowest unit cost. In presence of a media industry technology with decreasing average costs the model predicts that there will be a bias in the type of policies implemented: large and unorganized groups of voters will be favoured more. (Stromberg, 2004b) finds empirical support for this theoretical prediction.

The previous research sees media as an institutional player which supervises politician's activity or which communicates and spreads information from the government to the citizens (top - bottom role). Another strand of literature thinks of media as a player which insures that important social and political issues from the public reach the politicians (bottom - up role). Two important works here are (Besley and Burgess, 2001) and (Besley and Burgess, 2002). They show that the existence of free and widespread media is central in raising the salience of policy issues and the sensitivity of politicians to those issues. They test this theoretical conclusion using a panel data of Indian states and they find strong support for their hypothesis: the most responsive states to economic shocks like drought, flood and famine are the ones where the newspaper circulation is higher.

This work refers also to the literature on incentives in organisation in presence of career concerns. Classical references in this field are (Dewatripont and Tirole, (1999)a) and (Dewatripont and Tirole, 1999b). Their setting is quite similar to mine, since they analyse how an outside organization (called the market) can exploit two sources of independent information on agent's type, who is carrying out a task which is not contractible upon. They derive a number of propositions on the comparative statics of different information structures and test their robustness by considering several statistical distribution of signals. However, this work differs from theirs since I consider an

institutional (and political) setting and I introduce the "player" offering one of the two pieces of information, modelling its incentives and the possibility of collusion. Moreover, in this model one of the two signals the principal receives is valuable for him *per se* and not only as a source of information on agent's type. This work is also related to the literature on the role of elections as a screening and disciplining device. Classical references in this field are (Coate and Morris, 1995) and (Persson and Tabellini, 2000), ch. 4. However in these previous works, no mention of the role of media in politics is done. Finally (Kotsogiannis and Schwager, 2006) present a model relating policy innovation on part of politicians to information available to voters on those policies. In their setting several jurisdictions are present where politicians might experiment with new policies or not. They show that when the information increases, voters are more able to select the honest politicians; nevertheless the incentive to innovate decreases. This may result in the voter's welfare being reduced. The setting of the present paper is different from theirs: in their paper the information to voters about policies comes from other jurisdictions and it comes for free. In this model the information comes from media and I explicitly model media incentives. Finally, another important work building on the career concerns literature in the context of political economy is the one by (Le Borgne and Lockwood, 2006). They check whether the existence of career concerns in the sense of reelection prospect is sufficient in promoting effort on part of politicians. They show how a modification in the way politician's effort and ability interact in the production of public good changes the incentives for the politician and might make election not always the optimal institution as compared to appointment.

The remainder of the paper is organized as follows. In the following Section I introduce the model and the strategic situation at hand when only citizens and government interact with each other. In Section 3 I solve this game and highlight the existence of two effects that elections have on incumbent's behaviour: *disciplining* and *selecting* effect. In Section 4 I conduct the welfare analysis of this model and I highlight the existence of a conflict of interest between citizens and politicians depending on the time discount parameter. In Section 5 I introduce media in the framework and I derive the new equilibrium of the game when collusion is possible: in particular I find that the disciplining effect decreases when media is active, while the sorting increases. As a special case I also derive the equilibrium when collusion is not available to the players. In Section 6 I conduct the welfare analysis of the game with media and stress how the conflict of interest previously highlighted can be resolved when citizens demand information endogenously, depending on whether or not this increases their expected utility. Moreover, contrary to most of the findings of the literature, I find a condition such that making collusion easier between media and government increases citizen's expected utility. Finally Section 7 concludes.

2 The Model

I employ a model of political agency between the government and the citizens, where the former is the agent and the latter is the principal.[6] This modelling approach was pioneered by (Barro, 1973) and (Ferejohn, 1986). However this first generation of political agency models features moral hazard only: in equilibrium citizens are indifferent among competing politicians. In particular, they are indifferent between reelecting the incumbent or not. As a result these models are unable to highlight the fact that politicians may differ among themselves in some characteristic which is relevant to voters and upon which voters may cast their vote.

In order to be able to model this, a very recent literature in political economy has started to construct models with both moral hazard *and* adverse selection. This new modelling option was first proposed by (Austen Smith and Banks, 1989) and (Coate and Morris, 1995) and more recently (Persson and Tabellini, 2000) and (Besley and Smart, 2007). In this class of models politicians vary among themselves along some characteristic which is relevant but unobservable directly to voters; moreover the politicians can take some action in order to disguise this trait. Finally, citizens try to infer this characteristic and make their voting behaviour contingent on it.

This model follows rather strictly the one devised by (Besley and Smart, 2007).The model has two periods $t \in \{1, 2\}$. In each period the task of the elected politician is to produce a public good g_t valuable for the citizens. In order to produce the public good the government uses fiscal resources collected from the citizens. I make the hypothesis that there is a maximum T of tax revenues that the government can raise in both periods. So, $\tau_t \in F \equiv [0, T]$.

The citizens form the polity in this simple model of politics. Given both the impossibility of politician commitment (or the non-enforceability of electoral promises) and the non-contractibility of the output produced by the politician, the politician's reward cannot be made contingent on the output level: in words, politicians are not rewarded financially for their successes, as managers are in a private firm. Instead, citizens offer a simple implicit incentive scheme to the politician in the form of career concerns: if he reveals himself as a good quality official, the incumbent is rewarded by reelection; otherwise he is punished by being voted out and replaced by a challenger.In this way elections perform the double task of both sorting and disciplining politicians out. Citizens vote in a retrospective way based on past government performance. The citizens have only one information source to rely on to decide whether to reappoint or not the government: the quantity of public good produced by the government. Later on I will allow

[6] In order to avoid confusion, from now on the politician, either incumbent (i.e. government) or challenger, will be referred to with the pronoun "he", the citizen with "she", while media with "it".

for another signal coming from media to affect the voting decision.

2.1 The Government

Politicians come into two types: they can either be "honest" (h) or "dishonest" (d). j is the random variable for the politicians's type assuming values in $J \equiv \{h, d\}$, with $Pr(j = h) = \eta \in (0, 1)$. I assume that a politician's type represents his preferences: an honest politician does not like to take any money out of the collected fiscal revenues τ_t. As a consequence he always maximises citizens' welfare. On the other hand, a dishonest politician maximises the discounted sum of the funds r_t diverted from the fiscal resources. This means that a dishonest incumbent maximises the following utility function:

$$u_d = r_1 + \sigma_c \delta r_2 \tag{1}$$

where $\delta \in (0, 1)$ is the time discount factor between period 1 and 2 and σ_c is the rationally anticipated probability that the incumbent is reelected. In other words σ_c is the probability that the citizens are going to reelect the incumbent, with σ_c^* as the equilibrium probability.[7] As is clear from above, the dishonest politician is completely self-interested and derives his utility uniquely from grabbing rents when in charge of government. It is not surprising how this is going to influence citizens' behaviour: given politicians' preferences it is intuitive that citizens would like to have an honest politician as the incumbent government rather than a dishonest one.

2.2 The Citizens

There is a continuum of voters of measure 1 in every period t. Citizens derive their utility uniquely from the consumption of public good g_t.[8] They all have the same preferences, represented by the following utility function:

$$u_{c,t} = H(g_t) - \tau_t \tag{2}$$

where $H_g(g_t) > 0, H_{gg}(g_t) < 0$ and $H(g_t)$ satisfies the usual Inada conditions, i.e. $\lim_{g_t \to +\infty} H_g(g_t) = 0$ and $\lim_{g_t \to 0} H_g(g_t) = \infty$.[9] As already said, citizens

[7] We choose to consider only the monetary rents r_t in the government's utility function. However most of the literature (see (Persson and Tabellini, 2000)) allows for an additional term R, the so called "ego-rent". This is interpreted as the utility the politician derives from simply being in charge of the government. We choose not to include this ego-rent and focus on politician's decision regarding monetary rents r_t. Nevertheless having this additional term would not affect our main results.

[8] In the remaining of the paper we are going to use interchangeably the two words "citizen(s)" and "voter(s)" to refer to the same player(s) in the game.

[9] In our notation, the subscript in a function indicates the argument with respect to which the derivative of the function is taken. So, for instance $\frac{\partial H(g_t)}{\partial g_t} \equiv H_g(g_t)$.

also act as the principal in this agency relationship: they form the polity that is going to re-elect or vote out the incumbent at the end of the first period. Based upon the available information, i.e. common knowledge of the p.d.f. of politician's type and the observation of the public good supplied in period $t = 1$ (alternatively of the utility enjoyed), citizens will decide whether to reelect or not the incumbent.

This represents one of the differences between this paper and the model devised in (Besley and Prat, 2006): in their paper all the information accruing to the citizen comes from the media only and the public good is not observable by citizen.[10] Moreover in their paper they do not allow for different cost/quality in the production of the public good. Here instead, I allow for the public good cost parameter to be randomly chosen by the Nature and observed by the politician first but not by the citizen.[11] Finally there are differences between the supervision technology of the media in this paper and in theirs.

Since all citizens are alike, as they have the same preferences represented by the utility function in eq.(2) and the same available information, the voting decision can be treated as exactly the same for everyone. I will then restrict my analysis to the representative citizen knowing that everyone in the polity votes in the same way as she does.[12] In terms of the political economy literature, this is a model of pure political agency, where any partisan consideration is absent. In particular, the citizens and the politicians do not have any ideological motivation influencing their behaviour.

2.3 The Public Good Production Technology

In every period I assume that a single public good g_t is produced, supplied by the government and consumed by the citizens. Of course this single g_t can be thought as a bunch or amalgamate of public goods. The public good production function is the same in both periods and it is:

$$g_t = \frac{1}{\theta}(\tau_t - r_t) \tag{3}$$

Since no borrowing or lending is allowed between the two periods, from

[10] Notice that (Besley and Prat, 2006) allow for a number n of media to compete on the market for news, with $n > 1$. Since we want to analyse the effect of having another souce of information (the public good g) independent from the media, we limit ourselves to the case of one media only.

[11] The other differences are the introduction of the time discount $\delta \in (0, 1)$ and the fact that the monitoring activity of the media takes place ex-ante and not ex-post.

[12] Of course this is an extreme case far from reality and would lead us to draw the conclusion that the government is reelected or sent away with percentage close to 100%. Moreover, here there is not any strategic consideration on part of any voter on the electoral outcome; in particular the probability of being pivotal. However we choose to adopt this shortcut hoping to enlighten the role of media in the political system, leaving aside other considerations.

the above it is possible to recover the budget constraint that the government has to balance in each of the two periods:

$$\tau_t = \theta g_t + r_t \tag{4}$$

The parameter θ is the cost of producing the public good g_t. θ is a random variable assuming values in $\Theta \equiv \left\{\underline{\theta}, \overline{\theta}\right\}$,where $\overline{\theta} > \underline{\theta} > 0$, with probability $Pr(\theta = \overline{\theta}) = \rho$. Obviously the public good quantity g_t is larger when the cost θ is low, when the rents diverted are smaller, and when the tax revenues are larger. The set G is the set of feasible public good quantities g_t. When the incumbent grabs all the rents (i.e. $r_t = \tau_t$) then $g_t = 0$. When $r_t = 0$, then $g_t = \frac{\tau_t}{\theta}$. So the set $G \equiv [0, \frac{\tau_t}{\theta}]$.

2.4 The Game and the Definition of Equilibrium

This two-period model consists of a game of incomplete information among three players: incumbent politician, challenger politician, and citizen.[13] In the first period there are five stages. At $t = 1.0$, Nature selects the government's type j with a random draw from the set $J \equiv \{h, d\}$ with $Pr(j = h) = \eta$ and likewise the public good cost parameter from the set $\Theta \equiv \left\{\underline{\theta}, \overline{\theta}\right\}$, with $Pr(\theta = \overline{\theta}) = \rho \in (0, 1)$. At $t = 1.1$, the government observes his own type and the cost parameter θ. At $t = 1.2$ the incumbent politician decides the amount of tax revenues τ_1 to collect and how to allocate them between production of public good g_1 and rents appropriated r_1. The observation of tax collected and of public good by citizen (or the flow of utility coming from it) takes place at $t = 1.3$. At $t = 1.4$ an election is held, where the incumbent is confronted by a challenger politician whose type is unknown, but drawn independently by the Nature from the same set J and according to the same probability distribution as the incumbent's one. The challenger observes his own type. Knowing the politician's type probability distribution and having observed the public good produced, the citizen has to decide whether to reelect the incumbent or to vote him off in favour of the challenger. The second period comprises two stages only. At $t = 2.1$ the elected politician observes a new cost parameter θ which is i.i.d. with the probability distribution of the first period cost parameter and then has to decide again the amount of fiscal resources τ_2 to collect and how to allocate them between public good g_2 and rents r_2. At $t = 2.2$ the game ends.

Formally in every period, having collected the level of resources τ_t, the incumbent takes a (possibly mixed) strategy over $r_t \in A \equiv [0, \tau_t]$. However the citizen does not observe directly the level of rents appropriated: she observes instead the level of tax collected and of public good supplied. So I can describe equivalently the incumbent's strategyin terms of $(\tau_t, g_t) \in$

[13] The first period of the game goes from $t = 1.0$ to $t = 1.4$. The second period starts at $t = 2.1$.

$F \times G$ rather than $(\tau_t, r_t) \in F \times A$. A strategy for the incumbent has two components: the first describes a tax collection and public good production decision in the first period given the incumbent's type $j \in J$ and public good cost $\theta \in \Theta$. The second component specifies a tax collection and public good decision in the second period, should the incumbent gets reelected. Again this choice depends uniquely on (j, θ). A strategy for the challenger is a rule mapping from his type and public good cost to the second period level of taxation and production of public good: it determines a rent grabbing rule, should the challenger get elected and replace the incumbent in running the government.

Following the definition of a signaling game, I define the probability distribution function:

$$\sigma_p : J \times \Theta \rightarrow F \times G \tag{5}$$

I define $\sigma_p(g, \tau | j, \theta) \in [0, 1]$ as the probability that the type j, given the cost parameter θ, collects the amount of tax τ and produces the quantity g. To simplify notation I write $\sigma_p(g, \tau | j, \theta) = \sigma_{j,\theta}(g, \tau)$. With $\sigma_p(g, \tau)$ I indicate the mixed strategy profile taken by both types of politician, irrespective of the public good cost parameter.

A strategy for the citizen is defined to be a function mapping from the information the citizen has to the probability with which she will vote for the incumbent. The information the citizen has consists of her prior on the incumbent's type, the incumbent's first period record, and the prior on challenger's type.[14] So regarding the citizen's strategy, I define the following function:

$$\sigma_c : F \times G \rightarrow \{V, NV\} \tag{6}$$

where $\{V(ote), N(ot)V(ote)\}$ is the action space of the citizen. The citizen conditions her action on the strategy taken by the government i.e. (τ_1, g_1), the first period tax collected and quantity of public good. Eq.(6) defines the probability density function $\sigma_c(V | \tau_1, g_1) \in [0, 1]$ which maps from the first period taxation and public good quantity carried out by the incumbent government to the probability the citizen is going to reelect him. Again to simplify notation, I rewrite $\sigma_c(V | \tau_1, g_1)$ as $\sigma_c(\tau_1, g_1)$. When there is no fear of generating confusion, I will write simply σ_c.

To solve this game I employ the solution concept of Perfect Bayesian Equilibrium. It consists of a strategy for the incumbent politician, a strategy for the challenger and a strategy and beliefs for the citizen satisfying a number of properties. First, given the incumbent's strategy, citizen's beliefs are

[14] To economize on notation, the priors about incumbent and challenger types have been dropped in the definition of eq. (6).

consistent with it and are generated by Bayesian updating where possible, i.e. along the equilibrium path. Second, the citizen's strategy is consistent with her beliefs, and optimal given the strategies of the incumbent and of the challenger. Third, the incumbent's strategy is optimal given citizen's strategy and beliefs and challenger's strategy. Fourth, the challenger's strategy is optimal, given citizen's strategy and beliefs and incumbent's strategy.

3 Solving the Model

3.1 Second Period Behaviour of Politicians

In the second period, the only player called upon to move is the government, whether the old one or the newly elected. Since there is no continuation game and no need to signal (or disguise) his own type to be reelected, the second period dishonest incumbent has no incentive to restrain himself: he will collect the maximum quantity of fiscal resources $\tau_2 = T$, grab the maximum amount of rents $r_2 = T$ and produce no public good at all, i.e. $g_2 = 0$. As a result citizen's utility in the second period is $u_c = -T < 0$, when a dishonest incumbent in in charge.

On the other hand the honest incumbent will produce the optimal amount $g_2^*(\theta)$ depending on the cost parameter θ. More formally, the honest incumbent fully internalises the citizen's decision problem: the honest politician's interest is completely aligned with voter's one. Given his preferences, he will take the same decision the voter would if she could carry out the public good production by herself.

The programme the honest incumbent is solving is the following:

$$\begin{aligned} g^* &\in ArgMax\ H(g_2) - \tau_2 \\ s.t.\ \ \tau_2 &= \theta g_2 \end{aligned}$$

To solve the programme, substitute τ_2 accordingly in the expression to be maximised, take the first derivative with respect to g_2 and equate it to zero: the solution to the problem is that $g_2^*(\theta) = H_{g_2}^{-1}(\theta)$. Given the strict concavity of $H(g)$, from the theorem of the derivative of the inverse function, it follows that $g_2^*(\underline{\theta}) > g_2^*(\overline{\theta})$. From the budget constraint $\tau_2^*(\theta) = g_2^*(\theta)\theta$ is the optimal amount of tax collection, contingent on public good cost $\theta \in \left\{\underline{\theta}, \overline{\theta}\right\}$.

