THE MEDIA AND THE POLITICAL BUSINESS CYCLE

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Abstract. In this paper I study the consequences of politically motivated media bias over fiscal policy and electoral outcomes. The model follows the structure of a strategic information transmission game with reputation, which is embedded into a specific political economy problem. Constrained by a balanced-budget condition, a democratically elected government who serves for two periods, is mandated to set fiscal policy on behalf of the citizenry. Production of public goods is correlated to production of goods in the private economy. An informed player (the media) transmits information about the government’s competency. This information is used and processed by producers and voters. The media are politically motivated and have incentives to misreport their findings in order to influence the electoral outcome accordingly. The impact of strategic information transmission varies from non-electoral years to electoral ones, generating thereby a political business cycle.

(JEL: 131, D82, D83, D84, D72, D78, H30).

Keywords. Political Business Cycles, Equilibrium Political Budget Cycles, Belief Manipulation, Media Bias, Public Information, Political Accountability, Electoral Control, Strategic Information Transmission, Expert Advice.

1. Introduction

Credible media might manipulate disclosure of useful information in order to influence the electoral outcome to their advantage. But if the media are credible for the information they send their information manipulation might create economic distortions other than the ones implied by the choices we make through the election institution. If the public matter on which the media are informing the public is correlated to private actions media bias might have important side-effects. In fact, these side-effects might be sizeable enough so as to put an end to incentives of the media to misreport their findings. The objective of this paper is therefore to study strategic political information transmission when public and private affairs are strongly correlated, and to convey insights on the consequences that political media may have upon economic and political outcomes.

I consider fiscal policy. A democratically appointed incumbent is mandated to set, every period, and constrained by a balanced-budget condition, taxes and the provision of public goods. Elections are held every other period (every mandate lasts two periods), and all agents —voters, producers, and politicians—, are fully rational. Fiscal policy is correlated with private actions.

through an intermediate input used in the production of public goods. Because the technology in the production of public goods combines the government’s competency — an unobserved random variable — with the privately produced input, there is an endogenous demand for information about the incumbent government’s skill in power. Information conveyed by the media is, in a fundamental way, also useful to voters when deciding whether to keep or oust an incumbent, because social welfare is increasing in competency. The media are politically motivated and may manipulate information in order to alter the electoral outcome in accordance with those political preferences, by stochastically enhancing (diminishing when against the government) the re-election probability of the incumbent. However, when doing so, they are aware that their information manipulation will have consequences upon private production, and fiscal policy thereby, both of which affect, in turn, the electoral outlook they are attempting to influence in the first place.

There are several interesting results. First, I build a model where politically motivated media are able to influence the economy, the election outcome, and fiscal policy, in equilibrium, in spite of all receivers of their information being rational and aware of the media’s political motive. Following the structure of Bénabou and Laroque (1992)’s reputational game, the media are believed to be intrinsically honest or politically independent, with some probability. Because the signal on competency that the media are able to extract is noisy, neither voters, nor producers, can learn the media’s type with precision.

As in most work on media bias, the media influences economic variables through its influence over the electoral result. In the present model this operates mechanically through the appointment of politicians that differ in their abilities in manoeuvring fiscal policy. More interesting is the indirect influence that manipulation of the electoral outcome has over economic outcomes contemporaneously. This is, to my knowledge, the first work addressing this additional economic effect of biased media.

However, a novel and much more interesting consequence of strategic information by political media is that it generates a political business cycle. I show that the way strategic information influences economic and political outcomes varies from one period to another. When the election draws closer, the conflict between the economic and political consequences becomes starker. A key feature of the model is its asymmetry on the economic side. Welfare is positively correlated with supply of the intermediate input in the economy. Because the media’s welfare is assumed to be alike that of the representative agent in the economy, except for political rents through which I formally introduce political motivation, the media have a strong incentive to report optimistic outlooks on the economy (by sending a message informing the government’s competency being high). As a consequence, during non-electoral periods, dishonest media will tend to send optimistic outlooks always, knowing that their messages will not have a bearing over the election. When the election draws close, the media still have a strong incentive to send optimistic messages, specially when their signals recommend doing so. Only media strongly in favour of the incumbent will risk depletion of their reputation as honest media in order to re-appoint the incumbent when the signal is low. Contrariwise, only media strongly against the incumbent will risk their reputation in trying to oust an undesirable incumbent when the signal is high. Due to this effect, in equilibrium, fiscal policy behaves, on average, differently.

\footnote{In the model the media’s pay-off is assumed to be correlated to the economy’s performance. If we assumed that the media were rewarded for their precision when informing instead, we would still get a political business cycle with this model. The political business cycle would differ, however, in its essential traits.}
during electoral periods, as opposed to non-electoral ones. In particular —unless the media are strongly against the incumbent— taxes (public spending) will be on average lower (higher) in election periods as compared to non-electoral ones. This conforms to findings in the empirical literature on PBCs (see Drazen (2000a) and Alesina and Roubini (1992)).

**Related Literature.** — The model in this paper brings together two strands of the Political Economy literature which to present have not been related one to another.

From the literature on mass media bias, two key related contributions are Stromberg (2004a) and Anderson and McLaren (2010). In these articles media bias emerges in contexts where newspapers are heeded for their information on public matters that are somewhat correlated with other private actions. The model to be described in the present paper is the first attempt in studying this correlation within an explicit public policy problem, and the first one allowing private actions to have effects over the public ones directly (which is not addressed in these related works). This is a fundamental element in our approach: when reporting the media are aware that the distortions on the private decision-making process through the messages they send will have consequences upon the economy, fiscal policy, and the electoral outcome they are willing to influence in the first place.

The link with the literature on Political Business Cycles initiated by Nordhaus (1975), is of a different kind. This literature is large, and has been running now for more than 35 years (Drazen (2000b)). One of its most remarkable features is that in spite of having plenty of evidence on pre and post electoral Political Business Cycles on the empirical side, there is still no agreement on how these cycles are created. There is consensus though in that the monetary approach (such as the one stressed by several of Alesina’s and other authors’ contributions (see for example Alesina (1987) and Alesina and Roubini (1992))) is unsatisfactory in explaining them. A more auspicious avenue of research seems to be one exploiting either models combining both monetary and fiscal policies, or models featuring only fiscal issues instead (such as Rogoff (1990) and Rogoff and Sibert (1988)). In this work I take the latter route, which though sharing much of their environment and motivation, differs in several aspects to the ones found in those related works studying the Political Budget Cycle. In the light of this large literature, the contribution of the present contribution is to provide a new theory for PBCs that does not hinge on a signalling game between the incumbent in power and voters (as in Rogoff (1990)), which is to present, arguably, its most convincing theory (Drazen (2000a), Drazen (2000b)).

More generally, the supervision technology and information transmission conflict in the present model follows closely Bénabou and Laroque (1992), the media being the informed sender, and the voters and producers the rational receivers who heed the sender’s messages for its credibility to make-up a decision. A key difference with this paper is that the media is assumed to bear the distortions which it inflicts upon the economy together with voters and producers. In this work I show that the stronger is the pull in favour or against the incumbent (the receivers being neutral in this respect), the more scope there will be for electoral manipulation (a result evoking Crawford and Sobel (1982)). As a consequence, the larger the influence over economic policy would be.

The paper is structured as follows. In the next section I layout the model and describe the political economy. In Section 3 I sketch out and discuss the solution to the incumbent official’s

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As Drazen points out: “... after twenty-five years, monetary surprises as a driving force of a PBC just do not provide a very convincing story” (see Drazen (2000b), page 95).

For a discussion of all these and other related issues see Drazen (2000a) and Drazen (2000b).
problem, the voting decision, how the market for good \( z \) clears, and the media’s information transmission decision. In Section 4 we study information transmission and the political business for the simple two-mandate game. In Section 6 I conclude.

In the next subsection I lay out the basic mechanism generating a political business cycle. In simplifying the argument I have resorted to another information technology used by the media, different than the one studied in the model. The reader who wishes to skip this sketch of the argument can go directly to the next section without missing much (the overview is self-contained).

A. Overview: A sketch of the argument. \(^5\) In order to provide some intuition as to how the mechanism through which the media’s political motive generates a political business cycle, in equilibrium, consider the following oversimplified example. Suppose for a moment that the media are able to extract a perfectly correlated signal \( s_M \) of the incumbent’s competency, which is the decisive variable both for production and the election. The media extract information from this signal occasionally, with probability \( \nu \). With probability \( 1 - \nu \) they learn nothing, and cannot garble this information. This monitoring technology is exclusively owned by the media. Voters heed the media to improve their control over incumbents’ adverse selection. Producers of an intermediate good used as an input in the production of public goods also heed the media because their profits are correlated to competency in the production of a public good. In order to introduce the media’s political motive in the simplest way, suppose that their profits depend on pre-tax income \( \tilde{y} \) plus a variable capturing the media’s preference for the incumbent \( L^I > 0 \), which is independent of its skill in power. This means that the media’s pay-off is not that of the representative agent, whose welfare is affected by fiscal policy. Output \( \tilde{y} \) follows a stochastic process independent of the governmental efficiency stochastic process that both producers and voters try to infer. Specifically, at any point in time then, for a given realisation of \( \tilde{y} \), the media’s pay-off is:

\[
\Gamma_t = \mu y_t + L^I
\]

with \( 0 < \mu < 1 \) a constant reflecting the fact that profits of the media are proportional to output. In a fundamental way, this pay-off does not depend on variables in the economy that are influenced by the media’s reports. Every mandate is divided in two sub-periods. At the end of the second sub-period an election is held between the incumbent and a challenger. The incumbent’s competency \( \tilde{\alpha} \) follows a short MA(1) memory process:

\[
\tilde{\alpha}_t = a_t + a_{t-1}
\]

Where \( \tilde{a} \) can be high \( a_H = 1 \) (with probability \( \frac{1}{2} \)) or low \( a_L = -1 \) (with probability \( \frac{1}{2} \)). This is common knowledge. For simplicity’s sake, assume the media does not develop a preference for the opponent, and therefore normalise it to zero (that is \( L^O = 0 \), where ‘O’ denotes “opponent”). Assume also that the actual shock over competency is observed by all parties with a lag (so at time \( \tilde{a}_{t-1} \) is observed by all parties). Voters infer \( a_t \) after observing the media’s messages. Because next period’s expected welfare is increasing in \( a_t \), voters vote incumbent only if their posterior on the incumbent’s competency is above a certain threshold which depends on the challenger’s expected competency for next period.

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\(^5\)This example builds from Cox (2011).
In every electoral period it is assumed that the challenger’s expected competency for the upcoming period, if appointed, is an exogenously determined constant $-1 < \gamma < 0$. Denote by $m$ the media’s message, which can be either the observed competency ($m = a_t$), if observed, or and empty one ($m = \emptyset$). Voters vote incumbent, therefore, only if $E(\hat{a}|m = m) \geq \gamma$; otherwise, they vote challenger.

Producers are not concerned about the election. But profits are correlated to the incumbent government’s competence. Specifically, as we assume all through, they produce a non-storable intermediate input $z$ used in the production of public goods. Because the governmental demand for such good is monotonically correlated with competency, producers are willing to learn as much as possible about competency in order to maximise profits. We assume here that optimal production by producers commands supplying $z = E(\hat{a}|m = m)$ units of this intermediate input.

When the media does not observe evidence about the incumbent they cannot do anything but send an empty message $m = \emptyset$. The more interesting case is when the media had found evidence about competency. Of course, if competency is greater or equal than zero ($s_M = a > 0$) it is a dominant strategy to disclose information. In a non-electoral period, the media will always disclose information, even if it brings bad news on the incumbent’s current competency. This is due to the short memory process: only shocks at the end of the mandate will affect competency in the following mandate. Importantly, because agents in the economy know the media have no incentive to withhold information, they are certain that empty messages mean the media did not find evidence about competency. Their posterior for actual competency would be $E(\hat{a}|\Omega_t) = 0$ (where $\Omega_t$ is agents’ information set). Producers’ supply of $z$ in that case would be equal to zero.

Denote by $Pr(v = I|m = m)$ the probability that the incumbent $I$ is re-elected when message $m = m$ is conveyed. Now consider an election period and media with information that, if disclosed, would imply the incumbent is not re-elected (that is, $Pr(v = I|m = -1) = 0$). Suppose that $Pr(v = I|m = \emptyset; \mathcal{L}^T > 0) > 0$\(^6\). Then, it is easy to show that the media will withhold information in the election period.

The key is understanding that the media would not face then a contemporaneous trade-off between disclosure and concealment, for in spite of the consequences that its decision will have upon the economy through misalignment of producers’ expectations which the media have the power to correct to same extent, they would surely not have any effect upon the media’s profits, which are governed by the independently drawn level of output $\tilde{y}$.

The media will prefer to withhold information when found if and only if

$$\Delta = E_t(\Gamma_{t+1}|\hat{m} = \emptyset) - E_t(\Gamma_{t+1}|\hat{m} = -1) \geq 0$$

But the above assumptions imply $\Delta = Pr(v = I|\hat{m} = \emptyset, \mathcal{L}^T > 0$. The media will withhold information. Voters and producers know that if the media had found favourable evidence about

\(^6\)As discussed in Anderson and McLaren (2010) and Cox (2011), the posterior on competency will suffer from a suspicion effect if rational voters observe the media’s political motive. When in favour of the incumbent this would imply tilting the posterior below the unconditional mean for competency, 0. In fact, if the contender’s expected competency were 0, in our example the media would never have the power to influence the election outcome. We are assuming here that the posterior is dragged downwards when the media send empty messages, but not too much. This positive re-election probability is reflecting other stochastic shocks affecting the election choice, that we do not explicitly introduce here.
the incumbent they would have disclosed it. Only bad news on competency would have been withheld. The posterior for competency, given an empty message, and given the observed political motive $L^I$ is then obtained as follows

$$E_t(a_t | \hat{m} = \emptyset; L^I) = (1 - \nu)E(a) - \nu = -\nu$$

As long as $\gamma < -\nu$ the incumbent is re-elected$^7$.

The effect upon production of $z$ is evident enough. In electoral years, when empty messages are conveyed (an event occurring with ex-ante probability $\frac{\nu}{2} + 1 - \nu$) producers will supply less units of the intermediate input, which would affect the administration of public resources at the governmental level. That is, both private production and fiscal policy, will fluctuate differently in electoral years, from an ex-ante perspective, than in non-electoral ones.

2. The Model

A. The political economy.

A.1. Agents. We have a political economy populated by a continuum of citizens of overall mass 1. Citizens consume and vote$^8$. Importantly, citizens also read newspapers$^9$. Through a democratic electoral institution a member of the public (a candidate-citizen) is appointed as head of state every other period$^{10}$. The government is mandated to administer public resources on behalf of its fellow citizens. To simplify matters and focus on information transmission by the media, we treat the politician as an automaton setting fiscal policy in an optimal way, and always running for re-election. Further below I describe how a citizen may become a politician and if so, possibly, the head of state. A single citizen$^{11}$, indexed by $m$ and referred to as the media, exclusively owns a technology able to extract informative signals about the state of the economy. This information is useful both for private production and electoral decision-making. The introduction of the media is therefore the key distinctive feature of the model. With this setting we have producers, the media, and voters, as players in the information-transmission game to be described below.

A.2. Welfare of the representative agent. All citizens, excepting the media, have identical preferences, and we will refer to any one of these ordinary citizens also as the “representative agent”. Welfare of the representative agent of the polity at time period $t$ is

$^7$In that case in fact $\Pr(v = I | \hat{m} = 0) = 1$ and $\Delta = L^I$, if no other electorally related noise were allowed.

$^8$I shall use interchangeably the words ‘consumer’ and ‘citizen’ to refer to them throughout.

$^9$This is not crucial. We would get the same results if information released by the media is somehow perfectly transmitted to all members of the polity, even when their messages are meant to target specific audiences in the economy (such as the business community for instance).