I write that $\underline{\tau}^* = \tau_t^*(\underline{\theta}) = g_t^*(\underline{\theta})\underline{\theta}$ and $\overline{\tau}^* = \tau_t^*\left(\overline{\theta}\right) = g_t^*(\overline{\theta})\overline{\theta}$, for any $t \in \{1, 2\}$. Notice that it is not possible to decide whether $\underline{\tau}^* \lesseqgtr \overline{\tau}^*$.To economise on notation it is useful to define the following: $\underline{g}^* \equiv g_t^*(\underline{\theta})$; $\overline{g}^* \equiv g_t^*(\overline{\theta})$ and $\underline{H}^* \equiv H\left(g_t^*(\underline{\theta})\right); \overline{H}^* = H\left(g_t^*(\overline{\theta})\right)$. Also notice that I assume $T \geqslant max\{\underline{\tau}^*, \overline{\tau}^*\}$. An important remark is that from the Envelope Theorem

it follows that $\overline{H}^* - \overline{\tau}^* < \underline{H}^* - \underline{\tau}^*$. Obviously, I assume that $\overline{H}^* - \overline{\tau}^* \geqslant 0$.[15] So, conditional on having an honest government, the citizen prefers to have a low cost to a high cost public good environment, since the former gives her a larger net utility.

Finally it is clear that the citizen prefers to have an honest incumbent in the second period. In fact, in the second period the honest incumbent will give the citizen a non-negative utility, while the dishonest will give her a negative utility equal to $-T$.

3.2 Citizen's First Period Strategy

Since citizen's second period utility depends exclusively upon incumbent's type, her optimal strategy in the first period is uniquely determined by her beliefs on politician's type. As already said, the only way for the citizen to infer the politician's type is to observe the first period incumbent's strategy (τ_1, g_1) and update her prior beliefs on the politician being honest. I denote with $\mu(j = h|\,(\tau_1, g_1)) = \mu_h\,(\tau_1, g_1)$ the citizen's updated beliefs. Remember that Nature draws an honest type with probability $Pr(j = h) = \eta$; consequently this represents citizen's prior on the type being honest.

I already said that the voter prefers to have an honest incumbent to a dishonest one in the second period. So if she finds out in the first period that the incumbent is honest, she will reelect him for the following term. However, if she realizes that the first period incumbent is dishonest, her optimal strategy is to vote him off and replace him with a challenger of unknown type. To see this, let us compute the citizen's expected utility given by a challenger of unknown type in period t, which I indicate with $u^e_{c,t} = \eta u_{c,t}(h) + (1-\eta)u_{c,t}(d)$, where $u_{c,t}(h)$ is the welfare accruing to the citizen in period t when the incumbent is honest and $u_{c,t}(d)$ is citizen's welfare with a dishonest incumbent. In particular:

$$\begin{aligned} u^e_{c,2} &= \eta u_{c,2}(h) + (1-\eta)u_{c,2}(d) \\ &= \eta\left[\rho(\overline{H}^* - \overline{\tau}^*) + (1-\rho)(\underline{H}^* - \underline{\tau}^*)\right] + (1-\eta)[\rho H\,(0) + (1-\rho)H\,(0) - T] \\ &= \eta\left[\rho(\overline{H}^* - \overline{\tau}^*) + (1-\rho)(\underline{H}^* - \underline{\tau}^*)\right] - (1-\eta)T \end{aligned}$$

Obviously this is larger than the utility $u_{c,2}(d) = -T < 0$ which the voter would receive in the second period by reelecting a dishonest incumbent. In fact:

$$u^e_{c,2} = \eta\left[\rho(\overline{H}^* - \overline{\tau}^*) + (1-\rho)(\underline{H}^* - \underline{\tau}^*)\right] - (1-\eta)T > -T = u_{c,2}(d).$$

By simplifing the expression, I obtain that:

$$\left[\rho(\overline{H}^* - \overline{\tau}^*) + (1-\rho)(\underline{H}^* - \underline{\tau}^*)\right] > -T$$

[15] If not there would not be any reason to carry out tax collection and public good production on part of government.

which is true since for any $\theta \in \Theta : H^* - \tau^* \geqslant 0$ and $-T < 0$.

Finally when the posterior beliefs are equal to the prior, i.e. $\mu_h(\tau_1, g_1) = \eta$, the citizen has not learnt anything new about the incumbent: her posterior belief regarding the probability of the incumbent being honest are equal to her prior, i.e. equal to η. If she has to appoint the challenger politician, she knows that the new politician would have an expected honesty equal to η: as a conclusion, in this case the voter is indifferent between reelecting the incumbent and appointing the challenger politician. Since she is indifferent, the citizen will randomise with probability σ_c^* and $1 - \sigma_c^*$ between electing the incumbent or not.

For clarity I can sum up citizen's optimal strategy in the following table:

$$\text{if } \mu_h(\tau_1, g_1) > \eta : \sigma_c^* = 1 \tag{7}$$

$$\text{if } \mu_h(\tau_1, g_1) < \eta : \sigma_c^* = 0 \tag{8}$$

$$\text{if } \mu_h(\tau_1, g_1) = \eta : \sigma_c^* \in [0, 1] \tag{9}$$

3.3 The Incumbent's First Period Behaviour

The honest incumbent's equilibrium strategy in the first period is the same as in the second. Again, contingent on the true public good cost, he produces the optimal public good quantity from the citizen's viewpoint. Formally: $g^* \equiv g^*(\theta)$, for any $\theta \in \Theta$. Obviously the optimal amount of tax collection is equal to $\tau^* = g^*(\theta)\theta$.

Since the honest incumbent plays in equilibrium with probability one only the strategies $(\overline{\tau}^*, \overline{g}^*)$ or $(\underline{\tau}^*, \underline{g}^*)$ and this is common knowledge among the players in the game, then the citizen can rationally attach a probability equal to zero to the honest type playing any strategy $(\widetilde{\tau}, \widetilde{g})$ different from the two above. In particular $\mu_h(T, 0) = 0$. From this it follows that the dishonest type never plays any strategy $(\widetilde{\tau}, \widetilde{g}) \notin \left\{(T, 0), (\overline{\tau}^*, \overline{g}^*), (\underline{\tau}^*, \underline{g}^*)\right\}$. In fact such a strategy $(\widetilde{\tau}, \widetilde{g})$ will give him a probability of reelection equal to zero, as playing the strategy $(T, 0)$ does, and a utility equal (at the most) to the entire tax revenues $\widetilde{\tau} < T$. This means that any strategy $(\widetilde{\tau}, \widetilde{g})$ will be strictly dominated by $(T, 0)$ and a rational player will never take it.

The interesting case is with the dishonest incumbent, whose interest is opposed to the citizen's one. While in the second period the bad incumbent takes the unrestricted amount of rents $r_2 = T$, in the first period he has to take into account the effect of his strategy on citizen's beliefs and equilibrium strategy. Therefore the dishonest incumbent faces a trade-off between two objectives: on one hand acting myopically, taking all the resources and being voted out; on the other hand, forgoing part of the rents so to signal himself as an honest type and being reelected in the second period.

Suppose the cost of public good is equal to $\overline{\theta}$. The bad incumbent has to decide between two strategies: i) act myopically, take the maximum amount of rent in the first period $r_1 = T$ and not be reelected; ii) raise $\overline{\tau}^*$, take zero

rents in the first period, produce the quantity $\overline{g}^*$ and get reelected in the second period with probability $\sigma_c^*(\overline{\tau}^*, \overline{g}^*)$. Given $\delta \in (0,1)$, $T + 0 \cdot \delta T > 0 + \sigma_c^*(\overline{\tau}^*, \overline{g}^*)\delta T$ for any $\sigma_c^*(\overline{\tau}^*, \overline{g}^*)$: it follows that the bad incumbent will always act myopically and play the strategy $(T, 0)$ with probability one when the cost of public good is high. In fact a rational player will never play with some positive probability a strictly dominated action. Notice that the bad incumbent cannot produce a quantity $\underline{g}^*$ when the cost is $\overline{\theta}$: collecting $\underline{\tau}^*$ (which amounts to announcing that the cost is $\underline{\theta}$) is insufficient to produce $\underline{g}^*$ when the cost is $\overline{\theta}$, as $\underline{\tau}^* = \underline{g}^*\underline{\theta} < \underline{g}^*\overline{\theta}$. I can sum up the above findings in the following:

Lemma 1 *When the cost of public good is high, the honest incumbent raises the amount of taxes $\overline{\tau}^*$ and delivers $\overline{g}^*$. The dishonest incumbent always plays the myopic strategy.*

From the previous Lemma it follows immediately that:

Corollary 2 *When the cost of public good is high the dishonest incumbent never plays $(\underline{\tau}^*, \underline{g}^*)$ or $(\overline{\tau}^*, \overline{g}^*)$.*

Now suppose that the cost of public good is $\underline{\theta}$. In this case recall that the honest incumbent raises $\underline{\tau}^*$ and produces the optimal amount $\underline{g}^*$. The bad incumbent has three strategies he can take: i) take zero rents in the first period, produce the quantity $\underline{g}^*$and be reelected in the second period with probability $\sigma_c^*(\underline{\tau}^*, \underline{g}^*)$, where he will take the maximum amount of rents $r_2 = T$; ii) act myopically, take the maximum amount of rent in the first period $r_1 = T$ and not be reelected; iii) collect $\overline{\tau}^*$ and produce a quantity of public good $\overline{g}^*$, which allows him to be reelected in the second period with probability $\sigma_c^*(\overline{\tau}^*, \overline{g}^*)$, and then grab $r_2 = T$. Notice that with this last strategy the bad politician in the first period grabs $r_1 = \overline{g}_1^*(\overline{\theta} - \underline{\theta}) = \overline{g}_1^*\Delta\theta$.

Comparing the first and the second strategy, it is straightforward to see that given $\delta \in (0,1)$, $0 + \sigma_c^*(\underline{\tau}^*, \underline{g}^*)\delta T < T + 0 \cdot \delta T$ for any $\sigma_c^*(\underline{\tau}^*, \underline{g}^*)$. From this it follows immediately that the first strategy is strictly dominated by the second and a rational player will never take it. So the bad incumbent decision is restricted to the second and the third strategy. I can then establish the following Lemma:

Lemma 3 *When the cost of public good is low, the honest incumbent raises the amount of taxes $\underline{\tau}^*$ and delivers $\underline{g}^*$. The dishonest incumbent plays the myopic strategy with some positive probability iff the following condition holds:*

$$\begin{aligned} T &\geqslant \overline{g}^*\Delta\theta + \sigma_c^*(\overline{\tau}^*, \overline{g}^*)\delta T \\ \overline{g}^*\Delta\theta &\leqslant (1 - \delta\sigma_c^*(\overline{\tau}^*, \overline{g}^*))T \end{aligned} \tag{10}$$

If the above does not hold he will raise the quantity $\overline{\tau}^*$ and produce the amount $\overline{g}^*$, while grabbing rents equal to $\overline{g}^*\Delta\theta$. In particular if the eq.(10) holds with strict inequality, then $\sigma^*_{d,\underline{\theta}}(T,0)=1$.

Again it is useful to state the following finding which is a direct consequence of the above Lemma:

Corollary 4 *When the cost of public good is low the dishonest incumbent never plays $(\underline{\tau}^*,\underline{g}^*)$.*

Finally the following follows directly from the honest incumbent preferences:

Lemma 5 *The honest incumbent never grabs any collected fiscal resources as rents. Formally $\sigma^*_h(T,0)=0$.*

3.4 Citizen's Equilibrium Strategy

Given the incumbent's equilibrium strategy I can now compute citizen's equilibrium beliefs. Since the honest incumbent always delivers the optimal quantity of public good once he has collected resources, from Lemma 5 it is easy to establish that $\mu_h(T,0)=0$. Moreover from Corollary 2 and Corollary 4 I can conclude that $\mu_h(\underline{\tau}^*,\underline{g}^*)=1$. The interesting case is when the strategy $(\overline{\tau}^*,\overline{g}^*)$ is observed in equilibrium. Let us compute the citizen's equilibrium beliefs in this case:

$$\begin{aligned}
\mu_h(\overline{\tau}^*,\overline{g}^*) &= \frac{\sigma^*_{h,\overline{\theta}}(\overline{\tau}^*,\overline{g}^*)Pr(h)Pr(\overline{\theta})}{\sigma^*_{h,\overline{\theta}}(\overline{\tau}^*,\overline{g}^*)Pr(h)Pr(\overline{\theta})+\sigma^*_{d,\overline{\theta}}(\overline{\tau}^*,\overline{g}^*)Pr(d)Pr(\overline{\theta})+\sigma^*_{d,\underline{\theta}}(\overline{\tau}^*,\overline{g}^*)Pr(d)Pr(\underline{\theta})} \\
&= \frac{\eta\rho}{\eta\rho+0+\sigma^*_{d,\underline{\theta}}(1-\eta)(1-\rho)} = \\
&= \frac{\eta\rho}{\eta\rho+\sigma^*_{d,\underline{\theta}}(1-\eta)(1-\rho)}
\end{aligned}$$

In order for the incumbent to be reelected with some probability, the posterior has to be larger than the prior, i.e. the following condition has to hold:

$$\mu_h(\overline{\tau}^*,\overline{g}^*)=\frac{\eta\rho}{\eta\rho+\sigma^*_{d,\underline{\theta}}(1-\eta)(1-\rho)}\geqslant\eta \tag{11}$$

Building on all the previous results, I can now state and prove the following Lemmata:

Lemma 6 *Upon receiving a low public good cost, the dishonest incumbent always plays the myopic strategy with certainty iff $\delta<\delta^*=\frac{T-\overline{g}^*\Delta\theta}{T}$.*

Proof. The Proof follows immediately from Lemma 3 when eq. (10) holds with strict inequality. ■

Lemma 7 *Upon receiving a low public good cost, the dishonest incumbent collects* $\overline{\tau}^*$*, delivers the public good* $\overline{g}^*$ *and is reelected with some positive probability* σ_c^* *iff* $\rho \geqslant 1/2$ *and* $\delta > \delta^* = \frac{T-\overline{g}^*\Delta\theta}{T}$.

Proof. First consider the case with $\rho > 1/2$. In order to show that $\sigma^*_{d,\underline{\theta}}(\overline{\tau}^*, \overline{g}^*) = 1, \sigma_c^*\ (\overline{\tau}^*, \overline{g}^*) = 1, \mu_h(\overline{\tau}^*, \overline{g}^*) > \eta$ is an equilibrium, I proceed in the usual way. Fix the equilibrium beliefs $\mu_h(\overline{\tau}^*, \overline{g}^*) > \eta$ and derive the equilibrium strategy consistent with them. Given $\mu_h(\overline{\tau}^*, \overline{g}^*) > \eta$, from eq. (7) I know that $\sigma_c^*(\overline{\tau}^*, \overline{g}^*) = 1$. From Lemma 3 I know that when $\overline{g}^*\Delta\theta > (1-\delta)T$, then $\sigma^*_{d,\underline{\theta}}(\overline{\tau}^*, \overline{g}^*) = 1$. So $\sigma^*_{d,\underline{\theta}}(\overline{\tau}^*, \overline{g}^*) = 1$ is an equilibrium strategy for the incumbent given $\sigma_c^*(\overline{\tau}^*, \overline{g}^*) = 1$. Notice that this is true if and only if $\delta > 1 - \frac{\overline{g}^*\Delta\theta}{T}$. Moreover given the equilibrium strategies, from 11 it is easy to establish that $\mu_h(\overline{\tau}^*, \overline{g}^*) > \eta$ iff $\rho > 1/2$.

Next consider the case with $\rho = 1/2$. I want to show the existence of a continuum of equilibria $\sigma^*_{d,\underline{\theta}}(\overline{\tau}^*, \overline{g}^*) = 1, \sigma_c^*\ (\overline{\tau}^*, \overline{g}^*) \geqslant \frac{T-\overline{g}^*\Delta\theta}{\delta T}, \mu_h(\overline{\tau}^*, \overline{g}^*) = \eta$. Given the equilibrium beliefs $\mu_h(\overline{\tau}^*, \overline{g}^*) = \eta$, then $\sigma^*_{d,\underline{\theta}}(\overline{\tau}^*, \overline{g}^*) = 1$ iff $\rho = 1/2$. Given equilibrium beliefs and incumbent equilibrium strategy, the citizen randomizes between reelecting and not reelecting the incumbent with such a probability that: $\overline{g}^*\Delta\theta + \sigma_c^*\delta T \geqslant T$, i.e. $\sigma_c^*\ (\overline{\tau}^*, \overline{g}^*) \geqslant \frac{T-\overline{g}^*\Delta\theta}{\delta T}$. Notice that this is true if and only if $\delta \geqslant \delta^*$.

Finally given the equilibrium strategies, from (11) it is easy to establish that $\mu_h(\overline{\tau}^*, \overline{g}^*) = \eta$ iff $\rho = 1/2$. ■

So in the previous equilibrium strategy, upon receiving a public good cost $\theta = \underline{\theta}$, the dishonest incumbent acts as an honest one: he taxes the citizens with the tax $\overline{\tau}^*$, delivers the public good $\overline{g}^*$ and is reelected with some positive probability when both δ and ρ are large enough. In particular when $\rho = 1/2$ the citizen, conditional on observing the strategy $(\overline{\tau}^*, \overline{g}^*)$, reelects the incumbent with (a continuum of) probability $\sigma_c^*\ (\overline{\tau}^*, \overline{g}^*) \geqslant \frac{T-\overline{g}^*\Delta\theta}{\delta T}$.

Together with the previous equilibrium strategy, it is also possible to construct an equilibrium in mixed strategies, where the bad incumbent randomises between $(\overline{\tau}^*, \overline{g}^*)$ and $(T, 0)$ with probability respectively $\sigma^*_{d,\underline{\theta}}$ and $1 - \sigma^*_{d,\underline{\theta}}$ and, conditional on observing $(\overline{\tau}^*, \overline{g}^*)$, the citizen randomises between voting and not voting with probability σ_c^* and $1- \sigma_c^*$.

Lemma 8 *Upon receiving a low public good cost, the dishonest incumbent mixes with probability* $\sigma^*_{d,\underline{\theta}}\ (\overline{\tau}^*, \overline{g}^*) = \frac{\rho}{1-\rho} < 1$ *and* $1 - \sigma^*_{d,\underline{\theta}} = \frac{1-2\rho}{1-\rho}$ *between collecting* $\overline{\tau}^*$ *and delivering the public good* $\overline{g}^*$*, and collecting* T *and delivering no public good, iff* $\rho < 1/2$ *and* $\delta > \delta^* = 1 - \frac{\overline{g}^*\Delta\theta}{T}$*; conditional on producing a positive amount of public good, the dishonest incumbent is reelected with probability* $\sigma_c^* = \frac{T-\overline{g}^*\Delta\theta}{\delta T} < 1$*. There exists also a continuum of equilibrium strategies with* $\sigma^*_{d,\underline{\theta}}\ (\overline{\tau}^*, \overline{g}^*) \in [0, \min\{\frac{\rho}{1-\rho}, 1\}]$ *and the citizen*

reelecting the incumbent with certainty if and only if $\delta = \delta^*$ *for any value of* $\rho \in (0,1)$.

Proof. First consider the case $\delta > \delta^* = 1 - \frac{\overline{g}^* \Delta\theta}{T}$. I want to show the existence of a unique equilibrium in strictly mixed strategies $\sigma^*_{d,\underline{\theta}} = \frac{\rho}{1-\rho} \in (0,1)$, $\sigma^*_c(\overline{\tau}^*, \overline{g}^*) = \frac{T - \overline{g}^* \Delta\theta}{\delta T} \in (0,1)$, $\mu_h(\overline{\tau}^*, \overline{g}^*) = \eta$. From eq. (9) I know that the citizen randomises between the two actions when $\mu_h(\overline{\tau}^*, \overline{g}^*) = \eta$. It turns out that $\mu_h(\overline{\tau}^*, \overline{g}^*) = \eta$ if and only if $\sigma^*_{d,\underline{\theta}} = \frac{\rho}{1-\rho}$, where $0 < \frac{\rho}{1-\rho} < 1$ iff $\rho \in (0, 1/2)$. In order for the dishonest incumbent to mix between myopic and not-myopic I know that eq. (10) has to hold with equality, i.e. $\overline{g}^* \Delta\theta = T - \delta \sigma^*_c(\overline{\tau}^*, \overline{g}^*) T$, which is true iff $\sigma^*_c(\overline{\tau}^*, \overline{g}^*) = \frac{T - \overline{g}^* \Delta\theta}{\delta T}$. Finally notice that $\frac{T - \overline{g}^* \Delta\theta}{\delta T} < 1$ iff $\delta > \delta^* = 1 - \frac{\overline{g}^* \Delta\theta}{T}$.

Now consider the case when $\delta = \delta^*$. I want to show the existence of a continuum of equilibrium strategies with $\sigma^*_{d,\underline{\theta}}(\overline{\tau}^*, \overline{g}^*) \in [0, min\{\frac{\rho}{1-\rho}, 1\}]$, $\sigma^*_c(\overline{\tau}^*, \overline{g}^*) = 1$, $\mu_h(\overline{\tau}^*, \overline{g}^*) \geqslant \eta$. Since $\mu_h(\overline{\tau}^*, \overline{g}^*) \geqslant \eta$, then it has to be that $\sigma^*_{d,\underline{\theta}}(\overline{\tau}^*, \overline{g}^*) \leqslant min\{\frac{\rho}{1-\rho}, 1\}$, for any value of $\rho \in (0,1)$. Finally for the dishonest incumbent to play a mixed strategy it has to be that $\overline{g}^* \Delta\theta = T - \delta \sigma^*_c(\overline{\tau}^*, \overline{g}^*) T$, which is true, given that $\sigma^*_c(\overline{\tau}^*, \overline{g}^*) = 1$, iff $\delta = \delta^*$. Notice that given equilibrium beliefs $\mu_h(\overline{\tau}^*, \overline{g}^*) \geqslant \eta$, then equilibrium strategy $\sigma^*_c(\overline{\tau}^*, \overline{g}^*) = 1$ is consistent with them. ■

Before enunciating the proposition stating the PBE of this political game, I need to define what I mean with separating, pooling and hybrid equilibria of this game. I define a separating equilibrium in pure strategies when the two politician types take two different strategies (τ, g) and reveal themselves in equilibrium to the voter; observing the two strategies, the voter will be certain with probability equal to one that each strategy is taken by only one of the two types, h or d. In turn she will reelect the honest type and vote-off the dishonest incumbent. It is useful to repeat that the honest type never takes the strategy $(T, 0)$, from Lemma 5 and the dishonest type never takes $(\underline{\tau}^*, \underline{g}^*)$ from 4.

I define a pooling equilibrium, when the two politician types take the same strategy (τ, g) and so do not reveal their types in equilibrium to the voter. Observing the only strategy along the equilibrium path and updating her beliefs, the citizen will vote according to the rules specified in eqq. (7) - (9). Again let us stress that $(\overline{\tau}^*, \overline{g}^*)$ is the only common strategy the two politicians h and d can take.

Finally a hybrid equilibrium is an equilibrium where one type takes an action with probability one and the other randomises between two actions, one of which similar to the other type. After updating her beliefs, conditional on observing the similar action, the citizen randomises between reelecting and not the politician taking this action. Due to (9) this is true iff $\mu_h(\tau^*, g^*) = \eta$. Following the discussion above, it is obvious that in this hybrid equilibrium the action (τ^*, g^*) taken by both types will be $(\overline{\tau}^*, \overline{g}^*)$, while the other action will be $(T, 0)$.

I am ready now to state the following Proposition:

Proposition 9 *The honest incumbent always produces and taxes optimally, for any cost of the public good. When the dishonest incumbent receives a high cost parameter a unique separating equilibrium exists with the dishonest incumbent taxing the citizen with an amount T and taking maximal rents, and the citizen voting off the dishonest incumbent. When the dishonest incumbent receives a low cost parameter a unique separating equilibrium $\sigma^*_{d,\underline{\theta}}(T,0)=1$ and $\sigma^*_{h,\overline{\theta}}(\overline{\tau}^*,\overline{g}^*)=1$ exists iff $\delta<1-\frac{\overline{g}^*\Delta\theta}{T}$; a unique pooling equilibrium $\sigma^*_{d,\underline{\theta}}(\overline{\tau}^*,\overline{g}^*)=\sigma^*_{h,\overline{\theta}}(\overline{\tau}^*,\overline{g}^*)=1$ and $\sigma^*_c(\overline{\tau}^*,\overline{g}^*)=1$ exists iff $\delta>1-\frac{\overline{g}^*\Delta\theta}{T}$ and $\rho>1/2$; a continuum of pooling equilibria $\sigma^*_{d,\underline{\theta}}(\overline{\tau}^*,\overline{g}^*)=1$, $\sigma^*_c(\overline{\tau}^*,\overline{g}^*)\geqslant\frac{T-\overline{g}^*\Delta\theta}{\delta T}$ exists iff $\delta>1-\frac{\overline{g}^*\Delta\theta}{T}$ and $\rho=1/2$. Finally a unique hybrid equilibrium $\sigma^*_{h,\overline{\theta}}(\overline{\tau}^*,\overline{g}^*)=1$ and $\sigma^*_{d,\underline{\theta}}(\overline{\tau}^*,\overline{g}^*)+\sigma^*_{d,\underline{\theta}}(T,0)=1,\sigma^*_{d,\underline{\theta}}(\overline{\tau}^*,\overline{g}^*)=\frac{\rho}{1-\rho}$ and the citizen reelecting the incumbent with probability $\sigma^*_c(\overline{\tau}^*,\overline{g}^*)=\frac{T-\overline{g}^*\Delta\theta}{\delta T}$ exists iff $\delta>1-\frac{\overline{g}^*\Delta\theta}{T}$ and $\rho<1/2$. Moreover there exists a continuum of hybrid equilibria with the dishonest incumbent mixing between not myopic action and myopic one with probability $\sigma^*_{d,\underline{\theta}}(\overline{\tau}^*,\overline{g}^*)\leqslant min\{\frac{\rho}{1-\rho},1\}$ and the citizen reelecting for sure $\sigma^*_c(\overline{\tau}^*,\overline{g}^*)=1$ iff $\delta=1-\frac{\overline{g}^*\Delta\theta}{T}$.*

Proof. First I establish the first part of the Proposition. From Lemma 1 when the cost of the public good is high for the dishonest incumbent, he plays the myopic strategy $(T,0)$. From Lemma 5 we know that the honest politician never plays this strategy. So a separating PBE is the outcome. The same happens when the honest incumbent receives a low public good cost $\underline{\theta}$. His equilibrium strategy is to play $(\underline{\tau}^*,\underline{g}^*)$ with probability one. On the other hand from Corollaries 2 and 4 we know that the dishonest incumbent never plays this strategy, for any cost parameter θ. So again a separating equilibrium is the outcome. The only possibility left is with the types h with cost $\overline{\theta}$ and the type d with cost $\underline{\theta}$. We know that upon receiving the cost parameter $\overline{\theta}$, the honest type plays the strategy $(\overline{\tau}^*,\overline{g}^*)$. From Lemma 3 the type d with cost $\underline{\theta}$ plays the myopic strategy iff $\delta<1-\frac{\overline{g}^*\Delta\theta}{T}$. So in this case a separating PBE is the outcome. On the other hand from Lemma 7 we know that the type d with cost $\underline{\theta}$ plays the strategy $(\overline{\tau}^*,\overline{g}^*)$ with probability one and is reelected with certainty iff $\rho>1/2$ and $\delta>1-\frac{\overline{g}^*\Delta\theta}{T}$. So in this case the outcome is a pooling PBE. Moreover from the proof of the same Lemma 7 we know that the type d with low cost plays with certainty the strategy $(\overline{\tau}^*,\overline{g}^*)$ and the citizen mixes between reelecting and not reelecting the incumbent with a continuum of probability $\sigma^*_c\ (\overline{\tau}^*,\overline{g}^*)\geqslant\frac{T-\overline{g}^*\Delta\theta}{\delta T}$ iff $\delta>1-\frac{\overline{g}^*\Delta\theta}{T}$ and $\rho=1/2$. So for this set of parameters a continuum of pooling equilibrium exists.

To establish the part relative to the hybrid equilibrium, see that from Lemma 8 we know that iff $\rho<1/2$ and $\delta>1-\frac{\overline{g}^*\Delta\theta}{T}$ the type d with

cost $\underline{\theta}$ mixes between the actions $(\overline{\tau}^*, \overline{g}^*)$ and $(T, 0)$ and is reelected with probability equal to $\sigma_c^* = \frac{T-\overline{g}^*\Delta\theta}{\delta T}$. Given that the honest type with large cost plays the strategy $(\overline{\tau}^*, \overline{g}^*)$ with certainty, we have a hybrid equilibrium. Finally from the same Lemma 8 we can see given that the honest plays the strategy $(\overline{\tau}^*, \overline{g}^*)$ a continuum of hybrid equilibria exists with the dishonest mixing between strategy $(\overline{\tau}^*, \overline{g}^*)$ and myopic with a continuum of probability $\sigma_{d,\underline{\theta}}^*(\overline{\tau}^*, \overline{g}^*) \leqslant min\{\frac{\rho}{1-\rho}, 1\}$and the citizen reelecting the incumbent with certainty. ■

From the Proposition above it is possible to see that the existence of elections works as an incentive device for the dishonest incumbent. While the honest politician always acts in the (optimal) interest of the citizen, the dishonest incumbent can be induced to not fully appropriate fiscal resources thanks to the existence of career concerns in the form of the possibility of reelection. In fact, in order to persuade the citizen he is honest, he might end up producing the quantity $\overline{g}^*$ when the true cost of production is $\underline{\theta}$. This happens when two conditions are given: first, the dishonest politician values the future highly enough. In this case he is willing to forgo part of the appropriable rents in the first period in order to grab all the maximum rents T in the following one. This equilibrium strategy is more likely to be the outcome when the ratio $\frac{\overline{g}^*\Delta\theta}{T}$ is large, that is when the rents taken in the present are a large fraction of the total amount of rents available for grabbing. In turn this is true when the difference $\Delta\theta$ between the public good cost parameters is large. The second condition for a pooling equilibrium in pure strategy to be the PBE is if and only if the probability that the cost of public good is large is greater or equal to $1/2$. In fact, if this is common knowledge and the dishonest incumbent's equilibrium strategy is $(\overline{g}^*, \overline{\tau}^*)$, then it is more likely, from the voter's point of view, that the incumbent is of type h. In this case mimicking the honest's behaviour is an optimal strategy for the dishonest type.

Moreover, when the time discount is still large enough, but the probability that the public good cost is large is exactly equal to $1/2$, then a continuum of pooling equilibria exists, with the dishonest incumbent not distinguishing himself from the honest one and taking the strategy $(\overline{g}^*, \overline{\tau}^*)$ with certainty. Interestingly, not withstanding the pure strategy on part of both incumbent's type, the citizen mixes between reelection and not relection with a continuum of probability $\sigma_c^*\ (\overline{\tau}^*, \overline{g}^*) \geqslant \frac{T-\overline{g}^*\Delta\theta}{\delta T}$.

On the other hand when the probability that the cost of public good is large is less than $1/2$, a unique hybrid PBE is the equilibrium outcome. Knowing that the probability of a high public good cost is less than half, upon observing a $(\overline{g}^*, \overline{\tau}^*)$ strategy the citizen will find it optimal to randomize between reelecting the incumbent and not. In fact she will be less sure of facing an honest incumbent. In turn, the dishonest incumbent will find optimal to mix between the $(\overline{g}^*, \overline{\tau}^*)$ action and the myopic one.

Continuing the analysis, when the time discount parameter is exactly

$\delta = 1 - \frac{\overline{g}^* \Delta\theta}{T}$ a continuum of hybrid equilibria exists. In this case the dishonest incumbent mixes between $(\overline{g}^*, \overline{\tau}^*)$ action and the myopic one with a continuum of probabilities $\sigma^*_{d,\underline{\theta}} \in [0, \min\{\frac{\rho}{1-\rho}, 1\}]$ iff $\rho \leqslant \frac{1}{2}$ and $\sigma^*_{d,\underline{\theta}} \in [0, 1]$ iff $\rho > \frac{1}{2}$. Interestingly, whatever is the mixing probability between not-myopic and myopic action, the citizen is willing to reelect the incumbent with certainty given that her posterior beliefs are strictly larger or at the most equal to her prior on the incumbent's type. Notice that even though the equilibrium outcome is not unique for this space of parameters, all the outcomes belong to the same class of equilibria.

Finally a separating equilibrium is the only outcome when the present is more important than the future for the dishonest incumbent. This happens when only a small proportion of the total rents can be grabbed by the dishonest incumbent to mimic the honest one; in turn this is true when the difference $\Delta\theta$ is small. If one interprets the uncertainty of the economic environment as synthesized through the difference in the public good costs, then one can notice that the different politician's quality emerges more promptly when the "economic" environment does not show a large difference. It is when the conditions in the underlying economy are very different that the dishonest politician has the possibility of fooling the citizen and be reelected.

As a conclusion we have seen that the prospect of reelection can act as a "carrot" for the dishonest politician i.e. as a *disciplining* device: by giving him some rents now and the possibility of grabbing more rents in the future should he be reelected, elections work in such a way to improve citizen's welfare with respect to a situation when they are not available. In this latter case, in fact, the dishonest incumbent would misbehave and take all the available rents in any period, in the current as in the next one. So one can conclude that the existence of career concerns contributes to improving citizen's welfare. Of course this works only if there is some differentiation in the politicians' quality: in particular, it is necessary that together with the dishonest politicians, honest politicians also exist.

However elections work also as a "stick", i.e. as a *selecting* device: when the dishonest politician reveals himself as such, then it is optimal for the citizen not to reelect him and replace him with a challenger of expected honesty equal to η.

In the next section I derive the citizen's welfare for the equilibria of the game above. This will enable us to highlight the effect on citizen's welfare of the existence of career concerns for politicians. Moreover I will be able to emphasize the existence of a conflict of interest between citizen and dishonest incumbent which cannot be resolved unless another player in this political game is introduced: media.