$^{10}$This citizen will be indistinctly referred to as the ‘incumbent’, the ‘government’ or the representative ‘official’.

$^{11}$In the baseline model we treat the media as a single individual for simplicity, and leave for extensions of the model the study of environments in which there is more than one publisher. So the basic set-up the media may be interpreted as a monopoly or as a number of outlets owned by a single proprietor. In the latter, differentiation, if there were, would be interpreted to be the outcome of taste differences across the citizenry on matters other than the public one (e.g. entertainment). The media could be owned by a number of citizens. This is not relevant here as long as the mass of owners is negligible, as I assume throughout.
\( \Upsilon_t = U(C_t, G_t) + V(K_t) \)

Where \( C \) denotes the per capita amount of consumption of a private good, \( G \) the per capita consumption of a publicly provided good (that we shall interpret as current public spending), and \( K \) the per capita consumption of another public good.

In order to keep tractability, but without loss of generality\(^1\), welfare is parametrized. It is assumed that

\( \Upsilon_t = C_t^{\omega} G_t^{1-\omega} + K_t^{\phi} \)

Where \( 0 < \phi < 1 \) is a technological parameter transforming units of \( K \) into units of utility, and \( U(C_t, G_t) \) is Cobb-Douglas, with \( 0 < \omega < 1 \).

A.3. Private Technology. Every period, every citizen is endowed with an equal, constant, and exogenously determined amount of a non-storable final good for consumption, denoted by \( \bar{Y} \)\(^1\). In order to produce public goods the government levies on this income variable, every period, a lump-sum tax, that we denote by \( T \). This tax revenue serves as an input in the production of public goods both directly and indirectly, through the acquisition of other privately produced inputs. More on this below. Because income \( \bar{Y} \) cannot be stored, citizens consume all their disposable income at the end of every period.

\( C_t = \bar{Y} - T_t \)

A.4. The government and the public goods technologies. The government — that I shall denote by \( I \), for “incumbency” — consists of a democratically elected official. Preferences of the government are identical to those of the representative agent. Welfare of any incumbent in power at time \( t \) is thus\(^1\)

\( \Upsilon^I_t = \Upsilon_t \)

The way we introduce political accountability is by assuming that public provision of \( K \) depends on the government’s policy-making ability or competency, that we denote by \( X \). This variable is not controlled by the government, who takes it as an endowment used as an input in the production of \( K \). This overall ‘governance’ variable is affected in turn by two distinct variables: the government’s intrinsic competency or ability (that we denote by \( A \)), and other

\(^1\)The results remain essentially the same when a more general instantaneous quasi-linear utility function such as \( \Gamma_t = U(C_t, G_t) + V(K_t) \) is considered instead. Then it would suffice to impose that \( U_{CG} + U_{GG} < 0 \) and \( U_{CG} + U_{CC} < 0 \) (\( C \) and \( G \) are non-inferior goods), that \( U(.) \) and \( V(.) \) are standard strictly concave and twice differentiable increasing functions with \( U'(0) = V'(0) = \infty \) and \( \lim_{x \to \infty} V'(x) = 0 \) (the Inada conditions), and \( V''(K)K + V'(K) < 0 \).

\(^1\)One unit of this good transforms linearly into one unit of private consumption \( C \).

\(^1\)With this formulation we have an essentially utilitarian government, with the social welfare function being that of the representative citizen. This is an essential step in our political economy approach to the problem, differing to much work on information transmission in the context of fiscal or monetary policy-making (Cukierman and Meltzer (1986), Backus and Driffield (1985), Barro (1986), amongst others), where an “objective” policy function is assumed instead, and the role of voters, or more generally, agents’ preferences, are left aside.
exogenous shocks to government’s performance $X$, which are completely out of its control, and subsumed in a variable that we denote by $\Theta$. Voters care for the government’s competency and must try to tell these variables apart when deciding who they vote. The government’s competency $A$ is correlated through time, and elections offer citizens a chance to get rid of bad incumbents. Political accountability, therefore, takes the form of an adverse selection problem over politicians, with the election institution operating as a potentially effective mechanism screening good from bad incumbents. One of the key questions to be addressed in this paper is to what extent this screening device is impaired by the media’s meddling into public affairs.

To focus on the strategic information transmission phenomena, I have shut down the signalling motive potentially goading politicians enjoying political rents from holding power to manipulate fiscal policy in order to foster their re-electoral outlook (as in Rogoff and Sibert (1988) and Rogoff (1990)). In the baseline model I assume therefore the government to be an automaton maximizing welfare$^{15}$.

In a fundamental way, in order to produce $K$ the government must combine its overall policy-making ability $X$ with a non-storable intermediate input — denoted by $Z$ —, produced and supplied in the private economy by a large number of small and scattered price-taking firms that carry out exchange with the government in a perfectly competitive way.

I assume that $K$ is produced with the following technology$^{16}$

\begin{equation}
K_t = Z_t X_t
\end{equation}

To finance the acquisition of $Z$ the government uses tax revenues $T$ levied on the citizenry’s income, after having deduced from this amount the overall amount of resources to be spent on public good $G$, which transforms linearly with taxes. The government is constrained by a balanced-budget condition binding its manoeuvring of the public sector every period. Total public expenditures must equal thus tax revenues

\begin{equation}
T = P_z Z_t + G_t
\end{equation}

Where $P_z$ denotes the unitary price of $Z$. We now turn to how this input is produced and supplied in the private economy.

A.5. Producers in the private economy. There is a continuum of atomistic, ex-ante identical, price-taking firms, of overall mass 1, indexed by “$i$”, and uniformly distributed on $[0,1]$.$^{17}$ These

$^{15}$Note that the government is de facto benevolent. Benevolent governments would step down from an electoral race if their belief on their actual competency is below that believed for the contender for the upcoming mandate’s first period. This is not an issue in the model, which has the government holding the same information as voters. In equilibrium therefore, whenever a government is willing to step down after assessing its competency from the information it has learnt, voters would have already discharged him of his duty.

$^{16}$A more general formulation, having consequences on the substitutability between the government’s overall efficiency and the privately produced input, and therefore on the sign that changes on the tax level would take through higher levels of competency, would be one using a CES production function. The basic informational conflict, however, and the channels through which information manipulation takes place, do not change fundamentally, and in order to have a tractable model with a closed form solution, I have assumed a simpler parametrization.

$^{17}$Producers’ action profile is thus a measurable function. If we denote by $a(i)$ the action by individual “$i$”, then $a(i): [0, 1] \rightarrow \{0, 1\}$. 

producers produce units of the intermediate input $Z$. Producers do not vote\(^{18}\), and as such, are not to be considered citizens\(^{19}\).

Every period, producers are endowed with a single unit of an indivisible good they cannot consume, nor store\(^{20}\). This good delivers one unit of $Z$ only if it is put into production. Producing one unit of $Z$ implies incurring a fixed cost $f_i$, which varies across producers. The way I model heterogeneity across firms is by assuming a random draw every period, uncorrelated both through time and across firms. Both production and the cost of production are assumed to be certain: for every producer one unit of the endowment delivers one unit of $Z$, and deploying the unit of endowment for production implies incurring known cost $f_i$\(^{21}\).

A key assumption involves the timing of production of $Z$. Due to technological constraints, this good must be ready for sale before the government decides how much to dispense on its acquisition (after learning its ‘governance’ shock $X$). Otherwise, the producer would not be able to timely supply its unit of $Z$, which he cannot store either. At the time the government bargains with producers on the amount to be purchased, total supply of this intermediate input is therefore pre-determined.

It is assumed that both the government and producers are price-takers in the market for $Z$. To make this explicit on the demand side, I assume that the polity is administratively divided into a large number of units. Every period, and exogenously, it is assumed that the government allocates a given proportion, say $\mu_h$ (where $h$ indexes the administrative units), of the overall amount to be spent on $Z$, to unit “$h$”. With this amount each unit must purchase units of $Z$ in a competitive way.

Denote by $S_z \equiv \mathbb{P}_z^*(\beta)Z$ the overall amount to be spent on $Z$ in the economy, and by $S_{zh} \equiv \mathbb{P}_z^*(\beta)Z$ the amount of resources to be allocated to the administrative unit “$h$”. An equilibrium in the market for $Z$ implies\(^{22}\)

$$S_z \equiv \mathbb{P}_z^*(\beta)Z = \Pi_h S_{zh}$$

\(^{18}\)If the reader is uneasy with this assumption, one alternative interpretation with identical properties is that producers do not constitute a majority (they virtually have no political power) and their welfare is not considered in the social welfare function (that of the representative agent) when the government sets fiscal policy. As a matter of fact, it would make no difference at all if production were carried out by producers abroad. The key is having ordinary consumers constituting the majority in every election. Then their preferences, and not those of producers, will be considered by the incumbent when setting taxes and public spending. This assumption does not alter our results to any extent, as long as producers do not own the media. In that case they would always use information about the incumbent in order to maximise expected profits, but not necessarily share this information with other constituencies as long as there were political motives for doing so, as we assume the elite owning the media have in our model. In any case, we would not observe in that case a political business cycle, though the media would still influence the election: in our model voter’s signal extraction would be weaker and its consequences upon politicians’ accountability more severe, if producers owned the media.

\(^{19}\)There is no loss in generality therefore in normalizing their total mass to one.

\(^{20}\)Being labour perhaps the best interpretation for this good, but by no means the only one. The key is having these agents facing investment opportunities under uncertainty.

\(^{21}\)A more general formulation for production is one where the final amount of $Z$ also faces productivity or salability shocks.

\(^{22}\)We could allow for the existence of several independent markets and obtain a similar expression. This is without loss of generality. In that case the government would base its decision on some measure for the aggregate price.
generates, endogenously, a demand for information on the public matter—the government’s competency.

Timing mismatch between private production of the intermediate input and production of the public goods, which must be combined with the government’s competency. The higher is the incumbent politician’s competence believed to be.

Mechanisms, private partnership arrangements. Or directly an auction mechanism. However, at a cost of making the model governmental purchases is assuming that the implemented mechanism consists of a concession or other public— or mechanisms would also do. One may argue, for example, that a more natural environment for studying non-governmental demand for this input as if coming from foreign economies. Of course, many other ways to reflect intrinsic traits of the political system.

If the reader is uneasy with this assumption, it may help considering the economy (the aggregate price of an object is the rational expected equilibrium price that I denote by \( P_e \)).

Following standard uses in related literature (Barro (1986), Backus and Drifill (1985)) I assume that \( f_i \) is distributed with a cdf \( F \) belonging to the family of distribution functions such that \( F(x) = x^\gamma \), on \([0, 1]\), with \( \gamma \) being interpreted here as the elasticity of supply. Now take as given producers’ expectation \( P_e \). Producer “\( i \)” is willing to produce if and only if \( f_i \leq P_e \), which implies that the overall supply of \( Z \) in the economy would be

\[
F(P_e) = (P_e)^\gamma = Z^s(P_e)
\]

An alternative reductionism on the side of the government’s price-taking behaviour would incorporate an aggregate demand for input \( Z \) for private ends. Suppose we have \( Z_t = BZ_{pub,t} e^{\theta t} \), where \( Z \) is the aggregate demand for input \( Z \) in the economy, \( Z_{pub} \) the governmental demand, \( B > 0 \), and \( \theta \) an i.i.d aggregate demand shock, normally distributed such that \( \theta_t \sim \mathcal{N}(0, \sigma^2) \), and the parameter \( \rho > 0 \) is meant to capture some correlation between the governmental demand \( Z_{pub} \) and overall demand. Then the assumed equation is the reduced form of an economy with a continuum of scattered and independent competitive markets for \( Z \), all facing a common aggregate shock, an individual i.i.d normally distributed idiosyncratic shock, and each exhibiting some fixed individual effect (which in the aggregate sum up to some parameter \( B \)). If one assumes that the idiosyncratic shocks are independent, then when aggregating across markets, and using the law of large numbers, one arrives to an expression alike the one describing aggregate demand. We are not being explicit here on how input \( Z \) is used for private purposes (either consumption or production of final goods), for this is inconsequential for our subject matter. What is essential in the model is to have some observable aggregate variable in the economy (the aggregate price of \( Z \) in this case) containing some information (in the form of a noisy signal) about the incumbent official’s competence. If the reader is uneasy with this assumption, it may help considering the non-governmental demand for this input as if coming from foreign economies. Of course, many other ways or mechanisms would also do. One may argue, for example, that a more natural environment for studying governmental purchases is assuming that the implemented mechanism consists of a concession or other public-private partnership arrangements. Or directly an auction mechanism. However, at a cost of making the model less tractable and more knotty, we would not gain much more insights from the problem at stake if in those mechanisms, ceteris paribus and in equilibrium, the bidders are willing on average to bid more aggressively the higher is the incumbent politician’s competence believed to be.

The link between public and private affairs, therefore, is introduced by assuming a non-storable intermediate input used in the production of public goods, which must be combined with the government’s competency. The timing mismatch between private production of the intermediate input and production of the public good generates, endogenously, a demand for information on the public matter—the government’s competency.

From this aggregation approach we obtain a smooth aggregate “supply” of input \( Z \) in the economy.
The higher the prevailing equilibrium price is expected to be, the larger the number of producers willing to produce, and the larger the overall amount of salable $Z$ to be supplied at the time the government produces $K$.\textsuperscript{26}

Remarks. — We have introduced, in a very simple but tractable way, the correlation between a private action (production of $Z$) and the public matter on which the election is to be focused on: the government’s competency. This correlation is two-sided\textsuperscript{27}: on one hand, we have the government’s ability influencing producers’ final pay-off; on the other, expectations about the government’s competence will have consequences on production and fiscal policy, which in turn will influence voters’ inference of the government’s competency and because of it its re-election outlook. Because the media will provide information about the incumbent official’s competence, in a way to be described below, and because this competence will affect the governmental overall spending in the acquisition of the intermediate input, and with it, its equilibrium price, producers are willing to heed the newspaper’s message. The introduction of producers in our model, therefore, is not only introducing private actions correlated to the public matter. It explicitly introduces agents in the economy (producers) having incentives to heed (and potentially pay for) the media’s message in order to decide upon actions that have consequences on their private material welfare (expected profits) and that of their fellow citizens (through fiscal policy).\textsuperscript{28}

\textsuperscript{26}An alternative formulation rending a positively sloped supply of the intermediate input, is one following Grossman (1981)’s simple setting when introducing Muth (1961)’s seminal concept for rational expectations. In this environment production of $Z$ would be carried out by agents in the economy who own, or are endowed with, a fixed non depreciating capital good exhibiting decreasing returns, and which together with a commodity (say $n$) that is itself salable in international markets to which these producers have access but are not able to influence (the international price for $n$ is constant), serves in the production of $Z$. The capital good cannot be expropriated and we assume all producers holding an identical amount $\bar{L}>0$ of this production factor (it may help thinking this factor as land or human capital, or some other production factor that is fixed in the short run).

\textsuperscript{27}This two-sidedness is absent in the political economy literature on mass media (see Prat and Stromberg (2011) for a review). Two outstanding contributions correlate private actions with the public matter. In Anderson and McLaren (2010) a private action is abstractly assumed to be correlated to the public one, generating thereby a demand for news. However, the private action itself has no bearing over the public matter, which is decided through direct democracy (there are no political accountability issues by construction). In Stromberg (2004a) the mechanism differs, though the correlation still is one-sided. In that paper newspapers are assumed to be purchased for the utility they generate privately to the reader (through entertainment or advertisement, for instance). Pressure groups compete on the amount of public spending to be targeted to them. The more they contribute to the newspaper, the more content and news related to their ‘cause’ is published. Because information about public affairs is —presumably in a strategic way— placed next to entertainment content, there is a chance that the reader will draw its attention to news on the public affair —in particular the one advocating some pressure group’s favourite platform—, “maybe” influencing thereby his/her electoral behaviour. However, the private action (buying a newspaper for its content on Kate Moss’s latest wandering about, for instance) does not directly influence the policy that pressure groups attempt influencing in the first place (in the sense that whether “Kate took down to Kingsway” or instead “shuffled down Holborn”, would hardly affect—at any rate—the belief on the public matter).