4 Welfare Analysis of the Game

4.1 Citizen's Welfare and the Conflict between Politician and Citizen

In the previous Section I highlighted that there exists a trade off between selecting politicians and disciplining them. When the *disciplining effect* is at work, the dishonest incumbent does not separate from the honest politician but mimics him by producing a quantity of public good equal to $\overline{g}^*$. Obviously this represents a first-period improvement with respect to the case of the dishonest politician revealing himself: in fact thanks to the disciplining effect the citizen enjoys a positive utility in the first period. However, the drawback of this it is that by retaining a bad incumbent in charge of the office, the citizen will experience a negative utility in the second period.

If the dishonest incumbent reveals himself as such in the first period it is better for the citizen to send him off, substitute with the challenger of unkown type and enjoy a positive expected utility in the second period. This diverse mechanism functions when the *selecting effect* is in play: in the first period the citizen loses out since she receives a negative utility; however she gains in the second, thanks to the replacement of the dishonest incumbent with a challenger delivering a higher expected utility.[16]

To assess the balance between these two effects, I perform now a welfare analysis of the equilibria of the game in Proposition 9.

In this scenario if she wants to decide her voting strategy, the citizen can rely on the observed policies only. Remember that I have defined the expected utility the citizen enjoys in every period as $u^e_{c,t}$. Since the citizen's utility does not depend on the time period, but only on the parameters j and θ, I simply replace $u^e_{c,t}$ with $u^e_c = \eta u_c(h) + (1-\eta)u_c(d)$.

The expected welfare of the individual is the following:

$$\begin{aligned}
EU(\sigma^*_{d,\underline{\theta}}; \sigma^*_c) = \eta\,(1-\rho)\,[(\underline{H}^* - \underline{\tau}^*) + \delta u_c(h)] + \\
+\eta\rho[\left(\overline{H}^* - \overline{\tau}^*\right) + \delta(\sigma^*_c u_c(h) + (1-\sigma^*_c)\,(\eta u_c(h) + (1-\eta)\,u_c\,(d)))] + \\
+\,(1-\eta)\,\rho[u_c\,(d) + \delta(\eta u_c(h) + (1-\eta)\,u_c\,(d))] + \\
+\,(1-\eta)\,(1-\rho)\,\sigma^*_{d,\underline{\theta}}\left[\left(\overline{H}^* - \overline{\tau}^*\right) + \sigma^*_c \delta u_c\,(d) + \delta\,(1-\sigma^*_c)\,(\eta u_c(h) + (1-\eta)\,u_c\,(d))\right] + \\
+\,(1-\eta)\,(1-\rho)\left(1-\sigma^*_{d,\underline{\theta}}\right)[u_c\,(d) + \delta\,(\eta u_c(h) + (1-\eta)\,u_c\,(d))] \qquad (12)
\end{aligned}$$

It is possible to rewrite the above expression in the following and more

[16] Of course when a hybrid equilibrium is the equilibrium outcome of the game described in the previous section, there is also a mixed effect, i.e. a convex combination between *selecting* and *disciplining* effect, given that the dishonest incumbent with a low cost randomizes between producing a positive quantity $\overline{g}$ and reaping all the fiscal resources.

compact way:

$$\begin{aligned} EU(\sigma^*_{d,\underline{\theta}}, \sigma^*_c) &= (1+\delta)[\eta u_c(h) + (1-\eta)u_c(d)] + \\ &+(1-\eta)(1-\rho)\sigma^*_{d,\underline{\theta}}[\overline{H}^* - \overline{\tau}^* - u_c(d)] + \\ &+\eta(1-\eta)\delta(1-(1-\rho)\sigma^*_{d,\underline{\theta}}\sigma^*_c - \rho\,(1-\sigma^*_c))[u_c(h) - u_c(d)] \end{aligned} \tag{13}$$

Following (Besley and Smart, 2007) it is useful to distinguish in eq. (13) the following three terms to highlight the different effects that elections have on politician's equilibrium strategy and then on citizen's expected utility:

1. The term $(1+\delta)[\eta u_c(h)+(1-\eta)u_c(d)]$ is the welfare that would accrue to the citizen if elections were not an available institutional device and politicians were replaced with certainty at the end of each term;

2. The term $(1-\eta)(1-\rho)\sigma^*_{d,\underline{\theta}}[\overline{H}^* - \overline{\tau}^* - u_c(d)]$ is the *disciplining term*, i.e. the term indicating the increased welfare the citizen receives when the dishonest politician mimics the honest type's behaviour and produces the optimal amount of public good $\overline{g}^*$ while reaping rents equal to $\overline{g}^*\Delta\theta$;

3. Finally the term $\eta(1-\eta)\delta(1-(1-\rho)\sigma^*_{d,\underline{\theta}}\sigma^*_c - \rho\,(1-\sigma^*_c))[u_c(h)-u_c(d)]$ represents the *selecting term,* i.e. the term denoting the additional welfare the citizen gets when the dishonest type is discovered, voted off and replaced with a challenger of unknown honesty.

From the expression for the expected welfare, it is interesting to notice in the *selecting term* the expression $\eta(1-\eta)\delta\rho\,(1-\sigma^*_c))[u_c(h)-u_c(d)]$. This represents the cost that the citizen bears when in a hybrid equilibrium she randomizes between reelecting and not relecting the honest incumbent who has received the cost $\theta = \overline{\theta}$ and plays the strategy $(\overline{g}, \overline{\tau})$ with certainty. In this case the citizen makes a "mistake" as she is not reelecting the incumbent she would like to: the welfare "cost" of this error is exactly equal to $\eta(1-\eta)\delta\rho\,(1-\sigma^*_c))[u_c(h)-u_c(d)]$. The cost of another "mistake" in the selection of the right incumbent is expressed by the term $\eta(1-\eta)\delta(1-\rho)\sigma^*_{d,\underline{\theta}}\sigma^*_c[u_c(h)-u_c(d)]$: this represents the reduction in expected utility the citizen suffers when she reelects with probability σ^*_c the dishonest incumbent who has received the cost $\theta = \underline{\theta}$ with probability $(1-\rho)$ and plays the strategy $(\overline{g}, \overline{\tau})$ with probability $\sigma^*_{d,\underline{\theta}}$.

In order to evaluate which is the best strategic situation from the citizen's point of view, one needs to compare the welfare accruing to citizen in the different equilibrium situations described in Proposition 9. When a pooling equilibrium in pure strategy $\sigma^*_{h,\overline{\theta}}(\overline{g}, \overline{\tau}) = \sigma^*_{d,\underline{\theta}}(\overline{g}, \overline{\tau}) = 1$ and $\sigma^*_c = 1$ is the outcome then citizen's welfare is equal to:

$$\begin{aligned} EU^{Pool} &= EU(\sigma^*_{d,\underline{\theta}} = 1, \sigma^*_c = 1) = (1+\delta)[\eta u_c(h) + (1-\eta)u_c(d)] + \\ &+(1-\eta)(1-\rho)[\overline{H}^* - \overline{\tau}^* - u_c(d)] + \eta(1-\eta)\delta\rho[u_c(h) - u_c(d)] \end{aligned}$$

On the other hand, when a separating equilibrium is the outcome, the citizen's utility is equal to:

$$\begin{aligned} EU^{Sep} &= EU(\sigma^*_{d,\underline{\theta}} = 0, \sigma^*_c = 1) = \\ &= (1+\delta)[\eta u_c(h) + (1-\eta)u_c(d)] + \eta(1-\eta)\delta[u_c(h) - u_c(d)] \end{aligned}$$

Finally, when a hybrid equilibrium $\sigma^*_{h,\overline{\theta}}(\overline{g}, \overline{\tau}) = 1$, $\sigma^*_{d,\underline{\theta}}(\overline{g}, \overline{\tau}) = \frac{\rho}{1-\rho}$ and $\sigma^*_c = \frac{T - \overline{g}^* \Delta\theta}{\delta T}$ is the equilibrium outcome, then the expected welfare is equal to:

$$EU^{Hybr} =$$

$$= EU(\sigma^*_{d,\underline{\theta}} = \frac{\rho}{1-\rho}; \sigma^*_c = \frac{T - \overline{g}^* \Delta\theta}{\delta T}) =$$

$$= (1+\delta)[\eta u_c(h) + (1-\eta)u_c(d)] + (1-\eta)\rho[\overline{H}^* - \overline{\tau}^* - u_c(d)] + \eta(1-\eta)\delta(1-\rho)[u_c(h) - u_c(d)]$$

I can now continue my analysis and rank the different levels of expected utility the citizen receives depending on the various equilibrium outcomes situation.

With some simple algebra it is easy to verify that $EU^{Sep} \geqslant EU^{Pool}$, iff $\eta(1-\eta)\delta[u_c(h) - u_c(d)] \geqslant (1-\eta)(1-\rho)[\overline{H}^* - \overline{\tau}^* - u_c(d)] + \eta(1-\eta)\delta\rho[u_c(h) - u_c(d)]$. This is true if and only if the following condition holds:

$$\delta \geqslant \delta^{citizen} = \frac{1}{\eta} \frac{\overline{H}^* - \overline{\tau}^* - u_c(d)}{u_c(h) - u_c(d)} \tag{14}$$

On the other hand, $EU^{Hybr} \geqslant EU^{Pool}$ iff $(1-\eta)\rho[\overline{H}^* - \overline{\tau}^* - u_c(d)] + \delta\eta(1-\eta)(1-\rho)[u_c(h) - u_c(d)] \geqslant (1-\eta)(1-\rho)[\overline{H}^* - \overline{\tau}^* - u_c(d)] + \delta\eta(1-\eta)\rho[u_c(h) - u_c(d)]$. This holds true when $\delta\eta(1-2\rho)[u_c(h) - u_c(d)] \geqslant (1-2\rho)[\overline{H}^* - \overline{\tau}^* - u_c(d)]$. From this, depending on the parameter value of ρ, it is possible to distinguish two cases:

$$\text{when } \rho \geqslant \frac{1}{2} : EU^{Hybr} \geqslant EU^{Pool} \text{ iff } \delta \leqslant \delta^{citizen} = \frac{1}{\eta} \frac{\overline{H}^* - \overline{\tau}^* - u_c(d)}{u_c(h) - u_c(d)} \tag{15}$$

$$\text{when } \rho < \frac{1}{2} : EU^{Hybr} \geqslant EU^{Pool} \text{ iff } \delta \geqslant \delta^{citizen} = \frac{1}{\eta} \frac{\overline{H}^* - \overline{\tau}^* - u_c(d)}{u_c(h) - u_c(d)} \tag{16}$$

Finally it is straightforward to compare the expression for EU^{Hybr} and EU^{Sep} and determine the condition(s) such that $EU^{Hybr} \geqslant EU^{Sep}$. The

previous is true iff $(1-\eta)\rho[\overline{H}^* - \overline{\tau}^* - u_c(d)] + \delta\eta(1-\eta)(1-\rho)[u_c(h) - u_c(d)]$ $\geqslant$ $\delta\eta(1-\eta)[u_c(h) - u_c(d)]$ i.e. iff $(1-\eta)\rho[\overline{H}^* - \overline{\tau}^* - u_c(d)] \geqslant \delta\eta(1-\eta)\left(1-1+\rho\right)[u_c(h) - u_c(d)]$, which is true iff the following condition holds:

$$\delta \leqslant \delta^{citizen} = \frac{1}{\eta}\frac{\overline{H}^* - \overline{\tau}^* - u_c(d)}{u_c(h) - u_c(d)}$$

The last part of the welfare analysis involves computing the citizen's expected utility when the value of the parameters are $\delta = \delta^*$ or $\rho = \frac{1}{2}$ and the equilibrium outcome are the continuum of equilibria listed in Proposition 9.

When $\rho = \frac{1}{2}$ and $\delta > \delta^*$, from Lemma 7 a continuum of equilibria $\sigma^*_{d,\underline{\theta}}(\overline{\tau}^*, \overline{g}^*) = 1, \sigma^*_c(\overline{\tau}^*, \overline{g}^*) \geqslant \frac{T - \overline{g}^*\Delta\theta}{\delta T}$ exists. By substituting these values in the eq. (13), the expression for the Expected Utility is the following:

$$EU(\sigma^*_{d,\underline{\theta}} = 1, \sigma^*_c \geqslant \frac{T - \overline{g}^*\Delta\theta}{\delta T}) =$$
$$= (1+\delta)[\eta u_c(h) + (1-\eta)u_c(d)] + \frac{1}{2}(1-\eta)[\overline{H}^* - \overline{\tau}^* - u_c(d)] + \frac{1}{2}\eta(1-\eta)\delta[u_c(h) - u_c(d)]$$

When $\delta = \delta^*$, from Lemma 8 a continuum of equilibria $\sigma^*_{d,\underline{\theta}}(\overline{\tau}^*, \overline{g}^*) \in (0, min\{\frac{\rho}{1-\rho}, 1\})$, $\sigma^*_c(\overline{\tau}^*, \overline{g}^*) = 1$ exists. Moreover there exists also a unique equilibrium where $\sigma^*_{d,\underline{\theta}}(\overline{\tau}^*, \overline{g}^*) = min\{\frac{\rho}{1-\rho}, 1\}$, $\sigma^*_c(\overline{\tau}^*, \overline{g}^*) = 1$. By substituting these values in the eq. (13), and distinguishing for the value of ρ, the expression for the expected utility is the following:

$$\text{if } \rho < \frac{1}{2} : EU(\sigma^*_{d,\underline{\theta}} \in (0, \frac{\rho}{1-\rho}\}), \sigma^*_c = 1) =$$
$$= (1+\delta^*)[\eta u_c(h) + (1-\eta)u_c(d)] + (1-\eta)(1-\rho)\sigma^*_{d,\underline{\theta}}[\overline{H}^* - \overline{\tau}^* - u_c(d)] +$$
$$+ \eta(1-\eta)\delta^*\left(1 - (1-\rho)\,\sigma^*_{d,\underline{\theta}}\right)[u_c(h) - u_c(d)]$$
$$\text{if } \rho < \frac{1}{2} : EU(\sigma^*_{d,\underline{\theta}} = \frac{\rho}{1-\rho}, \sigma^*_c = 1) =$$
$$= (1+\delta^*)[\eta u_c(h) + (1-\eta)u_c(d)] + (1-\eta)\rho[\overline{H}^* - \overline{\tau}^* - u_c(d)] +$$
$$+ \eta(1-\eta)\delta^*(1-\rho)[u_c(h) - u_c(d)]$$

$$
\begin{aligned}
\text{if} \quad \rho \;&\geqslant\; \frac{1}{2} : EU(\sigma^*_{d,\underline{\theta}} \in (0,1), \sigma^*_c = 1) = \\
&= (1+\delta)[\eta u_c(h) + (1-\eta)u_c(d)] + (1-\eta)(1-\rho)\sigma^*_{d,\underline{\theta}}[\overline{H}^* - \overline{\tau}^* - u_c(d)] + \\
&\quad +\eta(1-\eta)\delta(1-(1-\rho)\sigma^*_{d,\underline{\theta}})[u_c(h) - u_c(d)] \\
\text{if} \quad \rho \;&\geqslant\; \frac{1}{2} : EU(\sigma^*_{d,\underline{\theta}} = 1, \sigma^*_c = 1) = EU^{Pool} = \\
&= (1+\delta)[\eta u_c(h) + (1-\eta)u_c(d)] + (1-\eta)(1-\rho)[\overline{H}^* - \overline{\tau}^* - u_c(d)] + \\
&\quad +\eta(1-\eta)\delta\rho[u_c(h) - u_c(d)]
\end{aligned}
$$

It is interesting to highlight the existence of a conflict of interest between the citizen and the dishonest incumbent with cost $\underline{\theta}$ depending on the space of parameters and in particular on the time discount parameter δ.[17] For instance, notice that while the politician plays a pooling equilibrium only if he weighs the future highly enough compared to the present $\left(\delta \geqslant \delta^* = 1 - \frac{\overline{g}^* \Delta\theta}{T}\right)$, the optimal decision from the citizen's viewpoint is the opposite. In fact for the citizen disciplining the incumbent is optimal if and only if the future is not important with respect to the present $\left(\delta \leqslant \delta^{citizen}\right)$.

Quite intuitively if the citizen weighs the present more than the future, then disciplining the incumbent and having him to deliver the optimal amount of public good now is more important than deselecting and replacing him. On the other hand, when the citizen has a long-term perspective and weighs the future more than the present, then a separating equilibrium is welfare improving for her. However this contrasts with the dishonest incumbent's incentives: when δ is large enough, the dishonest politician's optimal strategy is to pool with the honest one.

One can find this type of conflict of interest between the citizen and the dishonest incumbent when comparing the expected utility the citizen enjoys when a hybrid equilibrium is the outcome with her utility when separating and pooling equilibria are the outcome.[18] For instance, the (unique) hybrid equilibrium exists only if $\delta \geqslant \delta^*$ that is only if the time discount is large enough. However, from the citizen's viewpoint, having the incumbent dishonest politician mixing between revealing his type and not is better than pooling when the time discount is small enough that is if and only if $\delta \leqslant \delta^{citizen}$ and $\rho \geqslant \frac{1}{2}$.

In the examples I have described so far, the citizen's welfare is lower than it could be if a different amount of information information was available: however the equilibrium of the game does not allow there to be more (less) *selecting* than would be optimal from citizen's expected utility viewpoint.

[17] In fact remember that the honest incumbent acts in the citizen's interest always and the dishonest incumbent upon receiving the cost parameter $\overline{\theta}$ always finds it optimal to take the myopic action and grab the whole amount of rents $r_1 = T$.

[18] In this welfare analysis for simplicity I do not consider the multliple equilibria.

Neverthless, things would change if there was another player whom she could resort to in order to receive information and see whether the incumbent is honest or just pretending to be so. In the next section I am going to introduce this additional player: media will have the role of the informed supervisor supplying information to the citizen. Moreover, I will derive the conditions such that its presence is useful for her.

5 Introducing Media

Having derived the equilibria of the game in Proposition 9, I now introduce a new player in this stripped down model of politics: media. To keep things simple, I will concentrate on the role that one single media has in the political arena.[19]I study the general case when collusion between media and incumbent is possible. As a special case I derive the strategic situation when collusion between media and politician is not available.

I think of media as an informed supervisor, that is a player (having the role of) receiving a signal about the politico-economic environment and sending it to the citizens.[20] At least two modelling options are available: *either* the media receives and sends a signal about the politician's type *or* it informs the citizens about the true cost of the public good. Both options can be justified with anecdotical evidence. However, for the sake of the argument, I decide for the modelling choice where the media publishes news about the cost of the public good.[21] Given the present setting, this amounts to the media publishing news about wasteful and rent-seeking activity of the government. It is easy to show that the results derived in this Section hold also when the media publishes news about the incumbent's type.

I will show how the presence of media brings about more sorting and less disciplining of politicians with respect to a situation where media is absent. Moreover, I will highlight the conditions that make collusion between media and incumbent harder to take place.

I assume that the setting of the supervising activity is one of hard information: signals (information about public good cost) cannot be made up but, once received, can be concealed. This modelling of the supervis-

[19]For an interesting discussion about how the size of the media market and the number of outlets influence the relationship between media and government in terms of capture and collusion, see the seminal article by (Besley and Prat, 2006).

[20]This signal could be seen as received by media as the product of some sort of costly activity, for instance journalistic inquiry about government's ability. Of course this inquiry should be financed out of the revenue and then we could conduce an exercise of comparative statics on cost and revenue structure. However as the objective of the paper is to show how to make collusion and capture between media and government harder, I normalize the cost of getting news to zero.

[21]Also, politicians' preferences are more likely to be politicians' private information for any signal received by media. As such preferences are harder to detect for media than the true cost of public good.

ing activity is natural to assume in the case that the supervisor is a Mass Media. In fact think of the Mass Media that observes an important piece of information about the honesty of the politician. After learning this, the Mass Media can decide to hide this information, maybe destroying the support of this piece of evidence (think of some documents proving that the incumbent politician is corrupt). However, if the Mass Media decides to reveal the learned information, the evidence supplied must be verifiable by a third party, i.e. it must be possible to assess whether it is true or not. In the context of this paper, this means that, for instance, other Media, or a Court of Justice, or simply the "public" must be able to decide whther the information shown by the Mass Media is true or false. In the jargon of the theory of incentives, signals are verifiable but concealable. The information structure available for the supervising activity is the following:

$$\begin{aligned} Pr\left(s=\underline{\theta}|j,\theta=\underline{\theta}\right) &= \xi \\ Pr\left(s=\varnothing|j,\theta=\underline{\theta}\right) &= 1-\xi \\ Pr\left(s=\varnothing|j,\theta=\overline{\theta}\right) &= 1 \end{aligned}$$

The interpretation of the above information structure is the following. When the cost of the public good is high, the media learns nothing with probability equal to one. If the cost of the public good is low the media receives a message saying that the cost is low with some probability $\xi \in (0,1)$. With probability $1-\xi$, the media does not learn anything about the (low) public good cost.

This assumption can be justified by the fact that, in Proposition 9, I have shown that, when the cost of public good is high, both politicians reveal their type in equilibrium. So in this case media would not provide any additional information at all with respect to when it was not performing its task. There is another justification for employing the above information structure in the media supervising activity.[22] In fact such a structure creates an incentive for the dishonest type with low cost only to collude with the supervisor and conceal the signal.

I define the media's strategy as a function mapping from the information set the media receives to the information it releases to the public. Formally :

$$\sigma_m : S \equiv \{\varnothing, \underline{\theta}\} \rightarrow \{\varnothing, \underline{\theta}\}$$

where $\sigma_m(s'|s) \in [0,1]$ is the probability that, having received the signal $s \in S$, the media reveals to the public the signal $s' \in S$.[23] Given the above information structure for supervising activity, the media's payoff has the

[22] The above information structure is the most widely employed in the strand of literature dealing with supervision and collusion in three-tiers hierarchy (Tirole, 1995).

[23] As a remark, remember that when $s=\underline{\theta}$, $s' \in \{\varnothing, \underline{\theta}\}$. However when $s=\varnothing, s' \in \{\varnothing\}$.

following structure: when the signal the media is receiving and printing is blank, it will have a fixed revenue from selling the news; this can be normalized to zero without any loss of generality.[24] In this case the news printed or broadcast will be the usual "political chat" and it will not convey any new knowledge about government's type or economic environment.[25] On the other hand, when the media receives $s = \underline{\theta}$ and reports it to the voter, this signal will be more informative on the economic environment than the blank signal. As a consequence it will be more valuable for the citizens in their voting decision. In fact when observing such a signal, citizens can be sure with probability one that the cost of public good is low. Therefore if they observe a public good quantity different from $\underline{g}^*$, they can conclude that the incumbent politician is a dishonest one.Given this greater informativeness of the signal, citizens will be willing to pay more for this information.

To model in a simple way this increased value of information for citizens, I can think that the revenues (or the market profit) of the media jumps from the normalized value of zero to $M > 0$ when news about the low cost of public good is published. In this paper I do not think of media as newspaper or pay-per-view TV and have companies offering an excludable information good. Rather, I think of free internet or broadcast TV, which are media the citizens receive for free: in this case media profit comes from advertising revenues which increases when a "scoop" is made.

Then the media's payoff function in expected terms is:

$$u_m = (1-\eta)(1-\rho)\xi M + \eta(1-\rho)\xi M = (1-\rho)\xi M$$

Media has a payoff of M with probability $(1-\rho)\xi$ and a payoff of 0 with probability $1-(1-\rho)\xi$. In order for media to have an incentive to perform its role, this payoff has to be greater than the cost of information acquisition which I have put equal to zero.[26] The new timing of the game after the introduction of media is the following: at $t = 1.1.5$ the media receives the signal on public good cost s and shows it to the incumbent first. Subsequently the incumbent makes a take-or-leave-it offer to the media to conceal the signal and the collusive side contract is signed and executed. At $t = 1.2$ the incumbent decides τ and the public good g. At $t = 1.3$, both signals ((g^*, τ^*) and s') reach the citizen contemporaneously. At $t = 1.4$,

[24] An alternative explanation for this could be that the media prints (and sells) several news other than politics: e.g business news, sport, show business information, celebrity gossip, books, movies and music review and so on. From printing/broadcasting these non-political news media will get its normalized payoff of zero.

[25] Bayes's rule shows that a blank signal does not add any knowledge to incumbent's type. In fact:

$Pr(i = h|s = \varnothing) = \frac{Pr(s=\varnothing\,|h,\overline{\theta})Pr\left(h,\overline{\theta}\right)+Pr(s=\varnothing\,|h,\underline{\theta})Pr(h,\underline{\theta})}{Pr(s=\varnothing\,|h,\overline{\theta})Pr\left(h,\overline{\theta}\right)+Pr(s=\varnothing\,|h,\underline{\theta})Pr(h,\underline{\theta})+Pr(s=\varnothing\,|d,\overline{\theta})Pr\left(d,\overline{\theta}\right)+Pr(s=\varnothing\,|d,\underline{\theta})Pr(d,\underline{\theta})}$

$= \frac{1\rho\eta+(1-\rho)(1-\xi)\eta}{1\rho\eta+(1-\rho)(1-\xi)\eta+1\rho(1-\eta)+(1-\rho)(1-\xi)(1-\eta)} = \eta = Pr(i = h)$

[26] See Note 19.

the reelection decision is taken. Thereafter the game is the same as in the case of no media.

Some comments on the chosen timing of the game are needed: I have assumed the media shows the signal received to the incumbent first and then to the citizens. Knowing the signal that media has received, the incumbent is going to propose a side contract to the media and then carry out his production decision.From the point of view of realism of the modeling choice, the above timing represents a simplification of a more complex situation: in order to discover the cost of public good, media has to collect information on this parameter. This process implies that the media and the incumbent interact with each other and that the latter gets to know the information the former managed to discover, i.e. the signal $s \in \{\varnothing, \underline{\theta}\}$. For instance this may be so because the dishonest incumbent is aware of the journalistic activity the media is conducting and because this activity had the media interviewing the politician or going on site to discover the (possibly) wasteful activity of the public production.[27]

After receiving the two signals, the citizen's modified beliefs on government's type are: $\mu_h = Pr(j = h|(\tau^*, g^*(\theta); s' \in \{\varnothing, \underline{\theta}\})$. Moreover the incumbent's strategy has now three components: together with the tax and public good production, there is the bribe f , i.e. the "fee" the incumbent is paying to the media in order to conceal the signal. I indicate the incumbent's strategy with $\widehat{\sigma}_{d,\theta}((\tau, g)|f)$, and I put the superscript $\widehat{\ }$ in order to distinguish the dishonest incumbent strategy when collusion is a possibility $(\widehat{\sigma}_{d,\theta})$ from his strategy when collusion is not a possibility $(\sigma_{d,\theta})$.

In modelling the collusive activity, the existence of transaction cost has to be considered. When a side-payment between government and media takes place, what the payer is giving is greater than what the receiver is getting: the difference is in the transaction cost $\kappa = \frac{1}{1-\alpha}, \alpha \in (0, 1)$, where $\kappa \in (1, \infty]$.[28] When $\alpha = 0$, this means that the transaction cost is zero and the media is getting exactly what the incumbent is paying, i.e. $\kappa = 1$; when $\alpha \to 1, \kappa \to \infty$, i.e. the transaction cost is infinite: then the side payment does not take place. The parameter κ models the difficulties involved in "breaking the law" and performing corruption successfully: a high κ could mean that the probability of getting caught is high as the judicial system is efficient or that the transaction takes place in kind instead of money and so it is harder to perform. The crucial point is that the transaction does not take

[27] A good example in this respect could be the many reports about the NHS made by the BBC1 programme "Panorama". Another excellent example of journalistic inquiry is a programme on the Italian TV RAI3, called "Report" which has run several stories about wasteful and falsely highly costly public good production carried out by the Italian officials in the public sector.

For a discussion of this assumption see (Tirole, 1995).

[28] In (Besley and Prat, 2006) this transaction cost κ is interpreted as the parameter measuring the "media independence".

place frictionlessly and the costs associated with it are larger than if the same transaction took place through the market or lawfully (see (Tirole, 1995)).I can now state the following proposition when collusion between media and incumbent is possible:

Proposition 10 *With probability* $1-(1-\rho)\,\xi$ *the signal* $s=\varnothing$ *arrives and the PBE of the game are the same as in Proposition 9. When the signal* $s=\underline{\theta}$ *arrives, a unique separating equilibrium exists with* $\widehat{\sigma}^{*}_{d,\underline{\theta}}(T,0)=1$ *and* $\sigma^{*}_{h,\overline{\theta}}(\overline{\tau}^{*},\overline{g}^{*})=1$*, the media playing* $\sigma^{*}_{m}(\underline{\theta})=1$ *and the citizen not reelecting the dishonest incumbent iff* $\delta<1-\frac{\overline{g}^{*}\Delta\theta}{T}+\frac{\kappa M}{T}$ *; a unique pooling equilibrium exists with* $\widehat{\sigma}^{*}_{d,\underline{\theta}}(\overline{\tau}^{*},\overline{g}^{*}|\kappa M)=\sigma^{*}_{h,\overline{\theta}}(\overline{\tau}^{*},\overline{g}^{*})=1$*, the media playing* $\sigma^{*}_{m}(\varnothing)=1$ *and the citizen reelecting the incumbent for sure iff* $\delta>1-\frac{\overline{g}^{*}\Delta\theta}{T}+\frac{\kappa M}{T}$ *and* $\rho>1/2$ *; a unique hybrid equilibrium exists with* $\sigma^{*}_{h,\overline{\theta}}(\overline{\tau}^{*},\overline{g}^{*})=1$ *and* $\sigma^{*}_{d,\underline{\theta}}(\overline{\tau}^{*},\overline{g}^{*})=\frac{\rho}{1-\rho}$ *and the citizen reelecting the incumbent with probability* $\sigma^{*}_{c}(\overline{\tau}^{*},\overline{g}^{*})=\frac{T-\overline{g}^{*}\Delta\theta+\kappa M}{\delta T}$ *exists iff* $\delta>1-\frac{\overline{g}^{*}\Delta\theta}{T}+\frac{\kappa M}{T}$ *and* $\rho<1/2$*. Furthermore a continuum of pooling equilibrium* $\widehat{\sigma}^{*}_{d,\underline{\theta}}(\overline{\tau}^{*},\overline{g}^{*}|\kappa M)=\sigma^{*}_{h,\overline{\theta}}(\overline{\tau}^{*},\overline{g}^{*})=1$*, the media playing* $\sigma^{*}_{m}(\varnothing)=1$ *and the citizen reelecting the incumbent with probability* $\sigma^{*}_{c}\geqslant\frac{T-\overline{g}^{*}\Delta\theta+\kappa M}{\delta T}$ *exists iff* $\delta\geqslant 1-\frac{\overline{g}^{*}\Delta\theta}{T}+\frac{\kappa M}{T}$ *and* $\rho=1/2$*. Finally a continuum of hybrid equilibrium* $\widehat{\sigma}^{*}_{d,\underline{\theta}}(\overline{\tau}^{*},\overline{g}^{*}|\kappa M)<1$*, the citizen reelecting the incumbent with probability* $\sigma^{*}_{c}=\frac{T-\overline{g}^{*}\Delta\theta+\kappa M}{\delta T}$ *exists iff* $\delta=1-\frac{\overline{g}^{*}\Delta\theta}{T}+\frac{\kappa M}{T}$ *and* $\rho=1/2$*.*

Proof. Remember that I have already shown that the honest incumbent never wants to conceal the signal and corrupt the media. So if the signal $s=\underline{\theta}$ arrives the honest incumbent never offers a bribing contract to the media and this one reveals the signal $s'=s=\underline{\theta}$. Moreover, if the signal $s=\varnothing$ arrives, the collusive activity cannot take place, since there is no signal to hide and signals cannot be constructed. Therefore when no new information is available ($s=\varnothing$) thanks to media, the equilibria of the game are the same as in Proposition 9, since players' strategies and incentives remain unchanged with respect to the no media case.

Now contingent on $(d,\underline{\theta})$ suppose the media has received and shown to the incumbent the signal $s=\underline{\theta}$. I am going to solve the game by backward induction. So having solved the reelection game at stage $t=1.4$, I am solving the bargaining-collusion game between $(d,\underline{\theta})$ and the media taking place at $t=1.1.5$. In this game if the bargaining breaks down and the collusion does not happen, the media reveals the signal to the citizens and the dishonest incumbent plays the myopic strategy. So the players' utility in the disagreement point $(d_{d,\underline{\theta}},d_m)=(T,M)$. With indexes γ and $\gamma-1,\gamma\in[0,1]$ I represent the bargaining power of the politician and the media respectively. I define the bargaining frontier $u^{BF}_{d,\underline{\theta}}(u_m)$ as the maximum

utility the $(d, \underline{\theta})$ type receives, given the utility the media achieves if collusion is successful.

Obviously the frontier depends on the PBE that is reached at a later stage. So I am going to distinguish three cases, depending on the equilibrium at a later stage being separating, pooling, hybrid.

Case 11 ***PBE is separating***

Suppose that at $t = 1.4$ the PBE is a separating one, then the bargaining frontier is equal to $u^{BF}_{d,\underline{\theta}}(u_m) = T - \kappa u_m$. If collusion happens, for any strictly positive utility the media receives, the dishonest type utility is less than his utility in the disagreement point. So in this case there is no collusion.

Case 12 ***PBE is pooling***

Now suppose that at $t = 1.4$ a pooling equilibrium is the outcome and the incumbent is reelected with probability one. In this case $u^{BF}_{d,\underline{\theta}}(u_m) = \overline{g}^* \Delta\theta + \delta T - \kappa u_m$. If the players collude in equilibrium, the gain from the agreement is equal to $\overline{g}^* \Delta\theta + \delta T - T - \kappa M$. Of course if collusion does not happen, then Incumbent's utility is equal to T. In order for the collusion to be feasible then it has to be $\overline{g}^* \Delta\theta + \delta T - \kappa M \geqslant T$, which is true iff $\delta \geqslant 1 - \frac{\overline{g}^* \Delta\theta}{T} + \frac{\kappa M}{T}$. Having characterised the elements of this bargaining game, the Asymmetric Nash Bargaining Solution (ANBS) to the bargaining problem is given by the vector of payoff $\left(u^{ANBS}_{d,\underline{\theta}}; u^{ANBS}_{m}\right) = \left(T + \gamma(\overline{g}^* \Delta\theta + \delta T - T - \kappa M); M + \frac{1}{\kappa}(1-\gamma)(\overline{g}^* \Delta\theta + \delta T - T - \kappa M)\right)$.[29] If all the bargaining power is given to the incumbent (i.e. $\gamma = 1$), $\left(u^{ANBS}_{d,\underline{\theta}}; u^{ANBS}_{m}\right)$ $= (\overline{g}^* \Delta\theta + \delta T - \kappa M - \varepsilon, M + \varepsilon)$ with $\varepsilon > 0$ and "small", i.e. $\varepsilon \longrightarrow 0$, which establishes the Proposition statement.