\textsuperscript{28}It is indeed a key element in the model’s approach, conforming to recent work on the role of the media in political affairs (see in particular Stromberg (2004a) and Anderson and McLaren (2010)), where the paradigm is that of having readers buying newspapers out of the private benefits they get from doing so. This approach is a convenient way of not having to address the difficult task of rationalizing politically motivated behaviour among uncoordinated rational agents. In the present model we do not resort to Kantian arguments to justify why people want to buy newspapers to decide what to vote —as much stressed in the voting literature, to have
B. Technological uncertainty in the provision of public goods. For the sake of clearer exposition, and because of it being informationally equivalent, I use the log of overall governmental efficiency, \( x \), instead of its level \( X \), to describe uncertainty and information transmission. Also, I use \( \tau = \log(T) \) and \( \theta = \log(\Theta) \). Uncertainty originates in the government’s overall efficiency \( \tilde{x} \), which is a random variable affected simultaneously by two stochastic terms: the incumbent official’s competency \( \tilde{\alpha} \), and \( \tilde{\theta} \), an exogenous shock on governance which is out of the polity’s control. We have that the realisation of \( \tilde{x} \) at any point in time is

\[
x_t = \alpha_t + \theta_t
\]

where \( \tilde{\theta} \sim \mathcal{N}(0, \sigma^2_\theta) \). It is convenient to define the precision of this shock as \( p_\theta = \frac{1}{\sigma^2_\theta} \). Competency of incumbent \( I \) is assumed to follow a short memory time process

\[
\alpha^I_t = \alpha^I_t + \Delta_a
\]

where the contemporaneous ability shock \( \tilde{\alpha} \) when in power can be high \( (a_H) \), with probability \( \frac{1}{2} \), or low \( (a_L = -a_H) \), with equal probability. We define \( \Delta_a = a_H - a_L = 2a_H \).

C. Electoral rules. Every representative official’s mandate lasts two periods: every other period an election is held. I assume that the media does not gather, and therefore transmit, information about the contender’s competency (which can only be gauged when in power). Expected intrinsic competence of any newly appointed official during the first term of his/her first mandate is thus \( 0.5 \times a_H + 0.5 \times a_L = 0 \). Every incumbent runs for re-election against a challenger (denoted by \( O \), for “opponent”). A challenger is a candidate-citizen withdrawn from the population at large. Therefore, any challenger’s competency during his/her mandate’s first term is expected to be \( E[\tilde{\alpha}^O] = 0 \). The available actions for the representative agent when voting can then be summarized as follows. Denote with \( v \) the action of casting a vote in favour of one of the available choices. The set of actions is \( V \), with \( v \in V = \{I, O\} \), where \( v = I \) means voting for the “incumbent” and \( v = O \) means voting for the “opponent”.

D. Information, the media, and timing structure. Agents in the economy are concerned about the contemporaneous shock on competency \( a^I_t \). Voters are willing to vote for the ablest contender (this we show formally below), and producers of \( Z \) must make inferences on \( a \) in order to decide whether to produce or not. There are two sources of information. One is fiscal people purchasing newspapers in order to be informed on public affairs and make up a decision regarding an impending election only, would be hard to reconcile with the rational individual cost-benefit approach—. In short, newspapers’ existence is borne in having producers willing to pay for information released by the media in order to maximise expected profits. However, this information is spread to all members of the public, influencing their electoral behaviour.

\[29\] Notice that this out-of-the-polity’s control shock is isomorphic to having an aggregate shock on overall salable \( Z \) instead, though this formulation requires being more explicit on the information the government handles at the time its decision is made.

\[30\] These assumptions imply that, conditional on the state \( a \), \( X \) is log-normally distributed.

\[31\] In an open seat election, at the very beginning of the polity’s existence, say period \( t_0 \), two candidates are randomly withdrawn from the citizenry in the same way. In any subsequent period, an incumbent always runs against an opponent who is withdrawn form the citizenry at large. As mentioned above, incumbents cannot step down from the electoral race.
policy itself (through $T$, $G$, or $K$) which serves as a noisy signal for competency. Another is information transmitted by an expert (the media) at the beginning of the period. While voters can use both sources of information, due to the timing gap producers can only use information contained in the media’s messages. In the process of inferring $a$ (the ‘state’ of the economy) we assume as a simplification that agents observe the lagged shock on competency:

**Assumption 1 (Past competency is common knowledge with a lag).** In any period $t$ the realisation of the incumbent government’s $t-1$ competency shock, $a_{t-1}^T$, is known to all agents in the polity.

I describe next information transmission by the media.

D.1. *The media as an expert.* There is an agent of negligible mass, that we call the media, having exclusive access to a technology able to extract, every period, an informative but noisy signal $s_M$ about the incumbent government’s competence. Formally,

$$\text{prob}[\bar{a} = a | \bar{s}_M = a] = p > \frac{1}{2} \text{ for all } a \in \{a_L, a_H\}$$

Denote by $m$ the media’s action (message), and by $M$ the message space. We have thus $m \in M = \{a_L, a_H\}$. The media is therefore an expert resembling Bénabou and Laroque (1992)’s informed agent.

Both the signal’s extraction and its subsequent transmission, are assumed to be costless to the sender.

D.2. *The media are politically motivated.* Information provided by the media is useful for the electoral institution because it helps voters in keeping officials accountable for their performance in power. However, the media are politically motivated. Specifically, I assume that the media develop a preference for the incumbent administration which is independent of its capacity in manoeuvring the economy. Formally

$$\Upsilon^M_t = \Upsilon_t + \mathcal{L}_t$$

Where $\mathcal{L}_t$ is a preference for ($\mathcal{L}_t > 0$) or against ($\mathcal{L}_t < 0$) the incumbent, and $\Upsilon_t$ is the representative agent’s actual welfare according to (1).\(^{33}\)

This is common knowledge: both the sign and the magnitude of the political pull is observable and known to all parties. However, in spite of it, I assume that the media are believed to have

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32\(^{32}\)Notice that for the game it makes no difference whether this parameter reflects objective information about the relation between the media and the politician, or simply reflects the public’s belief about this relationship. Same is true for parameter $p$.

33\(^{33}\)We take this political motive as exogenous and given. Empirical work by Gentzkow and Shapiro (2010) and Groseclose and Milyo (2005) show that the media are biased, and several other contributions have shown that mass media influences voting behaviour (see DellaVigna and Kaplan (2007) and Stromberg (2004b) amongst others). In our framework the source for media bias is supply-driven (otherwise we would have to allow for political discrepancies between citizens). The media might be politically motivated out of political income by pressure groups or the government itself (through capture), or simply because the politician in power is a good source for news (Davis (2008)). It may also reflect like-mindedness on other aspects of government — e.g. the agenda on society’s values — not directly related to economic policy. This variable also resembles the distance between the sender’s pay-off and that of the receiver in Crawford and Sobel (1982).
an *intrinsic* compromise with political independence when reporting. Formally, the media are believed to be always honest with probability \( \rho \), and dishonest with probability \( 1 - \rho \). An honest type always reports its signal, whereas a dishonest one may garble it strategically and systematically. Hence, parameter \( \rho \) is the media’s reputation as independent media.

As for information transmission, we assume a symmetric binary signal model (see Chamley (2004) for a discussion of this type of models). Denote by \( \tilde{m} \) any message sent by the media (which is a random variable from the point of view of producers and voters). It is assumed that the media can report truthfully \( (\tilde{m} = \tilde{s}_M) \) or untruthfully \( (\tilde{m} \neq \tilde{s}_M) \). We assume that dishonest media uses a *symmetric* mixed strategy (see Bénabou and Laroque (1992))

\[
q = \text{prob}[\tilde{m} = s|\tilde{s}_M = s]
\]

Probability \( q \) is known in equilibrium.

Importantly, and consistent with the fact that the privately observed or extracted (depending on the interpretation) signal \( s_M \) has only one occurrence per period, it is assumed that the media send one, and only one, message at a time (per period).

Remarks. — Our strategic sender (the media) differs to the one in Bénabou and Laroque (1992) in several respects. Firstly, at least in our baseline model, we assume that the media cannot resort to financial operations insuring them of the costs to which they are exposed through the effect that information manipulation has upon the economy. If that were the case the stronger the incentives to misreport would presumably be. Here the paradigm is having media with utility strongly correlated to the economic performance of the polity in which they participate. Intuitively, if the media could hedge itself through financial markets, then the lower the political bias above which the media would have the incentives and ability to manipulate electoral outcomes, fiscal policy, and production. This would be evident further below. For this reason we do not have to worry about media’s trading, nor its visibility when doing so (which is overcome by introducing liquidity shocks in the form of ‘noisy traders’ in Bénabou and Laroque (1992)). However, and here comes the second remark, the media’s manipulation is not risk-free: the shock over overall governmental efficiency, which influences the voters’ final decision, may undo most of the media’s efforts in trying to influence voters’ belief on the incumbent politician’s capacity. And thirdly, by the very nature of the game, the media are forced to make pre-announcement speculation: producers cannot wait.

D.3. Inference. Messages by the media influence agents’ beliefs on competency. First consider producers and voters at the beginning of the period. Following Bénabou and Laroque (1992), we can obtain the media’s credibility (the probability that the media’s report on competency matches actual competency), that we denote by \( \pi \equiv \text{Pr}(\tilde{a} = a|\tilde{m} = a) \in [1 - p, p] \). Credibility is inferred by agents from knowledge of the structure of the information transmission game and their prior on the media’s type. We have

\[34\text{Its symmetry is without loss of generality. Results remain the same if the canonical binary model with } a_H = 1 \text{ and } a_L = 0 \text{ were used instead.}
\]

\[35\text{In the baseline model, readership is composed of these two types of agents. The model is easily extended to environments where information processing is weaker amongst voters (for example, in cases where voters do not pay attention to messages by the media and do not condition on the price of } Z \text{ when inferring competency, though still being somehow informed of the media’s report at the time the election is to be held).}
\]
\[ \pi = \rho p + (1 - \rho)[pq + (1 - q)(1 - p)] \]

An equilibrium of the reputation game has a level of credibility for media’s messages.

Now define \( \beta \) as the common posterior belief that actual competency is high (\( \tilde{a} = a_H \)). If \( \tilde{m} = a_H \) all agents update their belief from \( \frac{1}{2} \) to \( \pi \). Similarly, if \( \tilde{m} = a_L \), then \( \beta = 1 - \pi \). More generally, we can write

\[ \beta = \text{prob}[\tilde{a} = a_H | \tilde{m} = m] = \frac{1}{2} + \text{sign}(m) \left( \pi - \frac{1}{2} \right) \]

As in Bénabou and Laroque (1992), reputation is updated at the beginning of every period, after \( a_{t-1} \) had been observed. As we show below, the media’s strategy, when dishonest, will depend on its reputation, which evolves through time. Suppose that reputation of being honest at any time period “\( t \)” is \( \rho_t \). Using Bayes’s updating rule, we can obtain next period’s reputation \( \rho_{t+1} \), for given message, after learning the true state of competency in the ending period. The rational agent computes

\[ \rho_{t+1} = Pr(\text{honest} | \tilde{m}_t = m_t; \tilde{a}_t = a_t) = \frac{Pr(\tilde{m}_t = m_t; \tilde{a}_t = a | \text{honest})Pr(\text{honest})}{Pr(\tilde{m}_t = m_t; \tilde{a}_t = a)} \]

where \( Pr(\tilde{m}_t = m_t; \tilde{a}_t = m | \text{honest}) = p \) and \( Pr(\tilde{m}_t = m_t; \tilde{a}_t = -m | \text{honest}) = 1 - p \). Also \( Pr(\text{honest}) = \rho_t \), \( Pr(\tilde{m}_t = m_t; \tilde{a}_t = m_t) = \pi_t(\rho_t) \), and \( Pr(\tilde{m}_t = m_t; \tilde{a}_t = -m) = 1 - \pi_t(\rho_t) \). Summing up we have

\[ \rho_{t+1} = \begin{cases} \rho^+_t = \frac{p\rho_t}{\pi_t(\rho_t)} & \text{if } m_t = a_t \\ \rho^-_t = \frac{(1-p)\rho_t}{1-\pi_t(\rho_t)} & \text{if } m_t = -a_t \end{cases} \]

D.4. Timing structure. To study the interplay between media, producers, and voters, we consider a two-mandates case. The model can be extended to longer inter-temporal horizons. The two-mandate case is general enough, however, if the political motive is thought to be incumbent-specific. If, for instance, like-mindedness between the politician and the media is not believed to be transmitted from incumbents in power to other members of the ruling party, or alternatively, is not believed to be partisan, then one would have political like-mindedness to be random, drawn from a known c.d.f, with mean zero. In such environment (see Cox (2011) for a model with such a feature), consistent with short-term politics, analysis of the two-mandates case would be enough in describing much of the unfolding results of that game. In a more general framework, where like-mindedness is to be interpreted as partisan (with an infinitely lived two-party political system, for instance), the two-mandates case would have to be extended to allow for several mandates.

When analysing the game we proceed, as usual, backwardly. The game has two-mandates, each with two sub-periods. In the last mandate there is no election. In the first mandate an election takes place at the end of the second sub-period (the electoral period). The general timing-structure of the game goes as follows.

Timing structure across mandates
I. First Mandate of the polity\textsuperscript{36}
   I.1 (Non-electoral time period $t_0$)
   I.2 (Electoral time period $t_1$)

II. Second and Last Mandate of the polity
   I.1 (Non-electoral time period $t_2$)
   I.2 (Non-electoral time period $t_3$)\textsuperscript{37}

Our main focus is on the electoral period, which will be compared to a non-electoral one during an electoral-mandate. Within each period, the structure of the game goes as follows (we consider the electoral period).

*Timing structure within a given period*

1. Past competency shock $a_0$ is observed by all parties. Nature draws the appointed official’s actual *intrinsic* competency $a \in \{a_L, a_H\}$, and producers’ idiosyncratic production cost $f_i$;
2. The media observes the realisation of signal $\tilde{s}_M$, which is correlated (with some noise) with the shock on actual competency of the government, and decides to send a message $m \in \mathcal{M} = \{a_L, a_H\}$;
3. Message $m$ is heeded by both producers and voters, who update their beliefs on the government’s competency being high, $\beta$. When updating their belief on competency, agents condition on the media’s political motive, captured by parameter $L^M$. At this stage producers decide whether to produce or not, generating overall supply of the intermediate input $Z(\beta)$;
4. Nature draws the stochastic shock over the government’s competency $\tilde{\theta}$, which is independent of the government’s *intrinsic* competence. Also, from the political system, the distribution of overall spending on public good $K$ across political administrative units, $\mu_h$, is determined. After observing the overall shock on the government’s ability $X = A\Theta (\log X = a + \theta)$, and given the market price $P_z$, the market for $Z$ clears, and given the equilibrium price $P_z^*(\beta)$ fiscal policy is determined: $T(\beta), G(\beta), T(\beta)$;
5. The belief on the government’s competency being high, $\beta$, is updated upon observation of fiscal policy variables. Given this posterior, in an electoral period citizens vote either for the incumbent ($v = I$) or against him ($v = O$). The winner of the election takes office for the next two periods.

In the following figure I have summarized and displayed much of the model’s structure, assumptions, and timing, around an electoral period. Most of the variables are expressed in log levels. All agents are rational, and in particular have full common knowledge of the game. The media has an informational advantage over voters and the politician.

\textsuperscript{36}Within a small interim of time before the first mandate begins (at time period $t_0$, at the very beginning of the polity’s existence) Nature draws two candidates from the citizenry for electoral purposes. Through a majoritarian democratic election where all citizens participate, a winner is appointed in power for the next two periods.

\textsuperscript{37}Throughout, we use $t_0$ to denote the first mandate’s first period, $t + 1$ the first mandate’s last period, $t + 2$ the second mandate’s first period, and $t + 3$ the second mandate’s last period, when necessary.
As much stressed above, the government is not assumed to have an informational advantage\textsuperscript{38}. With political rents arbitrarily small, this implies that the government acts benevolently when setting fiscal policy.\textsuperscript{39} Here the aim is to highlight the impact of strategic information transmission over agents’ beliefs, and over the economy thereby. However, an additional assumption is in order: the government cannot step down from the electoral race\textsuperscript{40}.

**Figure I**  
Timing and Information

3. **Solving the model**

In this section I characterize each agent and player’s decision-making process, and actions, given the actions taken by other players in the game. We start with the government, who, although not being in practice a strategic player of the game, decides on important variables influencing the game’s outcomes, such as fiscal policy.

\textsuperscript{38}One of the interesting features of the present model is that it generates electoral manipulation without the politician’s direct intervention. Because we want to shut down the signalling mechanism (see Rogoff and Sibert (1988) and Rogoff (1990) for models where the government signals its competency—which it learns privately—through manipulation of fiscal policy), we implicitly assume that the incumbent (i) does not have an informational advantage over voters (in fact, the incumbent only learns its competence when the media discloses it, plus observation of public signals), and (ii) cannot step down from the re-election, even if the challenger’s competency is believed to be much higher than his own.

\textsuperscript{39}The interesting interplay between media and a privately informed government willing to manipulate fiscal policy for re-election is left as an extension.

\textsuperscript{40}When information about its competency implies inference of it being below the expected one for the contender. A benevolent government would prefer in that case not to go for re-election. A justification for this assumption is that candidates must decide to go for election before important information about them is known and released to voters. Besides, in equilibrium, as we show below, situations in which the government would not have been interested in running for re-election with ex-post information, are precisely situations where voters’ decision will have the incumbent withdrawn from power anyway.
A. The policy-maker’s problem. We start revisiting briefly the incumbent politician’s problem, for given price $P_z$, and given realised overall shock upon the governmental efficiency $X$. Unless strictly necessary, I drop time subscripts\footnote{Even in an inter-temporal framework with several periods and mandates, due to the MA(1) process the incumbent official’s problem boils down to maximisation of contemporaneous welfare, as in the present case.}. In equilibrium the government “absorbs” total supply of $Z$\footnote{We omit here analysis of how total spending on $K$ is distributed across the administrative governmental units (I refer to section A.5).}. What is to be determined is the price, which clears the market for $Z$. The government’s problem then consists in setting the amount of $Z$ (the governmental demand) it’s willing to purchase at price $P_z$, given this price. Using (3), (5), and (6) in (4) we can write the incumbent politician’s unconstrained optimization problem (assuming an interior solution exists) as follows

$$
\max_{Z,T} \mathcal{Y}_t^\tau = (\bar{Y} - T)^\omega (T - ZP_z)^{1-\omega} + [ZX]^{\phi}
$$

In practice the government maximises the representative agent’s welfare and acts benevolently in the name of its fellow citizens.

The problem satisfies Weistrass theorem. From the F.O.C (assuming an interior solution), the solution $\{Z^*, T^*, K^*\}$ is unique. Indeed, from the FOCs we obtain, for given price $P_z$

$$
T^* = (1-\omega)\bar{Y} + \omega Z^*P_z
$$

and

$$
Z^* = \left( \frac{\phi}{P_z B} \right)^{\frac{1-\phi}{\phi}} X^{\frac{\phi}{1-\phi}}
$$

Implying

$$
G^* = \omega [\bar{Y} - Z^*P_z]
$$

where I have defined $B \equiv \omega^\omega (1-\omega)^{1-\omega}$ to ease notation. To obtain the final outcome we must obtain the equilibrium price for the intermediate input. This we do next.

B. Equilibrium in the market for $Z$. The overall amount allocated to the acquisition of $Z$ must clear the market for this good. Given agents’ information set, the outcome of which is a belief on the government’s intrinsic competency, aggregate supply $Z^*$ (obtained in equation (7)) must equal demand (equation (16))

$$
Z^* = Z^* \iff (P_z^e)^\gamma = \left( \frac{\phi}{P_z B} \right)^{\frac{1-\phi}{\phi}} X^{\frac{\phi}{1-\phi}}
$$
For given overall competency shock $X$ and given $P^e\_z$ the final market-clearing price $P^*_z$ is unique. Given $X$’s log-normality for given realisation of competence, we obtain the REE equilibrium\(^{43}\). See appendix.

From the equilibrium two outcomes are of special interest. First, the total amount to be allocated to the acquisition of $Z$ in the economy, $S_z$. I show in the appendix that, for given $X$ and $X^e(\beta) \equiv E_t(X|\Omega_t)$, where $\Omega_t$ contains the media’s message and observed past competency shock $a^X_{t-1}$,

\[
(19) \quad S_z = Z^*P^* = \tilde{\Delta}X^\phi[X^e] \xi
\]

Where $\tilde{\Delta} \equiv \left[ \frac{1}{2p_\theta} \right]^{1+\gamma(1-\phi)} (\phi) \frac{\phi^\gamma}{1+\gamma(1-\phi)} > 0$ and $\xi \equiv \frac{\phi^2 \gamma}{1+\gamma(1-\phi)} > 0$. Another key object is final welfare

\[
(20) \quad \Upsilon^*(X^e, X, \Xi) = \bar{\Upsilon} + \tilde{\Delta}X^\phi[X^e] \xi
\]

Where $\Xi$ denotes a vector of parameters, and $\Delta \equiv \tilde{\Delta}(1-\phi) > 0$. Two observations deserve attention here. Firstly, note that welfare increases in actual competency. This is why voters prefer more competent governments than not. Secondly, welfare is increasing in agents’ belief on its actual realisation, through a larger supply of the intermediate input in the economy. As a consequence of this, a key feature of this political economy is that the media will have the incentive, and power, to influence the economy directly when sending messages. Because the relation is positive, there will be strong incentives to report competency being high, that is, to come about with optimistic messages.

C. The public signal. Before looking at the voters’ inference problem when voting, we introduce here the public signal used in this process. It is a fundamental feature of a macro model as the present one, where incumbents are mandated to set policy, which by definition is a visible outcome in the polity. It is indeed a key piece of information which only incumbents can influence, as opposed to potential contenders. In our framework several variables serve as signals for competency\(^{44}\), though all of them are equally informative. For simplicity we focus on taxes. Assuming that producers’ expectations are known to all parties, and after having observed the incumbent government’s policy-making decision $T$, rational voters extract a signal $s_\tau$. Specifically, for given observed $X^e$ and $a_{t-1}$, the public signal $s_\tau$ is defined as (using both (15) and (3))

\[
(21) \quad s_\tau \equiv \log \left[ \Psi \left( \frac{T^* - (1-\omega)\bar{Y}}{\omega} \right) \right] - a_{t-1} = a + \theta
\]

\(^{43}\)We proceed following the standard approach. We posit an “educated” guess on the expected equilibrium price and prove that indeed it is a unique equilibrium. Applying logs on both sides of (18) we get $\gamma p^e_z = \frac{1}{1-\phi}log\phi - x - \frac{1}{1-\phi}p_z$, which implies that $p_z$ is normally distributed for given $p^e_z$ (the REE is known in equilibrium). Taking expectations on both sides of this equation, and applying the law of iterated expectations, we get: $p^e_z = \varphi - \frac{1-\phi}{1+\gamma(1-\phi)}x^e$, where $\varphi$ is some constant.

\(^{44}\)Fiscal policy, through $T$ and $G$, the final price $P^*_z$, or welfare itself.
where $\Psi \equiv \left( \frac{1}{2p_\theta} \right)^{1+\gamma(1-\phi)} \left( \frac{\phi}{\beta} \right)^{1+\gamma(1-\phi)} \left[ X^\epsilon \right]^{1+\gamma(1-\phi)} \right).$ Therefore, $s_\tau$ is an unbiased noisy signal for the government’s competency, which is the key variable for voters’ decision. For a given “state” of the world, $a$, $s_\tau$ is distributed normal with $E(s_\tau|a) = a$. The signal’s precision is $p_\theta$ (recall assumptions on distribution of shock $\tilde{\theta}$).

This signal extraction problem could be extended to allow for other voting behaviour or other informational structures assumed for voters. For instance, one could argue that in many instances voters are not fully aware of, or simply not interested in, private decisions affecting public policy. Or that they do not have full common knowledge on how the economy works. This would change the signal extraction problem, and inference on the government’s competency, plausibly affecting the incentives faced by the media for electoral manipulation. Because the consequences of having uninformed or naive voters are ambiguous, however, and depend critically on the model that voters have of the polity and economy, in what follows we keep our assumption that voters are as well informed and rational as producers.

D. The Voter’s decision. The voters decision is only meaningful, of course, at the end of the first mandate, when an election is to be held. Voters are concerned about the incumbent politician’s competency, because next period’s expected welfare is increasing in this variable (recall equation (4)). The more able the politician, the higher is next period’s expected welfare. The voting rule can be represented thus as a simple rule over the the logarithm of the likelihood ratio $\lambda \equiv \log \left( \frac{\beta}{1-\beta} \right)$ (LLR). If at the end of the respective period $\lambda \geq 0$, then voters vote incumbent. Otherwise ($\lambda < 0$), they appoint the challenger.

As discussed above, voters use two sources of information: the media’s report and the public signal. They update beliefs twice therefore: once at the beginning of the period, together with producers, after observing the media’s message on competency; and at the end of the period, when they update their posterior belief after observing $s_\tau$.

Let us denote by $\lambda$ the LLR after observing the media’s report, which only when information is transmitted would be different than zero. Similarly, denote by $\lambda'$ the LLR after observing $s_\tau$. Then, we have from the Bayesian updating rule (see Chamley (2004), page 33)

$$\lambda' = \lambda + 2a_H p_\theta s_\tau$$

Voters vote incumbent iff $\lambda' \geq 0$.

Gathering our analysis of the government, producers, and voters’ problems, we can now state one important general result before analysing the media’s strategic behaviour. Note that at the beginning of the period the final price $P^z(\beta)$, the final amount spent on $Z$, that is $S_z(\beta)$, and the final LLR $\lambda'(\beta)$, are uncertain, random variables. Denote by $P_\beta$, $S_\beta$, and $L_\beta$ their respective cumulative distributions, which are known in equilibrium.

Property 1. Given any belief $\beta$ of rational producers and voters about the incumbent politician’s current competency shock $a_\tau^f$, there is a unique (random) price $P^z(\beta)$, a unique (random)
amount of public spending in the production of $Z$, $S_z$, and a unique (random) posterior belief of voters for the incumbent politician’s current competency shock, $\lambda'$. The more optimistic producers are, the lower is the price $\bar{P}^*_z(\beta)$, and the higher is the total public spending on the acquisition of units of the intermediate good $Z$. The more optimistic voters are, the higher is the probability of voting the incumbent. Formally, for any $\beta$ in $[1-p, p]$, there is a unique price $\bar{P}^*_z(\beta)$, a unique $\bar{S}_z(\beta)$, and a unique $\bar{\lambda}(\beta)$. If $\beta \geq \beta'$, then $\mathcal{P}_\beta \geq \mathcal{P}_{\beta'}$, $\mathcal{I}_\beta \leq \mathcal{I}_{\beta'}$, $L_\beta \leq L_{\beta'}$.

E. The Media’s decision. Much of the unfolding discussion is focused on the strategic information transmission by the media. Here I briefly highlight some of its main features.

First note that the media’s behaviour changes both across mandates and across sub-periods within a given mandate. In the last mandate, for instance, the political motive does not play any role. This lies in stark contrast with the first mandate, where the political motive plays a key role.

As for behaviour within mandates, there are two main forces shaping the media’s behaviour across periods. An obvious one is the election during the first mandate. Another more subtle one is the evolution of media’s reputation as politically independent press, which is captured by parameter $\rho$.

Our aim is to describe behaviour of dishonest media. In all cases the decision lies in whether to truthfully report the privately observed signal $s_{M\beta}$. When doing so, the media assesses the consequences of their messages upon the economy, their future reputation, and the electoral outlook.

A key feature of the particular political economy of this model is that incentives for truthful reporting are signal-dependent. This is due to two factors. On one hand, welfare is increasing in the supply of the intermediate good $Z$. On the other, the media cannot hedge themselves from the impact that their messages have upon their welfare (through side-financial operations). As a result, the equilibrium of the game has a level of credibility for each message: high or low.

This asymmetry is neat during the last mandate. When the media observes a high signal it has a strong incentive to report it truthfully. On one hand, for given reputation and the credibility it implies, actual welfare is always higher when the message is high. On the other hand, future expected welfare, as I show below, is increasing in the media’s reputation. By truthfully reporting a high signal, therefore, the media are more likely to enhance its power than not. When the signal is low, the media faces a trade-off between the net actual expected loss and next period’s net loss through lower reputation.

In the electoral mandate a structural phenomenon has to do with the opportunity of appointing a new politician. In an electoral period, for instance, when the signal is low, the media expects — out of the MA(1) process — this low performance to be carried over to the upcoming mandate’s next period. However, this effect may be overcome by the political rents the media expects to keep during the last mandate were the incumbent to be re-appointed.

A key variable driving the media’s incentive to manipulate information strategically during the electoral mandate is the re-election probability. As I show in the appendix, the LLR used by voters is, conditional on the government’s actual competency ($a_t$), normally distributed. As an example, suppose for a while that the media had observed a high signal and had reported it truthfully. Then the re-election probability, as viewed and assessed with the media’s information, is
$1 - p\Phi\left(\frac{-\lambda(\beta) + 2a_H^2\theta}{2a_H\sqrt{\theta}}\right) - (1 - p)\Phi\left(\frac{-\lambda(\beta) - 2a_H^2\theta}{2a_H\sqrt{\theta}}\right)$

Where $\Phi$ is the standard normal cdf. Of course, to make our problem interesting, we assume throughout that the size of competency as compared to the variance of $\theta$, is not too large (say $|a_H| / \sigma_\theta < 2$). If $|a_H| / \sigma_\theta \to \infty$ there would be little influence on the probability of re-electing the incumbent through posterior beliefs $\lambda(\beta)$ generated by the media’s reporting.

As discussed right above, the media’s credibility will be conditional on the message they send. Suppose $\beta^L$ is the belief that competency is high when the media report a low state, and $\beta^H$ the belief of a competency being high when the media report competency being ‘high’, and define $P^H \equiv Pr(v = I|m = a_H; .)$ and $P^L \equiv Pr(v = I|m = a_L; .)$, that is, the probability of re-electing the incumbent when the message is high and low, respectively, all else being equal. Define $D_P \equiv P^H - P^L$, the difference in the probabilities of re-election for different messages. Then, the following important property holds.

Property 2. $D_P$ is always strictly positive and is strictly increasing in $\beta^H$ and $\beta^L$.

This resembles property 2 in Bénabou and Laroque (1992), where the sender (the media in our case) is better off, the more the public’s belief differs from their private signal when this is low (recall that strategic information manipulation is state-contingent in our model). It also evokes results in Crawford and Sobel (1982).

We are now ready to analyse the equilibrium of the game with a strategic sender.