To conclude this part it remains to show that if collusion is successfully agreed upon, then a pooling equilibrium is the outcome. This is true iff $\delta \geqslant 1 - \frac{\overline{g}^* \Delta\theta}{T} + \frac{\kappa M}{T}$ and $\rho \geqslant 1/2$. In fact, given $\delta \geqslant 1 - \frac{\overline{g}^* \Delta\theta}{T} + \frac{\kappa M}{T}$, the collusion occurs in equilibrium, the media conceals the signal to the public and the dishonest type d with cost $\underline{\theta}$ takes the strategy $(\overline{\tau}^*, \overline{g}^*)$ with probability one, since the payoff from this is greater than the payoff from the myopic strategy. This follows trivially from the fact that $\overline{g}^* \Delta\theta + \delta T - \kappa M > T$ iff $\delta > 1 - \frac{\overline{g}^* \Delta\theta}{T} + \frac{\kappa M}{T}$ and $\sigma^*_c(\overline{\tau}^*, \overline{g}^*) = 1$.

Let us stress how the existence of collusion does not depend on the distribution of the gains from collusion between the parties but on their existence, i.e. on $\overline{g}^* \Delta\theta + \delta T - T - \kappa M > 0$. Finally, it remains to verify that the equilibrium beliefs are such that $\mu_h\left((\overline{\tau}^*, \overline{g}^*); \varnothing\right) \geqslant \eta$ and then as a consequence $\sigma^*_c(\overline{\tau}^*, \overline{g}^*) = 1$.

[29] See for instance (Muthoo, 1999), ch. 2.8.

In fact $\mu_g\left((\overline{\tau}^*,\overline{g}^*);\varnothing\right)=\frac{\eta\rho}{\eta\rho+(1-\eta)(1-\rho)(1-\xi)+(1-\eta)(1-\rho)\xi}\geqslant\eta$, which is true iff $\rho\geqslant 1/2$.

Obviously when $\delta<1-\frac{\overline{g}^*\Delta\theta}{T}+\frac{\kappa M}{T}$ or $\rho<1/2$, the collusion is not feasible in equilibrium, the signal $s=\underline{\theta}$ reaches the public and the only PBE at the stage $t=1.4$ is a separating one.

Case 13 ***PBE is hybrid***

Finally suppose that at $t=1.4$ the PBE is hybrid. From the definition of hybrid equilibrium, it follows that the dishonest type with cost $\underline{\theta}$ is indifferent between his payoff from pooling with the honest type who produces and taxes $(\overline{\tau}^*,\overline{g}^*)$ and the separating equilibrium.

Then the bargaining frontier is equal to $u^{BF}_{d,\underline{\theta}}(u_m)=\overline{g}^*\Delta\theta+\sigma^*_c(\overline{\tau}^*,\overline{g}^*)\delta T-\kappa u_m$. Assuming that all the bargaining power belongs to the Incumbent, from the definition of hybrid equilibrium, the Incumbent's utility when he corrupts the Media and produces $(\overline{\tau}^*,\overline{g}^*)$ has to be equal to the utility accruing to the Incumbent when he separates and does not corrupt the Media, that is T. In turn, this is equal to the disagreement point utility the dishonest type obtains. Therefore in order to have a hybrid equilibrium it has to be that $\overline{g}^*\Delta\theta+\sigma^*_c(\overline{\tau}^*,\overline{g}^*)\delta T-\kappa u_m=T$, which is true iff $\sigma^*_c(\overline{\tau}^*,\overline{g}^*)=\frac{T-\overline{g}^*\Delta\theta+\kappa M}{\delta T}$ and $\delta\geqslant\frac{T-\overline{g}^*\Delta\theta+\kappa M}{T}$, with the assumption that all the bargaining power belongs to the Incumbent. Furthermore, in order to have a hybrid equilibrium , then $\mu_g\left((\overline{\tau}^*,\overline{g}^*);\varnothing\right)=\frac{\eta\rho}{\eta\rho+\sigma^*_{d,\underline{\theta}}(1-\eta)(1-\rho)(1-\xi)+\sigma^*_{d,\underline{\theta}}(1-\eta)(1-\rho)\xi}=\eta$, which is true iff $\sigma^*_{d,\underline{\theta}}=\frac{\rho}{1-\rho}$ with $\rho<1/2$.

In case $\rho=1/2$, it is easy to verify that a continuum of hybrid equilibria is the game outcome, with $\sigma^*_{d,\underline{\theta}}<\frac{\rho}{1-\rho}$, $\sigma^*_c(\overline{\tau}^*,\overline{g}^*)=\frac{T-\overline{g}^*\Delta\theta+\kappa M}{\delta T}$ and $\mu_g\left((\overline{\tau}^*,\overline{g}^*);\varnothing\right)=\frac{\eta\rho}{\eta\rho+\sigma^*_{d,\underline{\theta}}(1-\eta)(1-\rho)(1-\xi)+\sigma^*_{d,\underline{\theta}}(1-\eta)(1-\rho)\xi}>\eta$. ■

As a special case of the most general result derived in the above Proposition, I state the Proposition when collusion between media and supervisor is not possible. There could be several reasons for this: the supervisor is honest and it does not value the side-payment received from the incumbent; the principal (i.e. the citizens) perfectly controls the communication between the other two players; the external enforcer, say a Court of Justice, is preventing the collusion; the transaction cost of colluding are very large (at the limit going to infinite), making capture of media impossible. I can formalise all this by putting $\kappa=\infty$. The following result is obtained immediately :

Proposition 14 *With probability* $1-(1-\rho)\,\xi$ *the signal* $s=\varnothing$ *arrives and the Perfect Bayesian Equilibria of the game is the same as in Proposition 9. With probability* $(1-\rho)\,\xi$ *the signal* $s=\underline{\theta}$ *arrives and then for any* ρ *and for any* $\delta\in(0,1)$ *the only equilibrium strategy is a separating equilibrium with the dishonest incumbent taking the myopic strategy, the media reporting truthfully the information and the citizen receiving the information and not reelecting the dishonest incumbent.*

Proof. The proof is trivial once one examines what happens when $\kappa = \infty$. Again consider the only relevant case, that is when at $t = 1.4$ the equilibrium of the reelection game is a pooling one. From the Proof of Proposition 10 we know that in this case, in order for the collusion to be feasible, then $\overline{g}^* \Delta\theta + \delta T - T - \kappa M > 0$. However as $\kappa \to \infty$, this means that for the collusion to exist it has to be $\lim_{\kappa \to \infty} \overline{g}^* \Delta\theta + \delta T - T - \kappa M > 0$, which is impossible for any finite $M > 0$. Since this is a contradiction, then collusion never happens in equilibrium. As a result, the signal $s \equiv \underline{\theta}$ is revealed in equilibrium by the media to the citizen. Observing it, the citizen is going to vote off the incumbent. Rationally anticipating this, the incumbent plays the myopic strategy $(T, 0)$ which reveals himself in equilibrium. ■

From Proposition 9 we know that when no media is around, producing a positive and large enough quantity of public good could be sufficient for the dishonest incumbent to "fool" the citizen and be reelected. On the contrary, in this new strategic situation with media, the media helps the voter avoid being deceived. Following the terminology introduced earlier, the presence of media increases the *sorting effect* of elections, while the *disciplining effect* decreases. Proposition 10 above shows how the presence of media together with the possibility of media capture on part of the incumbent changes the equilibria as compared to the scenario when media is not around. This effect of media on the game equilibria is more striking when collusion is not possible, i.e. when $\kappa = \infty$. In this new setting with media and no collusion, with some probability $(1 - \rho)\xi$, the cost of public good will be found to be low and the incumbent, if dishonest, will reveal himself as such. The citizen's optimal strategy will be then to send-off the incumbent politician and elect the challenger, whose expected honesty is higher than the dishonest incumbent. Anticipating all this, the best the dishonest government could do is to "take the money and run": he will act myopically and grab the maximum amount of fiscal resources available as rents. It is important to stress that the incumbent politician will do so no matter what the value of the time discount factor is. In fact, contrary to the no media scenario, there is no incentive in terms of highly-valued future rewards that could induce the incumbent to produce a positive quantity of public good, once he knows the signal $s = \underline{\theta}$ will be shown to voters and collusion is not available. In turn this is true because once the citizen observes the signal $s = \underline{\theta}$ she knows that the cost **is** low. Contrary to Proposition 9, there is no other way the incumbent could persuade the voter that the public good cost is different from low. In terms of the trade off between effects, the *sorting effect* is maximised, while the *disciplining effect* disappears.

What it is at work here is a sort of cross-checking strategy on the part of voters: if the citizen observes that the quantity of public good corresponds to high cost, then she will look at the media. If no informative news is reported, then she will reelects the incumbent. However if the news headlines

contradict the situation she is observing, then she will vote the incumbent out.

While in the no-collusion scenario the only possible optimal strategy for the dishonest incumbent is to reap all the rents and reveal himself in equilibrium, now in the media collusion scenario he has another option: he can bribe the media *and* deliver the optimal quantity of public good which the citizen expects in a high cost public good environment. If he does this, he knows the citizen will reelect him for sure, given that there is no hybrid equilibrium in this case. As regarding the *sorting* vs *disciplining* effect, here this trade-off is partially restored. When the collusion between the media and the incumbent takes place, then the dishonest incumbent delivers a quantity of public good larger than he would have done if there was no collusion. Again this is good in the first period as the citizen's utility is higher than it would have been if separation was the outcome. Neverthless, retaining the dishonest incumbent decreases the citizen's welfare in the second period. In the next section I am going to assess the welfare effect of this trade off between the disciplining and the sorting effect of media.

Once media capture is a possibility, it is useful to focus on the determinants which make it harder for collusion to take place. First, the existence of transaction costs. It is obvious that the larger are the transaction costs, the harder it will be to perform collusion successfully. High transaction costs could be due to the existence and the effective enforcement of a legislation against the corruption; to an efficient judiciary system which is ready to go after any wrongdoing; and to social values and culture that make corruption a practice difficult to be carried out. So a winning strategy to avoid media capture on part of the government is to raise the transaction costs, for instance by empowering the judiciary system.

The other determinant of a low level of collusion between media and politician is the size of the market for media. Remember that in order to prevent the signal being transmitted to the public at large, the incumbent has to pay the media at least κM, that is the whole value of the market for media when an informative signal has arrived. For the incumbent politician colluding with the media will be harder the larger the market for media is. In fact for the politician it will be difficult to bribe the media when the amount of money that he needs to transfer in order to conceal the signal is large. So an active and informed citizenship, one which consumes a large amount of information channeled through mass media, makes media capture on part of government more difficult. At the limit, collusion will be impossible when $\kappa M > g^*(\overline{\theta})\Delta\theta - T + \delta T$, which is more likely when κM is large and when the RHS is small. Notice that this happens when each of the addenda of the RHS is small: in particular when there are few rents available for grabbing now ($g^*(\overline{\theta})\Delta\theta$), when the resources available for grabbing are very large (T large) and when the future resources available to pocket are largely discounted (δ small).

6 Welfare Analysis

6.1 No Collusion between Media and Incumbent

In Section 4.1 I have characterised a conflict of interest between a dishonest incumbent and the citizen: given a certain time discount factor δ, the citizen might find optimal a certain politician's strategy, different from his equilibrium one. I have stressed how in that scenario the citizen had to accept the incumbent's equilibrium strategy. However thanks to the presence of media, now she can now make good use of it in order to receive useful information about the incumbent's type. By comparing Proposition 9 and the condition expressed in eq. (14) it is possible to clarify when it is optimal to resort to media for the citizen, i.e. when more information increases the citizen's expected utility. Remember that we have established in Proposition 9 that a separating equilibrium exists only if δ is small enough and in particular smaller than $\delta^* = 1 - \frac{\overline{g}^* \Delta\theta}{T}$. Moreover in the welfare analysis of this strategic situation we have seen that more selecting increases the citizen's expected welfare iff δ is large enough and in particular larger than $\delta^{citizen} = \frac{1}{\eta} \frac{\overline{H}^* - \overline{\tau}^* - u_c(d)}{u_c(h) - u_c(d)}$.

The following pictures will help to explain:

[`Insert Pictures 1 and 2 about here`]

In the first picture, $\delta^* = 1 - \frac{\overline{g}^* \Delta\theta}{T} \leqslant \frac{1}{\eta} \frac{\overline{H}^* - \overline{\tau}^* - u_c(d)}{u_c(h) - u_c(d)} = \delta^{citizen}$, while in the second $\delta^* = 1 - \frac{\overline{g}_1^* \Delta\theta}{T} \geqslant \frac{1}{\eta} \frac{\overline{H}^* - \overline{\tau}^* - u_c(d)}{u_c(h) - u_c(d)} = \delta^{citizen}$. When $\delta \in [0, min\left\{\delta^*, \delta^{citizen}\right\}$, there is no alignment of interests between citizen and politician. Since the future is not so important relative to the present, the citizen would like the dishonest incumbent to mimic the honest one and to deliver the optimal quantity of public good $\overline{g}^*$. However the dishonest incumbent does not have such an incentive to do so: since he discounts the future rents highly, he prefers to grab the present rents and reveal himself in equilibrium. Given the constraints on the instruments available to the citizen and in particular the unavailibility of contracts, there is no way she can induce the politician to pool rather than to separate.

When $\delta \in \left[min\left\{\delta^*, \delta^{citizen}\right\}, max\left\{\delta^*, \delta^{citizen}\right\}\right)$, there is an alignment of interest between the incumbent and the citizen. When $\delta^* < \delta^{citizen}$, then for any $\delta \in \left[\delta^*, \delta^{citizen}\right)$ both players find a pooling equilibrium optimal. On the contrary when $\delta^* > \delta^{citizen}$, then for any $\delta \in \left[\delta^{citizen}, \delta^*\right)$ both the dishonest incumbent with low public cost and the citizen find it optimal to have a separating equilibrium. In this intermediate range of parameters both players agree on what is the best course of action. As a consequence there is no need for the citizen to act in order to change politician's equilibrium strategy.

Finally, when $\delta \in \left(max\left\{\delta^*, \delta^{citizen}\right\}, 1\right]$ the dishonest incumbent with low public good cost has an incentive to mimic the good one. On the other

hand citizen's interest is the opposite to the incumbent's one: the citizen would like to sort out the honest politician from the dishonest one. In fact now that the future is very important, having in place a honest politician will assure her a higher expected utility. While in the range of parameters $\delta \in \left[0, min\left\{\delta^*, \delta^{citizen}\right\}\right)$ there was nothing she could do to align the incumbent politician's one to her interest, now the citizen could resort to the introduction and the use of media. Thanks to its presence, with some positive probability she will find out the true cost of the good publicly provided and the politician quality will be revealed. Let us recall that the media is there because citizens enjoy other news than political informative ones: however when scoops break the headlines citizens enjoy the informative content of these media. This means that the citizen will be able to sort out the honest from the dishonest politician and in this way increase her expected welfare. The existence of another institutional player, i.e. the media, and the fact that the citizen finds it optimal to receive informative news to sort politicians out, manages to improve her expected utility with respect to a situation where media is absent. It is also possible to derive the expression for the expected utility of the citizen when the mass media is present. Modifying the expression in eq. (12) this is equal to:

$$\begin{aligned}
EU(\sigma^*_{d,\underline{\theta}};\sigma^*_c;\xi) = \eta\left(1-\rho\right)\left[\left(\underline{H}^* - \underline{\tau}^*\right) + \delta u_c(h)\right] + \eta\rho[\left(\overline{H}^* - \overline{\tau}^*\right) + \sigma^*_c\delta u_c(h) + \\
+ \left(1-\sigma^*_c\right)\delta(\eta u_c(h) + \left(1-\eta\right)u_c\left(d\right))] + \\
+ \left(1-\eta\right)\rho[u_c\left(d\right) + \delta(\eta u_c(h) + \left(1-\eta\right)u_c\left(d\right))] + \\
+ \left(1-\eta\right)\left(1-\rho\right)\xi[u_c\left(d\right) + \delta(\eta u_c(h) + \left(1-\eta\right)u_c\left(d\right))] + \\
+ \left(1-\eta\right)\left(1-\rho\right)\left(1-\xi\right)\sigma^*_{d,\underline{\theta}}\left[\left(\overline{H}^* - \overline{\tau}^*\right) + \sigma^*_c\delta u_c\left(d\right) + \delta\left(1-\sigma^*_c\right)\left(\eta u_c(h) + \left(1-\eta\right)u_c\left(d\right)\right)\right] + \\
+ \left(1-\eta\right)\left(1-\rho\right)\left(1-\xi\right)\left(1-\sigma^*_{d,\underline{\theta}}\right)\left[u_c\left(d\right) + \delta\left(\eta u_c(h) + \left(1-\eta\right)u_c\left(d\right)\right)\right]
\end{aligned}$$

By comparing the expression above with the expression in eq. (12) one can derive the condition such that the citizen's utility when there media is larger than the citizen's utility when there is no additional information coming from media.