4. The Two-Mandates Equilibrium and the Political Business Cycle

In this section I analyse strategic information transmission by politically motivated media. I proceed, as usual, backwardly. As in Bénabou and Laroque (1992), in every period dishonest media are concerned with their reputation, because reputation affects their actual and future influence over the economy, and, during the first mandate, over the election. In the last mandate the media are aware that their messages will bear no consequences on political outcomes affecting their future pay-off, because the game is over on the political side. This is not true during the first mandate of the game, where the media must take into account the consequences of misreporting over the chances of being politically influential. Our analysis therefore must distinguish behaviour of the media according to the mandate in which they are operating in any point in time. First I characterize equilibrium at the end of the second mandate. I show that a unique equilibrium in which information is transmitted exists, although, for low values of $\rho$, there are multiple equilibria, where a unique equilibrium also exists in which no information is transmitted. Then I characterize equilibria for the dynamic game, and show that the dynamic sub-game encompassing the last mandate’s two periods, has an equilibrium as the one obtained for the polity’s last period. Taking this equilibrium as given, I proceed to study equilibrium in

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\(^{47}\)See Drazen (2000a) for a discussion on how the probability of re-election pervades most models studying the political economy of macroeconomic cycles. This is the key element linking our political economy with mass media bias with the macro literature studying the effects of elections over policy. As Drazen points out when introducing the chapter on elections and changes of policymakers, “even if the policymaker can affect neither the probability of being retained nor the policies of his successor, uncertainty about who holds office can have significant effects on economic outcomes.”
the first mandate. Once equilibrium with information transmission — which is the one I focus on— is characterized, I move on to study its implications over the Political Business Cycle.

A. The Last Mandate. A key distinctive feature in the last mandate, as opposed to the “electoral” mandate, is that information on the political motive \( Z^L \) does not play any particular role. Only influence over the economy will count. I start providing some intuition as to how the media decides on what message to send during the last period of the game.

A.1. Second Mandate’s Last Period. Consider \( t + 3 \), for given reputation \( \rho_{t+3} \). A key property underlying most of our results is that the media’s reporting strategy is signal-dependent. This implies in turn that credibility of their messages will be message-contingent. Consider for instance that the media had observed a high signal \( \bar{s}_M = a_H \). From (4), given the signal and observed past competency \( a_{t+2} \), one can obtain the media’s expected welfare after sending a particular message. To ease notation, let us generally define \( \mathbb{U}_{T H}(\rho) = \mathbb{E}_M(\bar{Y}^t \mid \bar{s}_M = a_H; m = a_H; a_{t-1}) \), the expected welfare at any time period “\( t \)”, when a “high” signal had truthfully been reported, where \( E_M \) denotes the expectation conditional on information privately observed by the media, and where \( \rho \), which influences \( \beta \) through \( m \), is obtained using the updating rule discussed at the end of section D.3. Similarly, we define \( \mathbb{U}_{UH}, \mathbb{U}_{TL}, \) and \( \mathbb{U}_{UL} \), where subscript “\( U \)” denotes “untruthful” reporting.

For a given signal “\( k \in \{L, H\} \)” , the media is willing to report it truthfully if and only if \( \mathbb{U}_{Tk} > \mathbb{U}_{Uk} \); indifferent if \( \mathbb{U}_{Tk} = \mathbb{U}_{Uk} \); and willing to misreport it if \( \mathbb{U}_{Tk} < \mathbb{U}_{Uk} \).

I also distinguish credibility after “high” competency had been reported, \( \beta_H \), to credibility of a message conveying a pessimistic forecast on the government’s competency, \( \beta_L \).

When assessing whether to truthfully report a high signal or not, the media computes thus \( \mathbb{U}_{TH} - \mathbb{U}_{UH} \). Taking expectations on (20), conditional on the media’s private information, it is easy to show that

\[
\mathbb{U}_{TH} - \mathbb{U}_{UH} = \Lambda(\beta^H + \beta^L - 1)(p \exp(\phi a_H) + (1-p) \exp(\phi a_L))(\exp(\xi a_H) - \exp(\xi a_L)) \geq 0
\]

where \( \Lambda = \Delta \exp \left( \left(a_{t+2} + \frac{\sigma^2}{2} \right) (\phi + \xi) \right) > 0 \). Whenever either \( \beta^H > \frac{1}{2} \), or \( \beta^L > \frac{1}{2} \), or both, the media strictly prefers to spread the truth.

Similarly, we have

\[
\mathbb{U}_{TL} - \mathbb{U}_{UL} = \Lambda(\beta^H + \beta^L - 1)(p \exp(\phi a_L) + (1-p) \exp(\phi a_H))(\exp(\xi a_L) - \exp(\xi a_H)) \leq 0
\]

When the signal is low, therefore, dishonest media is still willing to report the high state. Unless \( \beta^H = \beta^L = \frac{1}{2} \), the media always misreports their signal when low.

Now consider producers’ inference problem (of course, at this stage voters are no longer interested in following the media’s messages). In the knowledge that dishonest media always reports the high state (\( q = 1 \) when the signal is high, and \( q = 0 \) when low), credibility will be message-contingent, and only honest media would report a low signal. Then

\[
\pi_{t+3}(\rho_{t+3}) = \begin{cases} 
\pi^H_{t+3}(\rho_{t+3}) = \frac{1-p(1-p)}{2-p} & \text{if } m_{t+3} = a_H \\
\pi^L_{t+3}(\rho_{t+3}) = p & \text{if } m_{t+3} = a_L
\end{cases}
\]

where “\( H \)” stands for “high message” and “\( L \)” stands for “low message”.
Another strategy, consistent with extreme scepticism, is having producers not paying attention to any of the media’s messages. Then, from (23) and (24), the media would be indifferent as to what to report, and would randomize with probability \( q \in (0, 1) \). Credibility would be \( \pi_{t+3}(\rho_{t+3}) = p\rho_{t+3} + (1 - \rho_{t+3})[pq + (1 - p)(1 - q)] \), which can only be an equilibrium with no transmission \( \pi_{t+3}(\rho_{t+3}) = 1/2 \) if there exists \( q \in (0, 1) \) such that \( \pi_{t+3}(\rho_{t+3}) = 1/2 \). But if \( \rho_{t+3} \geq 1/2 \), for instance, there is no such \( q \).

**Proposition 1** (Equilibrium at the end of the Game (last mandate’s second period)). *In the last period of the game (second period of the second mandate), for any reputation of being honest \( \rho > 0 \), there is a unique equilibrium with information transmission where the media’s messages are credible. Credibility is message-contingent. Dishonest media always misreports a low signal \( s_M = a_L \) and always truthfully reports good news on the politician’s competency \( s_M = a_H \). Thus, credibility of a message conveying bad news on the incumbent is \( \pi^L = p > 1/2 \), whereas credibility of an optimistic message is \( \pi^H(\rho) = 1/2 - \rho(1 - p) \rho > 1/2 \), which is strictly increasing in reputation \( \rho \). If \( \rho < 1/2 \) there also exists an equilibrium with no information transmission where the public does not pay attention to the media’s messages and \( \pi = 1/2 \).

*Proof.* See Appendix.

The presence of multiple equilibria when the media’s reputation is low \( \rho < 1/2 \) pervades most of the game. Because our focus is on equilibria having consequences on the political business cycle, in what follows I shall analyse equilibria with information transmission only.

Note that, in equilibrium, \( \mathbb{U}_{TH} - \mathbb{U}_{UH} \) (\( \mathbb{U}_{TL} - \mathbb{U}_{UL} \)) is strictly increasing (decreasing) in the media’s precision power \( p \), its reputation \( \rho \), and past competency \( a_{t+2} \).

### A.2. Second Mandate’s Two-Period Game

The solution to the media’s problem during the first period of the polity’s last mandate resembles that of the last period. Taking the equilibrium of the game at the last period of the mandate as given, dishonest media is always willing to report competency to be high. There is a unique equilibrium with information transmission, with essentially the same properties as found for the short-run game at the end of the mandate.

Before proceeding, a useful result, general to equilibrium of any dynamic game in our model, is described. Let us denote by \( \mathbb{W}_{TH}(\rho) \) the media’s expected discounted sum of utility of a dishonest type at the beginning of any period, for given reputation \( \rho \), if he decided to truthfully report a high signal. Similarly, we define \( \mathbb{W}_{UH}(\rho), \mathbb{W}_{TL}(\rho), \) and \( \mathbb{W}_{UL}(\rho) \). If the media were to truthfully report a high signal, then we would have

\[
\mathbb{V}_{TH}(\rho) = \mathbb{U}_{TH} + \delta \mathbb{W}_{TH} \left[ \frac{p\rho}{\pi^H(\rho)} \right] + \delta(1 - p) \mathbb{W}_{TH} \left[ \frac{(1 - p)\rho}{1 - \pi^H(\rho)} \right]
\]

If, on the contrary, the media misreported the high state, then

---

\(48 \) As in Bénabou and Laroque (1992) there’s no short-run equilibrium in which \( \pi < 1/2 \). Suppose there were. Then whenever the media had reported a high state voters would update their belief on the incumbent being competent downwards, drawing down net expected welfare. But then the media would prefer to report untruthfully when observing a high state and truthfully when low, meaning that the media would be very truthful when reporting a high state, which is a contradiction.

\(49 \) Indeed, on the equilibrium path of any equilibrium with no information transmission, fiscal policy does not change across periods from an ex-ante point of view (on average).
Credibility of a message conveying bad news on the incumbent is 

In equilib- 

Proposition 3 following result. 

and 

Similarly, we have 

These functions slightly change when considering an electoral mandate, because the future utility flows must be conditioned on the electoral outcome. Dismissing this for a while (we will define these objects accordingly when so), we focus on any dynamic game with such structure. 

We also define the following two useful objects, the net expected gains of reporting truthfully when low. 

We also define the following two useful objects, the net expected gains of reporting truthfully over misreporting a signal, $F_H(\rho) = V_{TH}(\rho) - V_{UH}(\rho)$ and $F_L(\rho) = V_{TL}(\rho) - V_{UL}(\rho)$. 

Proposition 2 (An Equilibrium of the Dynamic Game). An equilibrium corresponds to a credibility for the media’s messages as functions $\pi^H : [0, 1] \rightarrow [1-p, p]$ and $\pi^L : [0, 1] \rightarrow [1-p, p]$ of the media’s reputation as independent (or honest) media, and to next period expected and discounted value function $W : [0, 1] \rightarrow \mathbb{R}$ such that for all $\rho$: 

\[ F_H(\rho) > 0 \text{ and } F_L(\rho) > 0 \implies \pi^H = \pi^L = p \]
\[ F_H(\rho) > 0 \text{ and } F_L(\rho) < 0 \implies \pi^H(\rho) = \frac{1-p(1-p)}{2-\rho} \text{ and } \pi^L = p \]
\[ F_H(\rho) = F_L(\rho) = 0 \implies \rho p + (1-\rho)[\rho q + (1-p)(1-\rho)]\pi(\rho) = \pi^H = \pi^L \leq p \]
\[ F_H(\rho) < 0 \text{ and } F_L(\rho) > 0 \implies \pi^H = p \text{ and } \pi^L(\rho) = \frac{1-p(1-p)}{2-\rho} \]
\[ F_H(\rho) < 0 \text{ and } F_L(\rho) < 0 \implies \pi(\rho) = \pi^H = \pi^L = \rho p + (1-\rho)(1-p) \]

and $W(\rho) = \max[V_{TH}(\rho), V_{UH}(\rho)]$ when the signal is high, and $W(\rho) = \max[V_{TL}(\rho), V_{UL}(\rho)]$, when low. 

Proof. See Appendix. \hfill \Box

Now we take as given equilibrium with information transmission in the last period of the last mandate. Function $W(\rho)$, for all cases, is continuous. Using proposition 1, we have the following result. 

Proposition 3 (Equilibrium of the two-period game during the polity’s last mandate). In the polity’s last mandate there is a unique equilibrium with information transmission. In equilibrium, dishonest media always reports competency to be high in both periods of the last mandate. Credibility of a message conveying bad news on the incumbent is $\pi^L = p > \frac{1}{2}$, whereas credibility
of an optimistic message is \( \pi^H(\rho) = \frac{1-\rho(1-p)}{2-\rho} > \frac{1}{2} \), which is strictly increasing in reputation \( \rho \).

\( ^{50} \) Again, an equilibrium with no information transmission always exists in the last mandate’s two-period game if \( \rho < \frac{1}{2} \).

Proof. See appendix.

Now we can move towards analysis of the most important and interesting period of the game: the election period.

B. The Electoral Mandate.

B.1. The Election Period. In the polity’s electoral mandate, any equilibrium must incorporate information about the media’s political motive, captured by parameter \( \mathcal{L} = 0 \). And yet, much of what we have learnt so far can be extended to the electoral mandate. As should be clear by now, if the media observes a high signal during an electoral period, they will have strong incentives to report it truthfully, for their reputation as honest media will be upgraded next mandate more likely than not, for whatever the electoral outcome might be. Contemporaneously, expected welfare will be larger than what it would have been if the high signal were misreported. And on top of that, by influencing the electoral outcome, the incumbent — which, according to the signal, is more likely to carry with him to next period a high shock on competency than a low one— will have higher chances of remaining in power. Not to mention political rents, which, when positive, would further foster the media’s incentive for truthful reporting.

The more interesting case is that having media pondering on whether to truthfully report a low signal or not. A downside of reporting a low signal continues to be the lower expected contemporaneous welfare. However, and differing in an fundamental way with behaviour during the last mandate, by reporting a low signal the media makes re-election of a relatively low ability incumbent less likely. Besides, expected welfare from the two-period game in the last mandate is clearly increasing in the media’s reputation. Another advantage for the media of sending a truthful message when the signal for competency is low, is enlarging its influence over the economy during the last mandate. There is a trade-off thus between increasing actual welfare at the cost of lowering expected welfare in the upcoming periods. This means that, in equilibrium, either \( \pi^H(\rho) = \frac{1-\rho(1-p)}{2-\rho} \) and \( \pi^L = p \), and the media always send an optimistic message, or \( \pi^H(\rho) = \pi^L(\rho) = p \), and the media are always truthful, whatever its signal.

A key variable resolving for the media’s trade-off, is indeed their political pull in favour or against the incumbent.

First consider dishonest media with political like-mindedness parameter \( \mathcal{L} \), deciding on whether to truthfully report a high signal (\( s_M = a_H \)) or not. Denote by \( \mathbb{W}_{UL}(\rho; \mathcal{I}) \) the expected discounted welfare of the continuation of the game in the last mandate game (where dishonest media always reports the high state) net of the political rents \( \mathcal{L} \) — if any —, after reporting untruthfully a low message, and given the fact that the incumbent had been re-elected. Similarly, define \( \mathbb{W}_{UL}(\rho; \mathcal{I}), \mathbb{W}_{T_H}(\rho; \mathcal{O}) \) and \( \mathbb{W}_{TL}(\rho; \mathcal{O}) \), where \( \mathcal{O} \) denotes the fact that the incumbent government’s opponent has been appointed.

The expected discounted welfare of reporting truthfully a high message, for given reputation \( \rho \) is then
\[
\mathbb{U}_{TH}(\rho) + \delta \mathcal{P}^H(\rho)(\mathbb{W}_{TH}(\rho^+; \mathcal{I}) + (1 + \delta)\mathcal{L}^I) + \delta(1 - \mathcal{P}^H(\rho))\mathbb{W}_{TH}(\rho^+; \mathcal{O})
\]

where —recall— \( \mathcal{P}^H \) is the probability of re-electing the incumbent when sending an optimistic message.

If the media decided to misreport its high signal then expected discounted welfare of that action would be

\[
\mathbb{U}_{UH}(\rho) + \delta \mathcal{P}^L(\rho)(\mathbb{W}_{UH}(\rho^-; \mathcal{I}) + (1 + \delta)\mathcal{L}^I) + \delta(1 - \mathcal{P}^L(\rho))\mathbb{W}_{UH}(\rho^-; \mathcal{O})
\]

I have used, abusing a bit of notation, the symbols “+” and “−” to denote a “more likely than not upgraded reputation” and “more likely than not downgraded reputation” in next mandate’s reputation, respectively, which are themselves functions of actual reputation \( \rho \) (recall (D.3)). Formally,

\[
\mathbb{W}_{TH}(\rho^+; \mathcal{I}) = \frac{P}{2} \left( \max \left\{ \mathbb{V}^I_{TH} \left[ \frac{\mathbb{P}^\rho}{\pi^H(\rho)} \right], \mathbb{V}^I_{TH} \left[ \frac{\mathbb{P}^\rho}{\pi^H(\rho)} \right] \right\} + \max \left\{ \mathbb{V}^I_{TL} \left[ \frac{\mathbb{P}^\rho}{\pi^L(\rho)} \right], \mathbb{V}^I_{UL} \left[ \frac{\mathbb{P}^\rho}{\pi^L(\rho)} \right] \right\} \right)
\]

\[
+ \frac{1 - P}{2} \left( \max \left\{ \mathbb{V}^I_{TH} \left[ \frac{(1 - P)^\rho}{1 - \pi^H(\rho)} \right], \mathbb{V}^I_{TH} \left[ \frac{(1 - P)^\rho}{1 - \pi^H(\rho)} \right] \right\} + \max \left\{ \mathbb{V}^I_{TL} \left[ \frac{(1 - P)^\rho}{1 - \pi^L(\rho)} \right], \mathbb{V}^I_{UL} \left[ \frac{(1 - P)^\rho}{1 - \pi^L(\rho)} \right] \right\} \right)
\]

where the superscript \( \mathcal{I} \) is denoting the fact that the incumbent had been elected for next period’s mandate (if the opponent had won the election instead, then \( \mathcal{O} \) is used instead).

Similarly, we have

\[
\mathbb{W}_{UH}(\rho^-; \mathcal{I}) = \frac{1 - P}{2} \left( \max \left\{ \mathbb{V}^I_{TH} \left[ \frac{\mathbb{P}^\rho}{\pi^L(\rho)} \right], \mathbb{V}^I_{TH} \left[ \frac{\mathbb{P}^\rho}{\pi^L(\rho)} \right] \right\} + \max \left\{ \mathbb{V}^I_{TL} \left[ \frac{\mathbb{P}^\rho}{\pi^L(\rho)} \right], \mathbb{V}^I_{UL} \left[ \frac{\mathbb{P}^\rho}{\pi^L(\rho)} \right] \right\} \right)
\]

\[
+ \frac{P}{2} \left( \max \left\{ \mathbb{V}^I_{TH} \left[ \frac{(1 - P)^\rho}{1 - \pi^L(\rho)} \right], \mathbb{V}^I_{TH} \left[ \frac{(1 - P)^\rho}{1 - \pi^L(\rho)} \right] \right\} + \max \left\{ \mathbb{V}^I_{TL} \left[ \frac{(1 - P)^\rho}{1 - \pi^L(\rho)} \right], \mathbb{V}^I_{UL} \left[ \frac{(1 - P)^\rho}{1 - \pi^L(\rho)} \right] \right\} \right)
\]

where \( P^L(\rho) \) and \( \pi^H(\rho) \) are to be determined in equilibrium.

And so on.

The net gain of reporting truthfully a high signal, that we denote by \( \mathcal{F}^H(\rho; \mathcal{L}^I) \) in this case (where we have conditioned on \( \mathcal{L}^I \)) is thus obtained

\[
\mathcal{F}^H(\rho; \mathcal{L}^I) = \mathbb{U}_{TH}(\rho) - \mathbb{U}_{UH}(\rho) + \delta \mathcal{P}(1 + \delta)\mathcal{L}^I + \delta \mathcal{P}^H(\rho)\mathbb{W}_{TH}(\rho^+; \mathcal{I})
\]

\[
- \delta \mathcal{P}^L(\rho)\mathbb{W}_{UH}(\rho^-; \mathcal{I}) + \delta(1 - \mathcal{P}^H(\rho))\mathbb{W}_{TH}(\rho^+; \mathcal{O}) - \delta(1 - \mathcal{P}^L(\rho))\mathbb{W}_{UH}(\rho^-; \mathcal{O})
\]

Similarly, we can obtain the net expected and discounted gain of reporting a low signal truthfully, that we denote by \( \mathcal{F}^L(\rho; \mathcal{L}^I) \), as follows

\[
\mathcal{F}^L(\rho; \mathcal{L}^I) = \mathbb{U}_{TL}(\rho) - \mathbb{U}_{UL}(\rho) + \delta \mathcal{P}(1 + \delta)\mathcal{L}^I + \delta \mathcal{P}^L(\rho)\mathbb{W}_{TL}(\rho^+; \mathcal{I})
\]

\[
- \delta \mathcal{P}^H(\rho)\mathbb{W}_{UL}(\rho^-; \mathcal{I}) + \delta(1 - \mathcal{P}^L(\rho))\mathbb{W}_{TL}(\rho^+; \mathcal{O}) - \delta(1 - \mathcal{P}^H(\rho))\mathbb{W}_{UL}(\rho^-; \mathcal{O})
\]
Both $T_H(\rho; L^I)$ and $T_L(\rho; L^I)$ are continuous and differentiable functions in all their arguments.

**Proposition 4** (An Equilibrium of Game in an Election Period). An equilibrium in an election period corresponds to a credibility for the media’s messages as functions $\pi_H : [0, 1] \to [1 - \rho, \rho]$ and $\pi_L : [0, 1] \to [1 - \rho, \rho]$ of the media’s reputation as independent (or honest) media, and to next period expected and discounted value function $W : [0, 1] \to R$ such that for all $\rho$:

$$\begin{cases}
T_H(\rho; L^I) > 0 \text{ and } T_L(\rho; L^I) > 0 \implies \pi_H = \pi_L = \rho \\
T_H(\rho; L^I) > 0 \text{ and } T_L(\rho; L^I) < 0 \implies \pi_H(\rho) = \frac{1-\rho(1-\rho)}{2-\rho} \text{ and } \pi_L(\rho) = \rho \\
T_H(\rho; L^I) = T_L(\rho; L^I) = 0 \implies \rho + (1-\rho)[\rho + (1-\rho)(1-q)] = \pi(\rho) \leq \rho \\
T_H(\rho; L^I) < 0 \text{ and } T_L(\rho; L^I) > 0 \implies \pi(\rho) = \pi_H = \pi_L = (1-\rho)(1-\rho) \\
T_H(\rho; L^I) < 0 \text{ and } T_L(\rho; L^I) < 0 \implies \pi(\rho) = \pi_H = \pi_L = \rho + (1-\rho)(1-\rho)
\end{cases}$$

and $W(\rho,J) = \max[V_{TH}(\rho), V_{UH}(\rho)]$ when the signal is high, and $W(\rho) = \max[V_{TL}(\rho), V_{UL}(\rho)]$, when low; $J \in \{I, O\}$ denotes the election outcome.

**Proof.** Proof is direct after proof of proposition 2.

**Proposition 5** (Equilibrium with information transmission during an electoral period). In the election period, given the level $L^I$ of political like-mindedness of the media with the incumbent, there exists a unique equilibrium with information transmission ($\pi(\rho) > \frac{1}{2}$, for all messages). In equilibrium there exists a uniquely determined level of like-mindedness $L_H (L_L)$ at which the media are indifferent between truthfully reporting a high (low) signal on competency $s_m = a_H$ ($s_m = a_L$) and misreporting it, where $L_L > L_H$, and $L_H < 0$ always.

i. If $L^I > L_L$ the unique equilibrium with information transmission has dishonest media always sending a ‘high message’, implying $\pi_H(\rho) = \frac{1-\rho(1-\rho)}{2-\rho}$ and $\pi_L = \rho$.

ii. If $L_H < L^I < L_L$ the unique equilibrium with information transmission has any type of media always reporting truthfully, for all possible signals. Thus, in this case in equilibrium implying $\pi_H = \pi_L = \pi = \rho$.

iii. If $L^I < L_H$ dishonest media always sends a pessimistic message on the politician’s competency and therefore, in equilibrium $\pi_L(\rho) = \frac{1-\rho(1-\rho)}{2-\rho}$ and $\pi_H = \rho$.

iv. If either $L^I = L_L$ or $L^I = L_H$, there is no equilibrium with information transmission.

Both thresholds are increasing in the media’s reputation as politically independent press $\rho$, and the lower (upper) threshold $L_H (L_L)$ is decreasing (increasing) in the realisation of the competency shock during the preceding period, $a_0$.

**Proof.** See Appendix.

Some important qualifications are in order. First note that the election exerts some discipline over media’s reporting, which is absent in the non-electoral mandate. Not all dishonest media will always report high messages. Indeed, there is a range within which dishonest media is always truthful, in spite of their political motives. Secondly, bearing from the economic
problem’s asymmetry, only rare situations (when \( L^L > 0 \)) will have media in favour of the incumbent reporting a low signal truthfully. Heuristically speaking, only media strongly against the incumbent would have incentives to report truthfully a low signal. These results are very important in the light of our upcoming discussion on the political business cycle.

B.2. The Non-Electoral Period. The non-electoral period is as important as the preceding one. The aim of having two sub-periods within a mandate serves precisely to study the impact of strategic information transmission around electoral years, as opposed to non-electoral ones.

I take equilibrium in the electoral game as given, and obtain equilibrium with information transmission in the first mandate’s first period.

From proof of proposition 5 an immediate property is the following.

**Property 3.** For given parameters of the economy, and for given observed signal \( s_M \), there is a uniquely determined pair of closed intervals, \( I_L \) and \( I_H \), that do not intersect, in which reputation \( \rho \), on the interval \([0, 1]\), is mapped into \( I_L = [L^L_{\text{min}}, L^L_{\text{max}}] \) and \( I_H = [L^H_{\text{min}}, L^H_{\text{max}}] \), respectively; \( L^L_{\text{min}} = L^L(0) \), \( L^L_{\text{max}} = L^L(1) \), \( L^H_{\text{min}} = L^H(0) \) and \( L^H_{\text{max}} = L^H(1) \).

**Proof.** Proof is direct from proposition 5. \( \square \)

I demonstrate the following proposition.

**Proposition 6** (Equilibrium with information transmission during the non-electoral period). In the non-election period, given the level \( L^I \) of political like-mindedness of the media with the incumbent, and given the signal for competency observed by the media, there exists a unique equilibrium with information transmission (\( \pi(\rho) > \frac{1}{2} \), for all messages). In equilibrium, there exists a uniquely determined level of like-mindedness \( L^*_H < L^H_{\text{min}} < 0 \) at which the media are indifferent between truthfully reporting a high (low) signal on competency \( s_M = a_H \) (\( s_M = a_L \)) and misreporting it.

i. If \( L^I > L^*_H \), the unique equilibrium with information transmission has dishonest media always sending a ‘high message’, implying \( \pi^H(\rho) = \frac{1-\rho(1-p)}{2-p} \) and \( \pi^L = p \).

ii. If \( L^I < L^*_H \), the unique equilibrium with information transmission has dishonest media always sending a low message, for all possible signals, implying \( \pi^L(\rho) = \frac{1-\rho(1-p)}{2-p} \) and \( \pi^H = p \).

iii. If \( L^I = L^*_H \), there is no equilibrium with information transmission. Credibility for any of the media’s messages is \( \pi = \frac{1}{2} \), and therefore the media are not heeded.

This uniquely determined threshold is increasing in the media’s reputation \( \rho \).

C. The Political Business Cycle. We are now ready to assess the consequences of politically motivated media. We know the media are credible and have power to influence both the economy and the election. Here we are more concerned about the consequences of this manipulation upon the economy across periods.

The aim is to study the evolution of taxes through periods. In particular, I compare the non-electoral period with the electoral one within the polity’s first mandate.

I focus on taxes\(^{51}\). Take equation (15) and (19). We have

\(^{51}\)As shown above, current expenditures are informationally equivalent, being the sign of their changes the only important difference.
$$T^* = (1 - \omega)\bar{Y} + \omega\bar{\Delta}X^e[X^e]^{\xi}$$

Taxes are strictly increasing in overall spending on the intermediate input $Z$. To ease computation, let us focus on $S_z$, knowing that taxes are a linear function of this variable. Furthermore, let us consider the log of this function, $\log(S_z) = s_z$. We can write

$$s_z = d + b_0x + b_1x^e$$

where $d$, $b_0$, and $b_1$, are some positive constants. I have expressed all variables in their logs equivalents.

To compare periods, I compute the ex-ante expectation over $s_z$, for given information about the media, and normalising past competency to be zero\textsuperscript{52}. As a benchmark, take the evolution of spending (and therefore taxes) when the media is known to be of the honest type. Evidently, $E[x|a_{t-1}] = E[\theta] + 0.5 \times a_H + 0.5 \times a_L = 0$. Similarly,

$$E[x^e|a_{t-1}] = 0.5 \times (2p - 1)^2a_H + 0.5 \times (2p - 1)(1 - 2p)a_H = 0$$

This implies that $E[s_z|a_{t-1}] = d$. This expected amount does not vary across periods. With honest media, for however large the political motive might be, there is no political business cycle as such.

Now let us consider dishonest media. There are several cases to consider. Take media with political motive $L < L_H \ll 0$, which corresponds to media strongly against the incumbent. According to proposition 6, when dishonest these type of senders send a pessimistic message in both periods, independent of the signals for competency that they learn. Now we have

$$E[x^e|a_{t-1}; L < L_H] = (1 - 2\beta_L(\rho)) < 0$$

Hence, $E[s_z|a_{t-1}; L < L_H] = d + (1 - 2\beta_L(\rho)) < d$. Taxes (current public spending) will be lower (higher) — all else being equal — when the media are dishonest and strongly against the incumbent, than when the media are honest.

But from D.3 we know that reputation evolves through time. From an ex-ante perspective, given the fact that dishonest media are strongly against the incumbent would always report a low message, the posterior reputation is obtained as follows (consider $\rho_t$ updated to $\rho_{t+1}$)

$$\rho_{t+1} = \frac{1}{2} \left( \frac{p}{\pi^L_t(\rho_t)} + \frac{(1-p)}{1 - \pi^L_t(\rho_t)} \right) \rho_t$$

with (from propositions 5 and 6)

$$\pi^L_t(\rho_t) = \frac{1 - \rho_t(1 - p)}{2 - \rho_t}$$

\textsuperscript{52}Recall that for any beginner initial competency is normalised to zero.
which is an increasing function of $\rho_t$. This implies that $\rho_{t+1}$ is strictly decreasing in $\rho_t$, implying in turn that credibility of media’s low messages fall across time during an electoral mandate (during the last mandate all dishonest media, regardless of their political motive, always report the high state; this is direct from propositions 1 and 3).

But, as much discussed above, and due to the economy’s asymmetry, we know that having media against the incumbent is structurally a rarer event than having media in favour of incumbents. We consider this next.

During the electoral mandate’s first period, and following the same steps as the ones we took when analysing media against the incumbent, it is direct to show that (given reputation $\rho$, and given that $L_I > L_H$)

$$E[s_i|a_{t-1}; \mathcal{L}^I > \mathcal{L}_H] = d + (2\beta^H(\rho) - 1) > d$$

with (from propositions 5 and 6)

$$\pi_t^H(\rho_t) = \frac{1 - \rho_t(1 - p)}{2 - \rho_t}$$

When comparing the non-electoral period with the electoral one, given that the media are dishonest and in favour of the incumbent, there are two possible outcomes. Depending on the evolution of $\rho$ and the actual realisation of competency, either the political motive lies below, within, or outside the intervals defined in 3. If, for instance, $\mathcal{L}^I$ is such that $\mathcal{L}_H < \mathcal{L}^I < \mathcal{L}^{min}_H$, the media always reports a high state in the first period, while always sending a low message in the election period. If so, expected spending $s_z$ falls (and taxes thereby) from $d + (2\beta^H(\rho) - 1)$ to $d + (1 - 2\beta^L(\rho_-))$. If, on the contrary, the political motive were such that $\mathcal{L}^{max}_H < \mathcal{L}^I < \mathcal{L}^{min}_H$, then the media would always be truthful, and expected spending $s_z$ would fall to d. If, finally, the political motive implied media being in favour of the incumbent, expected spending $s_z$ (and taxes thereby) would fall all the same, through the fall in the media’s credibility.