Tedious algebra shows that $EU(\sigma^*_{d,\underline{\theta}};\sigma^*_c;\xi) \geqslant EU(\sigma^*_{d,\underline{\theta}};\sigma^*_c)$, after cancelling out the common terms, amounts to the following:

$$\begin{aligned}
EU(\sigma^*_{d,\underline{\theta}};\sigma^*_c;\xi) \geqslant EU(\sigma^*_{d,\underline{\theta}};\sigma^*_c) \\
\left(1-\eta\right)\left(1-\rho\right)\xi[u_c\left(d\right) + \delta(\eta u_c(h) + \left(1-\eta\right)u_c\left(d\right))] + \\
+ \left(1-\eta\right)\left(1-\rho\right)\left(1-\xi\right)\sigma^*_{d,\underline{\theta}}\left[\left(\overline{H}^* - \overline{\tau}^*\right) + \sigma^*_c\delta u_c\left(d\right) + \delta\left(1-\sigma^*_c\right)\left(\eta u_c(h) + \left(1-\eta\right)u_c\left(d\right)\right)\right] + \\
+ \left(1-\eta\right)\left(1-\rho\right)\left(1-\xi\right)\left(1-\sigma^*_{d,\underline{\theta}}\right)\left[u_c\left(d\right) + \delta\left(\eta u_c(h) + \left(1-\eta\right)u_c\left(d\right)\right)\right] \geqslant \\
\left(1-\eta\right)\left(1-\rho\right)\sigma^*_{d,\underline{\theta}}\left[\left(\overline{H}^* - \overline{\tau}^*\right) + \sigma^*_c\delta u_c\left(d\right) + \delta\left(1-\sigma^*_c\right)\left(\eta u_c(h) + \left(1-\eta\right)u_c\left(d\right)\right)\right])
\end{aligned}$$

Simplifying the common terms $(1-\eta)(1-\rho)$ and factoring out, one obtains that:

$$EU(\sigma^*_{d,\underline{\theta}};\sigma^*_c;\xi) \geqslant EU(\sigma^*_{d,\underline{\theta}};\sigma^*_c)$$
$$u_c(d) + \delta(\eta u_c(h) + (1-\eta)u_c(d)) \geqslant$$
$$\geqslant \left(\overline{H}^* - \overline{\tau}^*\right) + \delta[\sigma^*_c u_c(d) + (1-\sigma^*_c)(\eta u_c(h) + (1-\eta)u_c(d))]$$

In the above expression the LHS represents the welfare accruing to the citizen once he has received the information that the incumbent is dishonest (or better that the public good cost is $\overline{\theta}$ and therefore the dishonest incumbent cannot produce the minimum public good quantity $\overline{H}^*$) and that he is voting out him and appointing a new incumbent of unknown quality. On the other hand, the RHS represents the total citizen's utility when he observes a public good quantity $\overline{H}^*$and therefore mixes between reeleecting and not the incumbent with any probability σ^*_c. Therefore, while the LHS represents the citizen's utility of selecting the incumbent, the RHS shows the citizen's welfare of disciplining him. It is straightforward to see that it is not obvious that one effect dominates the other, what I have already found above.

To see this better, following (Besley and Smart, 2007), and rearranging the above expression one obtains that $EU(\sigma^*_{d,\underline{\theta}};\sigma^*_c;\xi) \geqslant EU(\sigma^*_{d,\underline{\theta}};\sigma^*_c)$ iff

$$u_c(d) + \delta(\eta u_c(h) + (1-\eta)u_c(d)) \geqslant \left(\overline{H}^* - \overline{\tau}^*\right) + \delta[\sigma^*_c u_c(d) + (1-\sigma^*_c)(\eta u_c(h) + (1-\eta)u_c(d))]$$
$$\delta\sigma^*_c[(\eta u_c(h) + (1-\eta)u_c(d)) - u_c(d)] \geqslant \left(\overline{H}^* - \overline{\tau}^*\right) - u_c(d)$$
$$\delta\eta\sigma^*_c[u_c(h) - u_c(d)] \geqslant \left(\overline{H}^* - \overline{\tau}^*\right) - u_c(d)$$

Therefore one can see that the effect on the citizen's utility coming from selecting the incumbent dominates the effect on the citzen's utility coming from disciplining him when the time discount is large (the future is discounted less heavily with respect to the present), the probability of having honest incumbents is large (there is more chance of drawing a honest incumbent when appointing a new one, after deselecting the old) and the probability of reelecting the incumbent is large.

It is worth highlighting the differences with the previous literature: while in previous works about mass media and political economy the supervising role of mass media is always deemed and shown to be welfare improving, here I derive a first attempt in making precise the conditions such that the offer and the demand for political news is optimal for the polity. Crucially, I show that the utility of information for citizens depends on the time discount factor δ. So media are useful if and only if the time discount factor of the polity is large enough, i.e. if and only if citizens value the future highly.Citizens

know that only when the time discount factor is large enough, the supervising activity of media is optimal in order to have more information and to sort incumbents out according to their honesty trait. In other cases either politicians separate without recurring to media or they pool but this is optimal ex-ante for citizens as well. Therefore I want to stress that by allowing media to operate in some circumstances rather than others, citizens can decide when receiving information and when not to. Indeed in some cases it is optimal for citizens to avoid to have too much information in order to increase their expected utility.

However, in circumstances such as these it is crucial that the citizen can credibly commit ex-ante not to receive any information. Take the case when the parameters are such that $\delta \in \left[\delta^*, \delta^{citizen}\right)$. In this environment it would be optimal ex-ante for both incumbent and citizens that the dishonest politician pooled with the honest one. However ex-post (i.e. *after* the incumbent has made his public good production decision) it is optimal for the citizen to receive information. If the media anticipates this, it would be optimal for this player to release the information and then for the incumbent to receive it. In turn, if the dishonest politician correctly conjectures this, it would be optimal for him not to pool and to reveal himself in equilibrium. This would cause a shift from a pooling equilibrium (in the scenario without media or with media and commitment) to a separating equilibrium (in the scenario with media and no commitment): a Pareto inferior equilibrium for both players with respect to the first one.

While I cannot claim to have endogenised the news exchange since this would require a fully fledged theory of information acquisition which would have to consider the public good element of this decision, I can say that my analysis sheds some light on the necessary conditions that such a theory would require. In fact rational agents would have to acquire information only if it was optimal to do so and I have shown this would require the time discount factor between the two periods to be large enough.

Another alternative interpretation of the above discussion is that I have devised the conditions that at the "constitutional" level have to be satisfied in order for the media to operate optimally in the citizens' interest. Following the approach of, among others (Laffont, 2000), the benevolent Founding Fathers which draw up any Constitution know and have to consider the danger that subsequent generations of politicians are not as honest as they are. One of the checks and balances they might want to introduce is the presence of mass media. However, contrary to conventional wisdom, my analysis has shown that the Founding Fathers would have to do so if and only if the temporal horizon of the society was large enough.

This finding could also shed some light on the fact that some countries have enjoyed considerable econmoic performance lately, although their political and media freedom was not as strong as conventional wisdom thought it should have been.

In this Section I have shown that the existence of an institutional player with the role of releasing information does not improve citizens' welfare in general. I have stressed that this depends crucially on the media exercising its supervising role only when it is optimal to do so. In fact I have shown that there are cases when having more information might cause a decrease in both players' welfare with respect to the case when media is not available. Of course this situation would not happen if citizens were able to commit ex-ante not to have too much information. Similarly, scenarios when too much information is harmful would not be an issue if the Constitution allowed media to operate if and only if this would be optimal. However, if such a commitment strategy is not possible or the Constitution fails to distinguish cases where media are optimal from cases where they are not, a viable alternative is to make corruption easier to happen and as a consequence the information easier to be concealed. In the next section I am going to show this.

6.2 Media is Available and Collusion is a Possibility

In the previous section I have seen that, thanks to the presence of media, citizens can improve their welfare with respect to a situation where no media is available. However I have warned that this relies on either i) the citizen being able to refrain from using the media when its use might be welfare increasing ex-post, but not ex-ante; or ii) the Constitution optimally distinguishing among environments when media are welfare improving and when they are not.

I have stressed how this second assumption depends critically on the citizen being able to commit not to use the media when using the media is optimal ex-post but not ex-ante. I have also highlighted the difficulties that this commitment strategy implies.

In this section I want to extend the welfare analysis made previously to the scenario where collusion between media and politician is possible. The findings are similar to the ones in the previous section. In addition I reach a surprising result: sometimes allowing corruption between media and politician solves the issue of citizen's commitment not to use the media and as a consequence improves citizen's welfare with respect to a situation when no collusion is possible.

Summing up the results in Proposition 10, regarding politician's equilibrium strategy, I know that when $\delta \in \left[0, \delta^* = 1 - \frac{\overline{g}^* \Delta\theta}{T}\right)$, the dishonest incumbent does not find it optimal to mimic the behaviour of the honest one. So a separating equilibrium is the outcome. When $\delta \in \left[\delta^*, \delta^* + \frac{\kappa M}{T}\right)$, given the not optimality on part of the dishonest incumbent to bribe the media and mimic the honest politician with this intermediate valuation of time, a separating equilibrium is the outcome with probability $(1-\rho)\,\xi$, i.e. the probability with which a signal $s = \underline{\theta}$ arrives. Finally when $\delta \in \left[\delta^* + \frac{\kappa M}{T}, 1\right]$

and $\rho \geqslant 1/2$ the equilibrium outocme is a pooling equilibrium with media and politician colluding and the citizen reelecting the incumbent with some positive probability. As before the citizen finds it optimal to have a pooling equilibrium when $\delta \leqslant \delta^{citizen} = \frac{1}{\eta} \frac{\overline{H}^* - \overline{\tau}^* - u_c(d)}{u_c(h) - u_c(d)}$.

As I did in the previous section, in every region of parameters δ I want to compare incumbent's equilibrium strategy to what would be the optimal one with respect to the citizen's expected utility.

[`Insert Pictures 3, 4 and 5 about here`]

Figure 3 refers to the case when $\frac{1}{\eta} \frac{\overline{H}^* - \overline{\tau}^* - u_c(d)}{u_c(h) - u_c(d)} = \delta^{citizen} < \delta^*$. Here when $\delta < \delta^{citizen}$, there is no alignment between politician and citizen: the former reveals himself in equilibrium, while from the citizen's viewpoint, the incumbent's optimal strategy would be the one resulting in a pooling equilibrium. When $\delta \in \left[\delta^{citizen}, \delta^*\right)$ the politician takes the separating strategy which is optimal for the citizen as well: there is no need on the introduction of media. On the other hand, when $\delta \in \left[\delta^*, \delta^* + \frac{\kappa M}{T}\right)$ the introduction of media and the use of its information is in the citizen's interest, as media transmitting information on incumbent politician increases the citizen's welfare. Finally when $\delta \in \left[\delta^* + \frac{\kappa M}{T}, 1\right]$ the dishonest politician finds it optimal to mimic the honest one and to buy off the silence of media by paying it the whole amount κM. In this case there the existence of collusion represents a loss in welfare for citizens with respect to the case where no collusion was possible.

A similar discussion can be made when $\delta^* \leqslant \delta^{citizen} \leqslant \delta^* + \frac{\kappa M}{T}$. The only difference in this environment is that there exists an intermediate range of parameters $\delta \in \left[\delta^*, \delta^{citizen}\right]$ where the use of media could be possible in such a way that citizens could get more information and induce the dishonest politician to separate. However in this case doing so would be harmful ex-ante: the optimal strategy for the citizen is to let the dishonest politician mimic the honest one and deliver a pooling strategy equilibrium. However in this circumstance the issue of citizen's commitment not to resort to media and/or of media not to enter the market arises. That is the reason why benevolent and rational Founding Fathers would have to prevent or limit the role of media in such circumstances.

Finally let us analyse the case where $\delta^* + \frac{\kappa M}{T} < \delta^{citizen}$. When $\delta < \delta^*$, there is no alignment between bad incumbent and voter, since the voter would like the incumbent to pool, while politicians optimal strategy is to reveal themselves in equilibrium. When $\delta \in \left[\delta^*, \delta^* + \frac{\kappa M}{T}\right)$, although it would be possible to induce more separation through the use of media, it is optimal for citizens to have politicians pool on the strategy $(\overline{\tau}^*, \overline{g}^*)$: therefore also in this case the introduction of media or having media to transmit political news is not optimal for citizens' expected welfare. Moreover, when $\delta \in \left[\delta^{citizen}, 1\right]$, though optimal for her, again it is not possible to induce politicians to separate through use of the media: given the incentive he is facing,

for the dishonest incumbent it is optimal to mimic the honest one. Furthermore, should the signal arrive, the dishonest incumbent finds it optimal to buy the silence of the media.

The interesting case is when $\delta \in \left[\delta^* + \frac{\kappa M}{T}, \delta^{citizen}\right)$: here the dishonest politician's optimal strategy is to collude with the media and to mimic the honest politician behaviour. However, this is optimal from the citizen's viewpoint as well: in this case, allowing the collusion maximises citizen's welfare. As a conclusion, in this case, decreasing κ and/or M is the optimal choice to adopt.

As I have said before it is a well known phenomenon in this class of reelection games that citizen's equilibrium strategies might suffer from not being sub-game perfect: it is optimal for the citizen ex-ante to commit not to acquire new information, as in this case in the range of parameters $\delta \in \left[\delta^*, \delta^* + \frac{\kappa M}{T}\right)$. However, once the information has been received by the media, it is optimal for the citizen to know it. Should the media anticipate this, then it could be possible for them to release the information they received and there could be a shift from a pooling equilibrium to a non-optimal separating equilibrium. So in this case the optimal constitution should be written in such a way as to not allow the media to transmit information about political incumbents. Alternatively citizens should have to credibly commit not to use any information the media would release. However if the constitution is not written in an optimal way and/or the citizen is unable to committ not to use any information, the existence of collusion functions as a substitute for these failures.

In fact quite interestingly in the space of parameters $\delta \in \left[\delta^* + \frac{\kappa M}{T}, \delta^{citizen}\right)$ the citizen can credibly commit not to acquire new information. If the information gets produced the citizen knows that it will not reach her, as the politician would act in order to conceal it. Since for the citizen it is optimal that the politicians pool, then allowing more collusion is optimal. In this case, making the collusion easier by decreasing κ and/or M, is optimal, contrary to the conclusions of the literature in this field. In fact decreasing κ and/or M will increase the range of parameters δ where a pooling equilibrium is optimal for both players and where the citizen can credibly committ not to recur to media. Morever decreasing κ and/or M will shrink the complementary region $\left[\delta^*, \delta^* + \frac{\kappa M}{T}\right)$, where a pooling equilibrium is again optimal but citizen's commitment not to use the media is not credible and collusion as a substitute device to both an imperfect Constitution and an imperfect citizens committment does not work.

Again it is possible to derive the expression for the expected utility of the citizen when the mass media is present and collusion is a possibility.

Modifying the expression in eq.(12) this is equal to:

$$\begin{gathered}
EU(\sigma^*_{d,\underline{\theta}};\sigma^*_c;\xi;\sigma_m)=\eta\left(1-\rho\right)\left[\underline{H}^*-\underline{\tau}^*+\delta u_c(h)\right]+\\
+\eta\rho[\overline{H}^*-\overline{\tau}^*+\sigma^*_c\delta u_c(h)+\left(1-\sigma^*_c\right)\delta(\eta u_c(h)+\left(1-\eta\right)u_c\left(d\right))]+\\
+\left(1-\eta\right)\rho[u_c\left(d\right)+\delta(\eta u_c(h)+\left(1-\eta\right)u_c\left(d\right))]+\\
+\left(1-\eta\right)\left(1-\rho\right)\left[\xi((\sigma_m(u_c\left(d\right)+\delta(\eta u_c(h)+\left(1-\eta\right)u_c\left(d\right)))+\right.\\
\left.+(1-\sigma_m)(\overline{H}^*-\overline{\tau}^*+\sigma^*_c\delta u_c(h)+\left(1-\sigma^*_c\right)\delta(\eta u_c(h)+\left(1-\eta\right)u_c\left(d\right)))\right)+\\
+(1-\xi)((\sigma^*_{d,\underline{\theta}}(\overline{H}^*-\overline{\tau}^*+\delta(\sigma^*_c u_c\left(d\right)+\left(1-\sigma^*_c\right)\left(\eta u_c(h)+\left(1-\eta\right)u_c\left(d\right)\right))+\\
\left.+(1-\sigma^*_{d,\underline{\theta}})(u_c\left(d\right)+\delta\left(\eta u_c(h)+\left(1-\eta\right)u_c\left(d\right)\right))\right)\Big]
\end{gathered}$$

where σ_m is the probability that, having received the signal $s\in\{\underline{\theta},\varnothing\}$ the incumbent reveals the truth, while $1-\sigma_m$ is the probability that the incumbent suppresses the signal. Since the relevant case is when $s=\underline{\theta}$, in the expression above I consider only that case, since when $s=\varnothing$, the probability that the Incumbent reveals that signal, i.e. $\sigma_m(\varnothing|\varnothing)=1$.

By comparing the expression above with the expression in eq. (12) one can derive the condition such that the citizen's utility when there is media and the possibility of corruption is larger than the citizen's utility when there is no additional information coming from media.