This is indeed quite a general result.

**Proposition 7.** When the media are honest, there is no Political Business Cycle (PBC). On average, from an ex-ante point of view, taxes, and public spending, are the same across periods. When the media are dishonest and strongly against the incumbent (that is, political like-mindedness is $\mathcal{L}^I < \mathcal{L}_H$; where $\mathcal{L}_H$ is obtained from proposition 6), then there is a PBC in which taxes $T$ (public spending $G$) increase (decrease) during the election period, as compared to a non-electoral one. Contrariwise, if the media are in favour of the incumbent (that is, the political like-mindedness parameter is $\mathcal{L}^I > \mathcal{L}_H$), there is always a PBC in which taxes $T$ (public spending $G$) decrease (increase) during the election period, as compared to a non-electoral one.

\[\frac{\partial}{\partial \rho_t} \left( \frac{p}{\pi_t^L(\rho_t)} + \frac{(1-p)}{1-\pi_t^L(\rho_t)} \right) = -\frac{(1 - 2\pi_t^L) \frac{\partial \pi_t^L(\rho_t)}{\partial \rho_t} p + (1 - 2p) \frac{\partial \pi_t^L(\rho_t)}{\partial \rho_t} (\pi_t^L(\rho_t))^2}{(\pi_t^L(\rho_t))^2(1 - \pi_t^L(\rho_t))^2} < 0\]
5. DISSCUSION AND POSSIBLE EXTENSIONS

Our micro-founded theory for PBCs is an important result. It conforms to some regularities documented in the literature on political business cycles. In particular, it is consistent with regularity number 7 in Drazen (2000b):

*There is evidence of pre-electoral increases in transfers and other fiscal policy instruments in a number of countries. In the United States, this effect appears strongest prior to 1980.*

In the present model taxes decrease and public spending increase around election periods. The fact that the effect is strongest prior to 1980 in the US requires thorough investigation, specially on how the media industry is and was organized in the US in the last decades. Recent concentration of the media appears to go against our theory, though this needs further investigation and calls for an extension of the model allowing for pluralism, which I address in an extension of the present basic set-up. Commercialism, and the decay of investigative journalism (see Davis (2008)), however, may be interpreted to be the outcome explaining the fall in the political business cycle effect, which would be consistent with our model.

Pluralism is a major topic we have not discussed and could easily incorporated into this model. Note, however, that even when the media are pluralistic — or perhaps because of it — there will be a political business cycle. I provide a brief intuition to this result, in the light of our model. Suppose that pluralism has media extremely located on each side of the political divide; that is, while one publisher is strongly against the incumbent, the other is strongly in favour (where “strongly against” or “strongly in favour” are defined according to equilibrium in the electoral period), they would still send an optimistic outlook in the first period of the electoral mandate, while disagreeing during the electoral one. An equilibrium of the sequential game would have then media reporting dissonant messages. Given that the signal is the same and voters cannot infer which one is being dishonest, the signals will cancel each other out, rendering equilibrium credibility to be \( \pi = \frac{1}{2} \) (where no information is transmitted). As shown above, this would imply, on average, having taxes lower than the values they would exhibit on average in cases without pluralism.

In the light of our results there are several interesting predictions that I summarize next.

1. If the media were honest we would not observe a political business cycle, and taxes (public spending) would be lower (higher) than in polities with dishonest media moderately in favour or against the incumbent.
2. In polities in which the media are strongly in favour of the incumbent, taxes (public spending) are (is) expected to be lower (higher), everything else being equal. The

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54 In an extension I consider the existence of two publishers with differing political news, having the same information transmission technology, and assuming a sequential game. The scope for information manipulation is diminished, although many cases bear a political business cycle. In another extension I allow the signal they extract to differ, while being correlated. Depending on the correlation of these signals, and the publishers’ political motives, there would still be scope for electoral manipulation bearing a political business cycle. Recall that, as we have shown throughout the present work, during electoral years all media, independent of their political pull, have incentives to report the same message (this is not true when the media are honest).

55 If they were defined according to proposition 6 instead, then media against the incumbent would always send a pessimistic message, and we would not obtain a political business cycle.
political business cycle is smoother than in cases where the media are moderately in favour or against the incumbent government.

3 When the media are dishonest and strongly against the incumbent, then taxes (public spending) would be lower (higher) than in the case with honest media, and would increase (decrease) around election periods.

4 The larger the media’s precision $p$ and reputation $\rho$, the starker the political business cycle.

5 The political business cycle is more likely to be pronounced when competency during the period preceding the election period had been low. “Bad” incumbents generate sharper political business cycles.

Note that the model is not specific to the short-run memory process assumed for competency. In an extension, I consider an AR(1) process. Persistence of competency does have an effect upon the cycle, but the basic structure of the equilibrium does not change. A more general framework, however, in which both processes must be addressed, is one having several mandates. Generally speaking, what a stronger persistence shock over competency does in the present framework, everything else being equal, is to further foster the incentive of media moderately against the incumbent for truthful reporting when the state is low. One would expect the political business cycle to be less pronounced the lower the persistence of competency.

A more crucial assumption is related to the timing in assumption 1, affecting the learning process of agents in the economy. A more general model should incorporate other learning and inference processes.

Another situation not addressed in the model is one in which the media are rewarded for the information they convey. In an extension I study an endogenous demand for information by producers, in which the price they are willing to pay (and the media’s surplus as a consequence) is increasing in the media’s credibility. In that case we would still obtain a political business cycle, though with different characteristics. The stronger the political motive, the lower the media’s credibility in equilibrium would be. However, because the media would have no incentives for information manipulation during non-electoral periods, even dishonest media would report truthfully in those periods. In our setting, this would make taxes, on average, higher around electoral periods if we computed the unconditional mean, which does not fit well the empirical evidence unless the media were structurally against the incumbent.

Finally, an interesting extension is analysing the interplay between an office-motivated incumbent seeking re-election and information transmission by politically motivated media. In such environment, a key variable would be the incumbent politician’s information on his own competency. Even when the incumbent had not such advantage he would consider manipulation of fiscal policy for re-election, but this must be weighted against the media’s intervention.

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56 Which findings resemble much of those obtained when considering “foreign press” or media deriving profits from sources uncorrelated to welfare of the polity (in the present model the media derives utility from the polity’s welfare). In any of these environments, politically motivated media will manipulate information only during electoral periods, which implies that taxes would increase around election periods as compared to non-electoral ones, if one computed, as we have done throughout, the unconditional expectation over taxes and public spending. Of course, if the assessment were made conditional on the particular messages or prospects of the economy at any point in time, then taxes would decrease around electoral periods. But this is true in the present model as well.
6. Conclusions

I have shown in this paper that political motivated bias in the media may have important consequences over economic outcomes, economic policy, and electoral outcomes. This is in spite of all agents being fully rational. As in Bénabou and Laroque (1992), when being credible, the media can manipulate systematically important information about the government, which serves in making public and private decisions.

The most interesting and novel feature of the model is that political motivated information transmission by the media — which is by the very structure of the economy and assumptions on the media’s behaviour essentially asymmetric — may generate political business cycles. Around election periods, in equilibrium, unless the media are strongly against the incumbent, taxes (public spending) decrease (increase) in electoral years as compared to non-electoral ones, as it has been reported in most empirical work on political business cycles. The effect is stronger if the media are moderately against the incumbent, but holds for any dishonest media not having a strong dislike for the incumbent government.

The model also casts light over an important theme not addressed in related work on media, nor in work on political business cycles. By incorporating the media, which is without doubt, a key strategic player in any actual political economy, I have shown that strategic information transmission provides interesting results and seems to be a useful and promising analytical framework for studying the political economy of mass media and the political business cycle.

A. Appendix

A.1. Solving for the REE in section B. For given overall competency shock $X$ and given $P^e_z$ the final market-clearing price $P^*_z$ is unique.

\[
P^e_z = \left[ \frac{1}{2p_\theta} \right] \frac{1}{\frac{1}{\gamma(1-\phi)}} \left( \frac{\phi}{B} \right) \frac{1}{\frac{1}{\gamma(1-\phi)}} \frac{X^e}{\frac{1}{\gamma(1-\phi)}}
\]

where $X^e \equiv E_t(X|\Omega_t)$. As equation (1) shows, in equilibrium the supply of $Z$ is increasing in the expected overall governance, and by extension, increasing in the belief on the government’s competency. Using (1) back in (18) we obtain the REE equilibrium price function

\[
P^*_z = \left[ \frac{1}{2p_\theta} \right] \frac{1}{\frac{1}{\gamma(1-\phi)}} \left( \frac{\phi}{B} \right) \frac{1}{\frac{1}{\gamma(1-\phi)}} \frac{X^e}{\frac{1}{\gamma(1-\phi)}} X^\phi
\]

We have that in equilibrium all supply is absorbed, and therefore

\[
Z^* = (P^e_z)^\gamma = \left[ \frac{1}{2p_\theta} \right] \frac{1}{\frac{1}{\gamma(1-\phi)}} \left( \frac{\phi}{B} \right) \frac{1}{\frac{1}{\gamma(1-\phi)}} \frac{X^e}{\frac{1}{\gamma(1-\phi)}} X^\phi
\]

implying in turn

\[
Z^*P^*_z = \left[ \frac{1}{2p_\theta} \right] \frac{1}{\frac{1}{\gamma(1-\phi)}} \left( \frac{\phi}{B} \right) \frac{1}{\frac{1}{\gamma(1-\phi)}} \frac{X^e}{\frac{1}{\gamma(1-\phi)}} X^\phi
\]

In equilibrium, the optimal amount to be spent on $Z$ is increasing both in the actual overall governmental performance and in producers’ expectation of it. From (15), (16) and (17) we obtain the optimal levels of $T$, $K$, and $G$, in equilibrium, respectively (once the market for $Z$ had cleared). Using these optimized variables, we can obtain optimized welfare by plugging them back in (14). After some algebra, it is straightforward to show that
\[ \mathcal{T}^*(X^e, X, \Xi) = \mathbb{E}Y + \Lambda X^\phi [X^e] \frac{e^{2\gamma}}{1 - \gamma} \]

Where \( \Xi \) denotes a vector of parameters, and \( \Lambda \equiv \left[ \frac{1}{2p_\phi} \right] \frac{e^{2\gamma}}{1 - \gamma} \left( \frac{\phi}{\beta} \right) \frac{e^{2\gamma}}{1 - \gamma} (1 - \phi) \). So welfare increases in actual competency and agents’ belief on its actual realisation.


**Proof.** That the variables are uniquely determined is direct and has been proven above. Take a given state \( \hat{a} = a \). Then \( s_x|a \sim \mathcal{N}(a, 1/p_\theta) \), which implies, for given \( \beta \),

\[ \lambda' \sim \mathcal{N}(\lambda(\beta) + 2a_H p_\theta a, 4a_H^2 p_\theta) \]

With \( \frac{\partial \lambda(\beta)}{\partial \beta} = \frac{1}{\beta(1 - \beta)} > 0 \).

From equations (2) and (3) it is evident that the final price is decreasing, and the amount spent on acquisition of \( Z \) increasing, in \( X^e \).

\[ \phi \]


**Proof.** First note that the LLR affecting voters’ decision, conditional on state \( a \), is normally distributed

\[ \lambda' \sim \mathcal{N}(\lambda(\beta) + 2a_H p_\theta a, 4a_H^2 p_\theta) \]

We can apply therefore the useful normal standard transformation, which implies

\[ Z = \frac{\lambda' - E(\lambda')}{\sqrt{V(\lambda')}} = \frac{\theta}{\sqrt{p_\theta}} \sim \mathcal{N}(0, 1) \]

First consider that the media had observed a low state: \( \hat{s}_M = a_L \). If they misreport their signal, \( m = a_H \), the probability of re-election is

\[ \Pr(v = I|m = a_H; \hat{s}_M = a_L) = 1 - p\Phi \left( \frac{-\lambda(\beta^L) + 2a_H^2 p_\theta}{2a_H \sqrt{p_\theta}} \right) - (1 - p)\Phi \left( \frac{-\lambda(\beta^H) - 2a_H^2 p_\theta}{2a_H \sqrt{p_\theta}} \right) \]

If the media had decided to send a truthful message the probability of re-election that they compute is

\[ \Pr(v = I|m = a_L; \hat{s}_M = a_L) = 1 - p\Phi \left( \frac{\lambda(\beta^L) + 2a_H^2 p_\theta}{2a_H \sqrt{p_\theta}} \right) - (1 - p)\Phi \left( \frac{\lambda(\beta^H) - 2a_H^2 p_\theta}{2a_H \sqrt{p_\theta}} \right) \]

Taking (5) and (6) implies

\[ \mathcal{D}_p = p \left[ \Phi \left( \frac{\lambda(\beta^L) + 2a_H^2 p_\theta}{2a_H \sqrt{p_\theta}} \right) - \Phi \left( \frac{-\lambda(\beta^H) + 2a_H^2 p_\theta}{2a_H \sqrt{p_\theta}} \right) \right] + (1-p) \left[ \Phi \left( \frac{\lambda(\beta^L) - 2a_H^2 p_\theta}{2a_H \sqrt{p_\theta}} \right) - \Phi \left( \frac{-\lambda(\beta^H) - 2a_H^2 p_\theta}{2a_H \sqrt{p_\theta}} \right) \right] > 0 \]

which is increasing in both \( \beta^H \) and \( \beta^L \). Indeed

\[ \frac{\partial \mathcal{D}_p}{\partial \beta^H} = p\Phi'(\cdot) \frac{\partial \lambda(\beta^H)}{\partial \beta^H} + (1 - p)\Phi'(\cdot) \frac{\partial \lambda(\beta^H)}{\partial \beta^H} > 0 \]

and

\[ \frac{\partial \mathcal{D}_p}{\partial \beta^L} = p\Phi'(\cdot) \frac{\partial \lambda(\beta^L)}{\partial \beta^L} + (1 - p)\Phi'(\cdot) \frac{\partial \lambda(\beta^L)}{\partial \beta^L} > 0 \]

\[ \Box \]

Proof. We define \( \pi^H \equiv \text{Prob}(\hat{a} = a_H|m = a_H) \) and \( \pi^L \equiv \text{Prob}(\hat{a} = a_L|m = a_L) \), that is, the credibility of media’s messages, contingent on what state of competency these messages specifically convey.

Using Bayes’s rule we have

\[
\pi^H = \frac{\text{Prob}(m = a_H|\hat{a} = a_H)\text{Prob}(\hat{a} = a_H)}{\text{Prob}(m = a_H)}
\]

\[
\pi^L = \frac{\text{Prob}(m = a_L|\hat{a} = a_L)\text{Prob}(\hat{a} = a_L)}{\text{Prob}(m = a_L)}
\]

First we prove that \( \pi^H > \frac{1}{2} \) and \( \pi^L < p \) is a consistent equilibrium.

I. Case \( \pi^H > \frac{1}{2} \) and \( \pi^L = p \).

If \( \pi^H > \frac{1}{2} \) then \( q^H = 1 \) and if \( \pi^L = p \), then \( q^L = 0 \). Taken together, these probabilities imply that dishonest media always reports competency to be high, and never, under any circumstances, sends a low-competency message. Therefore \( \text{Prob}(m = a_L|\text{dishonest}) = 0 \) and \( \text{Prob}(m = a_H|\text{dishonest}) = 1 \). With this information, and checking for consistency, we obtain that indeed low messages have the highest credibility

\[
\pi^L = \frac{\rho p(1/2)}{\rho(1/2)} = p
\]

Similarly,

\[
\pi^H(\rho) = \frac{1 - \rho(1 - p)}{2 - \rho} > \frac{1}{2}
\]

Only if \( \rho = 0 \) we have no information transmission when the message is high: \( \pi^H = \frac{1}{2} \). Contrariwise, if \( \rho = 1, \pi^H = p > \frac{1}{2} \). Besides, \( \frac{\partial_\rho \pi^H(\rho)}{\rho} = \frac{2p-1}{(2-\rho)^2} > 0 \). Therefore, for any \( \rho > 0 \) indeed \( \pi^H > \frac{1}{2} \).