After simplifying the common factors $EU(\sigma^*_{d,\underline{\theta}};\sigma^*_c;\xi;\sigma_m)\geqslant EU(\sigma^*_{d,\underline{\theta}};\sigma^*_c)$ can be rewritten like the following:

$$\begin{gathered}
EU(\sigma^*_{d,\underline{\theta}};\sigma^*_c;\xi;\sigma_m)\geqslant EU(\sigma^*_{d,\underline{\theta}};\sigma^*_c)\\
\left(1-\eta\right)\left(1-\rho\right)\xi\sigma_m[u_c\left(d\right)+\delta(\eta u_c(h)+\left(1-\eta\right)u_c\left(d\right))]+\\
\left(1-\eta\right)\left(1-\rho\right)\xi(1-\sigma_m)[(1-\sigma^*_{d,\underline{\theta}})(u_c\left(d\right)+\delta(\eta u_c(h)+\left(1-\eta\right)u_c\left(d\right))]+\\
+\left(1-\eta\right)\left(1-\rho\right)\xi(1-\sigma_m)\sigma^*_{d,\underline{\theta}}\left[\overline{H}^*-\overline{\tau}^*+\delta\sigma^*_c u_c\left(d\right)+\delta\left(1-\sigma^*_c\right)\left(\eta u_c(h)+\left(1-\eta\right)u_c\left(d\right)\right)\right]+\\
+\left(1-\eta\right)\left(1-\rho\right)\left(1-\xi\right)\sigma^*_{d,\underline{\theta}}\left[\overline{H}^*-\overline{\tau}^*+\delta\sigma^*_c u_c\left(d\right)+\delta\left(1-\sigma^*_c\right)\left(\eta u_c(h)+\left(1-\eta\right)u_c\left(d\right)\right)\right]+\\
+\left(1-\eta\right)\left(1-\rho\right)\left(1-\xi\right)\left(1-\sigma^*_{d,\underline{\theta}}\right)\left[u_c\left(d\right)+\delta\left(\eta u_c(h)+\left(1-\eta\right)u_c\left(d\right)\right)\right]\geqslant\\
\left(1-\eta\right)\left(1-\rho\right)\sigma^*_{d,\underline{\theta}}\left[\overline{H}^*-\overline{\tau}^*+\sigma^*_c\delta u_c\left(d\right)+\delta\left(1-\sigma^*_c\right)\left(\eta u_c(h)+\left(1-\eta\right)u_c\left(d\right)\right)\right])+\\
+\left(1-\eta\right)\left(1-\rho\right)\left(1-\sigma^*_{d,\underline{\theta}}\right)\left[u_c\left(d\right)+\delta\left(\eta u_c(h)+\left(1-\eta\right)u_c\left(d\right)\right)\right]
\end{gathered}$$

Simplifying the common terms $\left(1-\eta\right)\left(1-\rho\right)$ and factoring out, one obtains that:

$$\begin{aligned}
EU(\sigma^*_{d,\underline{\theta}};\sigma^*_c;\xi;\sigma_m) &\geqslant EU(\sigma^*_{d,\underline{\theta}};\sigma^*_c)\\
u_c\left(d\right)+\delta(\eta u_c(h)+\left(1-\eta\right)u_c\left(d\right)) &\geqslant \left(\overline{H}^*-\overline{\tau}^*\right)+\delta[\sigma^*_c u_c\left(d\right)+\left(1-\sigma^*_c\right)\left(\eta u_c(h)+\left(1-\eta\right)u_c\left(d\right)\right)]
\end{aligned}$$

In the above expression the LHS represents the citizen's utility when the information is available, although there is some chance that it is concealed. The RHS, instead, represents the total citizen's utility when there is not any information available through media. It is easy to notice that the expression above is the same relationship as found in $EU(\sigma^*_{d,\underline{\theta}};\sigma^*_c;\xi;\sigma_m) \geqslant EU(\sigma^*_{d,\underline{\theta}};\sigma^*_c)$.

Finally, it is easy to verify that the same algeabriac manipulation leads to conclude that the citizens'utility when mass media is around and collusion is a possibility is larger than citizens' utility when there is no possibility of collusion if and only the welfare coming from disciplining the incumbent is larger than the welfare accruing to the citizen from selecting the politician. In formal terms:

$$EU(\sigma^*_{d,\underline{\theta}};\sigma^*_c;\xi;\sigma_m) \geqslant EU(\sigma^*_{d,\underline{\theta}};\sigma^*_c;\xi)$$
$$\overline{H}^* - \overline{\tau}^* + \delta[\sigma^*_c u_c(d) + (1-\sigma^*_c)(\eta u_c(h) + (1-\eta) u_c(d))] \geqslant u_c(d) + \delta(\eta u_c(h) + (1-\eta) u_c(d))$$

7 Conclusion

In this paper I have extended the previous literature about the political economy of mass media by analysing how a citizen's voting decision and collusion between the media and politicians change when two pieces of information about politician's type are available: a media signal and observation of the public good. By using both the two signals, I have shown that citizens manage to sort an honest politician from a dishonest one more often than if they were relying on media information only. Moreover, I have shown that the use of both signals makes collusion harder to take place. Furthermore, in this paper I have taken a departure from most of the exisisting literature. In previous works voters have quite a passive role towards information. In this work I have started endogenising citizens' information acquisition and I have shown how this decision depends critically on the time discount factor between the two periods. By using media in an active way the citizen can decide whether to use information if and only if this increases her expected utility. I have highlighted that there is a certain region of time discount factor between the two periods where it is optimal ex-ante for the citizen to commit not to acquire information about the incumbent. However, it is a well known result that there is a tension between optimality ex-ante and optimality ex-post. Even though for the voter it may be optimal ex-ante to commit not to use any information, once the new information is available, it is optimal for her to use it. This argument might make for unstable equilibria where the voter commits ex-ante to a sort of "rational and strategic ignorance". On the other hand I have conjectured that, if the citizen's commitment not to acquire information is not possible, the existence and easing of collusion might contribute, by concealing informative signals, to

increase citizen's utility ex-ante. I judge this a surprising and novel result which contradicts most of the findings of the literature in this new but very interesting field of the research in political economy.

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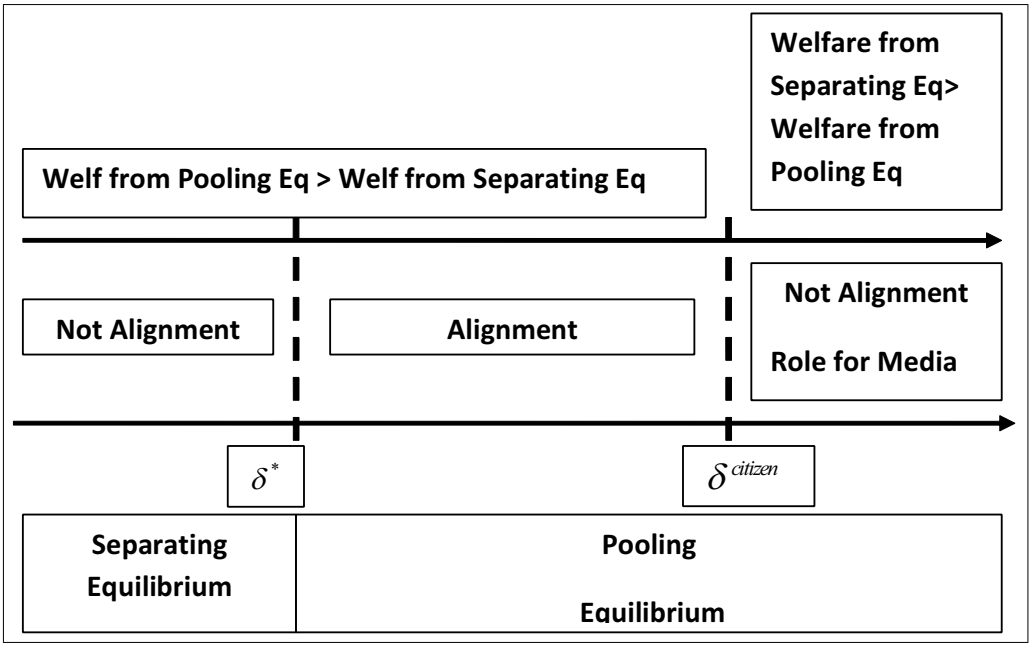

Figure 1: Collusion is not Possible

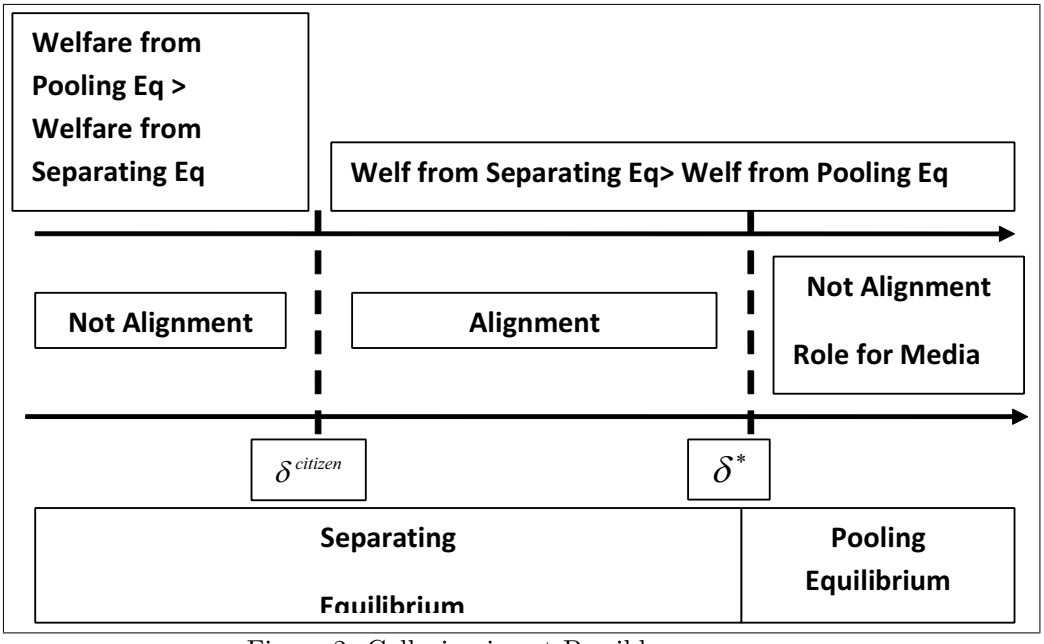

Figure 2: Collusion is not Possible

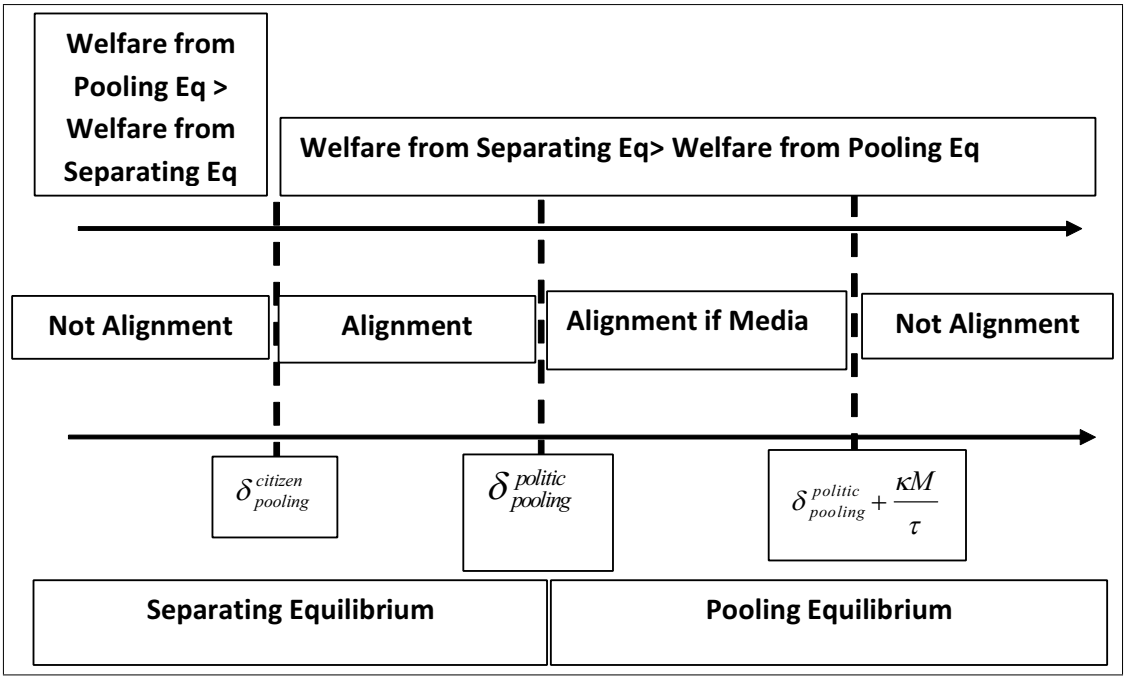

Figure 3: Collusion is Possible

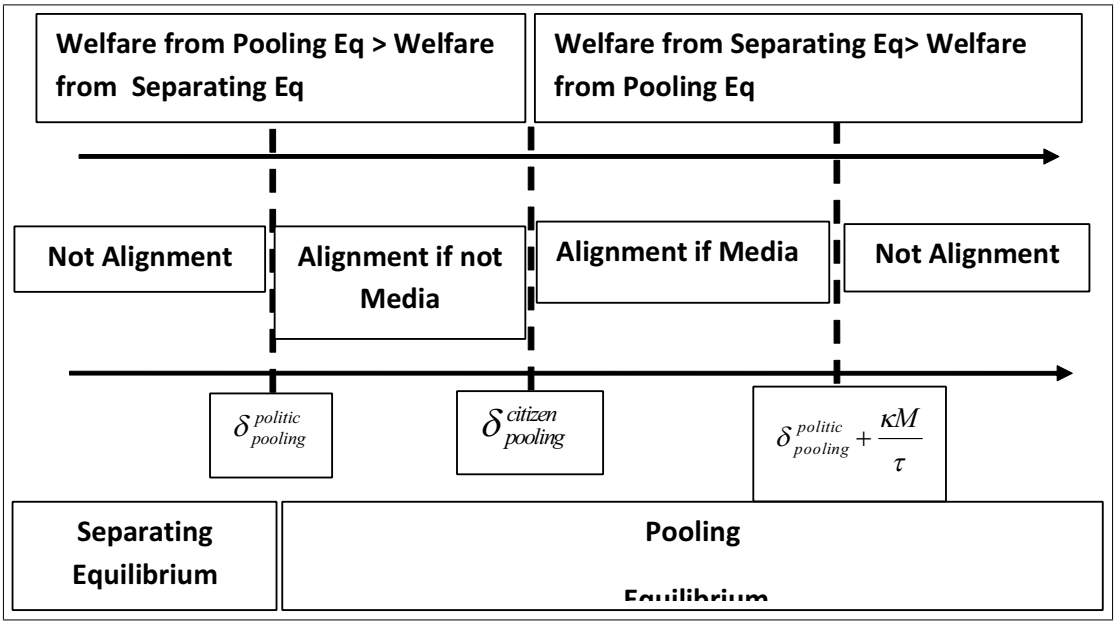

Figure 4: Collusion is Possible

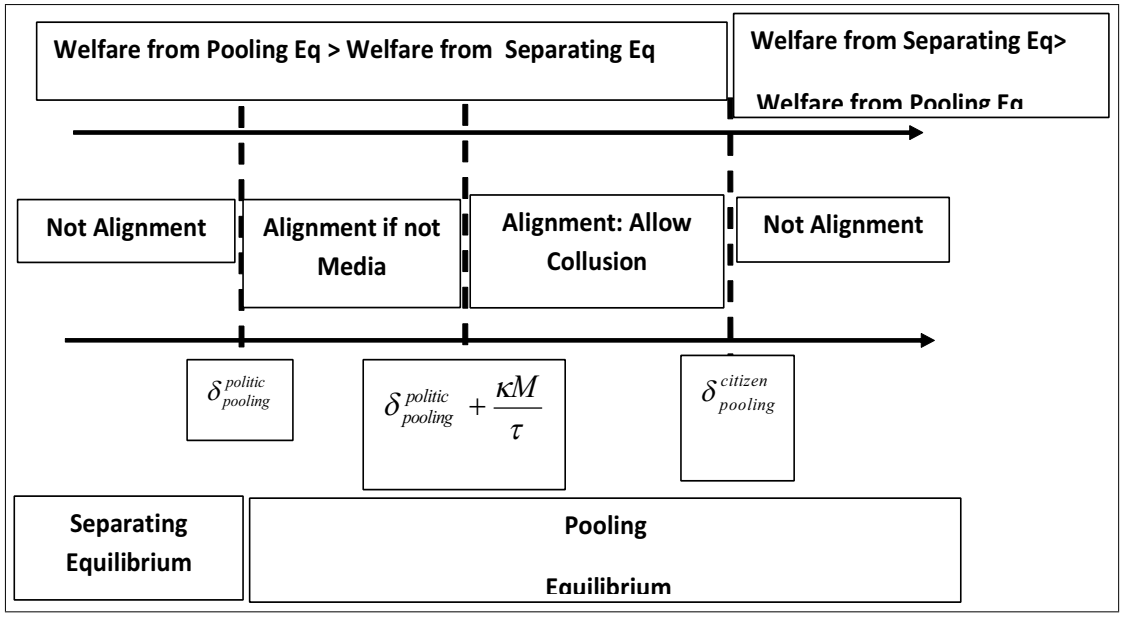

Figure 5: Collusion is Possible