Next we show that either the case where \( \pi^H = \frac{1}{2} \) and \( \pi^L > \frac{1}{2} \) or \( \pi^H > \frac{1}{2} \) and \( \pi^L = \frac{1}{2} \), cannot hold in equilibrium.

II. Case \( \pi^H > \frac{1}{2} \) and \( \pi^L > \frac{1}{2} \).

If \( \pi^L = \frac{1}{2} \) (the public does not take into account the media’s message when low, and does not react to it) the media randomizes whenever their signal is low: \( 0 < q^L < 1 \). If \( \pi^H > \frac{1}{2} \), dishonest media strictly prefers to truthfully report a high signal: \( q^H = 1 \), while “sometimes” telling the truth when low, which implies that only honest media or dishonest media acting honestly, will report a low state. If that were the case, however

\[
\pi^L = \frac{[\rho p + (1 - \rho)q^L](1/2)}{(1/2)[\rho + (1 - \rho)q^L]} = p > \frac{1}{2}
\]

which is a contradiction.

III. Case \( \pi^H = \frac{1}{2} \) and \( \pi^L > \frac{1}{2} \).

If \( \pi^H = \frac{1}{2} \) (the public does not take into account the media’s message when high, and does not react to it) the media randomize whenever their signal is high: \( 0 < q^H < 1 \). If \( \pi^L > \frac{1}{2} \), the dishonest media strictly prefers to misreports the signal if low: \( q^L = 0 \), while “sometimes” not telling the truth when high. If that were the case, however

\[
\pi^L(\rho) = p - \frac{(2p - 1)(1 - \rho)(1 - q^H)}{\rho + (1 - \rho)(1 - q^H)}
\]

and

\[
\pi^H(\rho) = p - \frac{(2p - 1)(1 - \rho)}{\rho + (1 - \rho)(1 + q^H)}
\]

For this to be an equilibrium, both \( \pi^L > \pi^H \) and \( \pi^H = \frac{1}{2} \) must hold. But imposing the first one, for any \( \rho < 1 \), implies imposing \( q^H[(1 - \rho)(1 - q^H)] < 0 \). For \( q^H > 0 \) this implies imposing \( \rho > \frac{1 - q^H}{2 - q^H} \).
where the RHS of the inequality is maximal when \( q^H \) approaches zero, and minimal when \( q^H = 1 \).
Indeed \( \frac{\partial -q^H}{\partial q^H} = -\frac{1}{2-q^H} < 0 \).

However, imposing \( \pi^H = \frac{1}{2} \) implies imposing \( \rho = \frac{1}{2-q^H} \). Both conditions cannot hold at the same time.

IV. Case \( \pi^H = \frac{1}{2} \) and \( \pi^L = \frac{1}{2} \).

In this case the media randomizes in both cases, either when its signal is high, or low. We have therefore \( q = q^L = q^H \), and by extension \( \pi(\rho) = \pi^H(\rho) = \pi^L(\rho) \), where

\[ \pi(\rho) = \rho \rho + (1 - \rho)[p q + (1 - p)(1 - q)] \]

However, \( 0 < q < 1 \) iff \( \rho < \frac{1}{2} \). Therefore, an equilibrium with no information transmission exists if \( \rho < \frac{1}{2} \).


Proof. The proof consists in showing that there is no equilibrium in which dishonest media randomize on one of the signals while following pure strategies on the other. In proof of proposition 1 we showed that either the \( \pi^H = \frac{1}{2} \) and \( \pi^L = \frac{1}{2} \) case or the \( \pi^H = \frac{1}{2} \) and \( \pi^L > \frac{1}{2} \) one, cannot hold in equilibrium. One missing case is \( \pi^H < \frac{1}{2} \) and \( \pi^L = \frac{1}{2} \).

If \( \pi^L = \frac{1}{2} \) (the public does not take into account the media’s message when low, and does not react to it) the media randomizes whenever their signal is low: \( 0 < q^L < 1 \). If \( \pi^H < \frac{1}{2} \), dishonest media strictly prefers to misreport a high signal: \( q^H = 0 \), while “sometimes” telling the truth when low, which implies that only honest media or dishonest media acting honestly, will report a low state. If that were the case, however

\[ \pi^H(\rho) = p - \frac{(2p - 1)(1 - \rho)(1 - q^L)}{\rho + (1 - \rho)(1 - q^L)} \]

and

\[ \pi^L(\rho) = p - \frac{(2p - 1)(1 - \rho)}{\rho + (1 - \rho)(1 + q^L)} \]

For this to be an equilibrium, both \( \pi^H > \pi^L \) and \( \pi^L = \frac{1}{2} \) must hold. But imposing the first one, for any \( \rho < 1 \), implies imposing \( q^L[(1 - \rho)(1 - q^L)] < 0 \). For \( q^L > 0 \) this implies imposing \( \rho > \frac{1 - q^L}{2-q^L} \), where the RHS of the inequality is maximal when \( q^L \) approaches zero, and minimal when \( q^L = 1 \). Indeed \( \frac{\partial -q^L}{\partial q^L} = -\frac{1}{2-2q^L} < 0 \).

However, imposing \( \pi^L = \frac{1}{2} \) implies imposing \( \rho = \frac{1-q^L}{2-q^L} \). Both conditions cannot hold at the same time.


Proof. We consider dishonest media deciding on what to report at the beginning of the last mandate, given that in the last period they always report the high state (see proposition 1; I focus on equilibrium with information transmission). We take the media’s reputation \( \rho_{t+2} \) as given. As before, recall that credibility is message-contingent. We use thus, as above, \( \pi^L \) and \( \pi^H \). Any equilibrium must describe \( \pi^L(\rho) \in [1-p, p] \) and \( \pi^H(\rho) \in [1 - p, p] \). We denote by \( \beta_H(\rho^+) \) the credibility of a high message at the end of the mandate when the message in the first period had been high and it had been confirmed so (using the updating rule according to (D.3)). Similarly, we have, \( \beta_L(\rho^-) \) (when the updating rule drags reputation downwards, after observing a high message), and \( \beta_L(\rho^+) \) and \( \beta_L(\rho^-) \) correspond to the same beliefs, respectively, when the message during the first period of the mandate had been low.

From proposition 1 we know that at the end of the mandate, in an equilibrium with information transmission, the media will be heeded, and if so, dishonest media will always report a high state. Using (A.8) and (A.8) we have
that (credibility of a low message in the first period, were this to be an equilibrium, would be misreported a high signal in the first period, as with the case we discussed right above, credibility is not updated information in assessing the media’s credibility when sending a high message in the last period. If the media

But in that case, for any

would be updated accordingly (had misreported its signal when high in the first period, then the credibility of a high message in the last one

would equal the belief of a low one in the first one (there is no updating):

\[ q = q_L = q_H = 1, \] implying \( \pi^* = \pi^L = \pi^H = p. \) But in that case

which is a contradiction (recall equation (24)).

Similarly, we start showing that there is no equilibrium in which \( V_{TL} > V_{UL} \) and \( V_{TH} > V_{UH}. \) If so, we would have

\[ q = q_L = q_H = 0, \] implying \( \pi^L = \pi^H = \pi(\rho_{t+2}) = p(1 - \rho)(1 - p). \) But in that case, for any \( \pi(\rho_{t+2}) \)

\[ \mathcal{F}_L(\rho) = \mathcal{Q}_\exp(\phi a_{t+1})[p \exp(\phi a_H) + (1 - p) \exp(\phi a_L)][\beta_H(\rho) - \beta_L(\rho)] \]

\[ + \delta p[\beta_L(\rho^+ - \beta_H(\rho^-)]Q \exp[(\phi + \xi)a_H] + \delta(1 - p)[\beta_L(\rho^-) - \beta_H(\rho^+)]Q \exp[(\phi + \xi)a_L] \]

Similarly, we obtain

\[ \mathcal{F}_L(\rho) = \mathcal{Q}_\exp(\phi a_{t+1})[p \exp(\phi a_L) + (1 - p) \exp(\phi a_H)][1 - \beta_H(\rho) - \beta_L(\rho)] \]

\[ + \delta p[\beta_L(\rho^+ - \beta_H(\rho^-)]Q \exp[(\phi + \xi)a_L] + \delta(1 - p)[\beta_L(\rho^-) - \beta_H(\rho^+)]Q \exp[(\phi + \xi)a_H] \]

Now we use proposition 2, to show the existence of a unique equilibrium with information transmission.

We start showing that there is no equilibrium in which \( V_{TL} > V_{UL} \) and \( V_{TH} > V_{UH} \). If so, we would have

\[ q = q_L = q_H = 1, \] implying \( \pi^* = \pi^L = \pi^H = p. \) But in that case

which is strict positive as long as \( \rho > 0 \). Similarly

\[ \mathcal{F}_H(\rho) = \mathcal{Q}_\exp(\phi + \xi) a_{t+1} [p \exp(\phi a_H) + (1 - p) \exp(\phi a_L)][\beta_H(\rho) + \beta_L(\rho)] \]

\[ + \delta p[\beta_L(\rho^+ - \beta_H(\rho^-)]Q \exp[(\phi + \xi)a_H] + \delta(1 - p)[\beta_L(\rho^-) - \beta_H(\rho^+)]Q \exp[(\phi + \xi)a_L] \]

\[ = \mathcal{Q}_\exp(\phi + \xi) a_{t+1} [p \exp(\phi a_L) + (1 - p) \exp(\phi a_H)][1 - \beta_H(\rho) - \beta_L(\rho)] \]

\[ + \delta p[\beta_L(\rho^+ - \beta_H(\rho^-)]Q \exp[(\phi + \xi)a_L] + \delta(1 - p)[\beta_L(\rho^-) - \beta_H(\rho^+)]Q \exp[(\phi + \xi)a_H] \]

\[ = \mathcal{Q}_\exp(\phi + \xi) a_{t+1} [p \exp(\phi a_H) + (1 - p) \exp(\phi a_L)][\beta_H(\rho) + \beta_L(\rho)] \]

\[ + \delta p[\beta_L(\rho^+ - \beta_H(\rho^-)]Q \exp[(\phi + \xi)a_H] + \delta(1 - p)[\beta_L(\rho^-) - \beta_H(\rho^+)]Q \exp[(\phi + \xi)a_L] \]

\[ = \mathcal{Q}_\exp(\phi + \xi) a_{t+1} [p \exp(\phi a_L) + (1 - p) \exp(\phi a_H)][1 - \beta_H(\rho) - \beta_L(\rho)] \]

\[ + \delta p[\beta_L(\rho^+ - \beta_H(\rho^-)]Q \exp[(\phi + \xi)a_L] + \delta(1 - p)[\beta_L(\rho^-) - \beta_H(\rho^+)]Q \exp[(\phi + \xi)a_H] \]

\[ = \mathcal{Q}_\exp(\phi + \xi) a_{t+1} [p \exp(\phi a_H) + (1 - p) \exp(\phi a_L)][\beta_H(\rho) + \beta_L(\rho)] \]

\[ + \delta p[\beta_L(\rho^+ - \beta_H(\rho^-)]Q \exp[(\phi + \xi)a_H] + \delta(1 - p)[\beta_L(\rho^-) - \beta_H(\rho^+)]Q \exp[(\phi + \xi)a_L] \]

\[ = \mathcal{Q}_\exp(\phi + \xi) a_{t+1} [p \exp(\phi a_L) + (1 - p) \exp(\phi a_H)][1 - \beta_H(\rho) - \beta_L(\rho)] \]

\[ + \delta p[\beta_L(\rho^+ - \beta_H(\rho^-)]Q \exp[(\phi + \xi)a_L] + \delta(1 - p)[\beta_L(\rho^-) - \beta_H(\rho^+)]Q \exp[(\phi + \xi)a_H] \]

\[ = \mathcal{Q}_\exp(\phi + \xi) a_{t+1} [p \exp(\phi a_H) + (1 - p) \exp(\phi a_L)][\beta_H(\rho) + \beta_L(\rho)] \]

\[ + \delta p[\beta_L(\rho^+ - \beta_H(\rho^-)]Q \exp[(\phi + \xi)a_H] + \delta(1 - p)[\beta_L(\rho^-) - \beta_H(\rho^+)]Q \exp[(\phi + \xi)a_L] \]
which is strictly negative as long as \( \rho > 0 \). We have obtained the unique equilibrium with information transmission.

It is immediate from observation of \( \mathcal{F}_L(\rho_t + 2) \) and \( \mathcal{F}_H(\rho_t + 2) \) that there is always an equilibrium with no information transmission, where \( \pi = \frac{1}{2} \), as long as \( \rho < \frac{1}{2} \). If the media were believed to convey no information, then \( \mathcal{F}_L(\rho_t + 2) = \mathcal{F}_H(\rho_t + 2) = 0 \).

\[ \Box \]

A.7. Proof of Proposition 5.

**Proof.** From proposition 3 we know that dishonest media, regardless of their political pull, always reports, in every period of the last mandate, a high state. Credibility of high messages, in equilibrium, is, according to 3, \( \pi^H(\rho) \). Given the electoral outcome, notice that \( \mathbb{W}_{TH}(\rho^+; J) = \mathbb{W}_{TL}(\rho^+; J) \)

\[
\begin{align*}
\mathbb{W}_{TH}(\rho^+; J) &= \mathbb{W}_{TL}(\rho^+; J) = \frac{1}{2} \mathbb{P}_L^J + \frac{1}{2} \mathbb{P}_H^J \left[ \frac{\rho}{\pi^H(\rho)} \right] + \frac{1}{2} \mathbb{P}_L^J \left[ \frac{(1-\rho)(\rho - \rho^q)}{\pi^H(\rho)} \right] + \frac{1}{2} \mathbb{P}_H^J \left[ \frac{(1-\rho)(\rho - \rho^q)}{\pi^H(\rho)} \right]
\end{align*}
\]

where superscript “\( J \)” is conditioning on the electoral outcome. Either \( J = I \) or \( J = O \). For any \( \rho \), \( \mathbb{W}_{TH}(\rho^+; J) > \mathbb{W}_{UH}(\rho^-; J) \). At the same time, any function \( \mathbb{W} \) is strictly increasing in \( \rho \), through function \( V \) (recall that we impose equilibrium with information transmission always). Now reconsider the net expected gain of reporting truthfully over misreporting the observed signals. We can write

\[
\begin{align*}
\mathcal{F}_H(\rho; L^I) &= \mathcal{U}_{TH}(\rho) - \mathcal{U}_{UH}(\rho) + \delta \mathcal{P}_H(1 + \delta) L^I + \delta \mathcal{K}^L(\rho) \mathbb{W}_{TH}(\rho^+; I) - \mathcal{E}_H(\rho) \mathbb{W}_{UH}(\rho^-; I) - \mathcal{E}_L(\rho) \mathbb{W}_{TL}(\rho^-; I) - \mathcal{E}_O(\rho) \mathbb{W}_{UO}(\rho^-; O)
\end{align*}
\]

Similarly, we can obtain the net expected and discounted gain of reporting a low signal truthfully, that we denote by \( \mathcal{F}_L(\rho; L^I) \), as follows

\[
\begin{align*}
\mathcal{F}_L(\rho; L^I) &= \mathcal{U}_{UL}(\rho) - \mathcal{U}_{UL}(\rho) - \delta \mathcal{P}_H(1 + \delta) L^I + \delta \mathcal{K}^L(\rho) \mathbb{W}_{TH}(\rho^+; I) - \mathcal{E}_H(\rho) \mathbb{W}_{UH}(\rho^-; I) - \mathcal{E}_L(\rho) \mathbb{W}_{UL}(\rho^-; O) - \mathcal{E}_O(\rho) \mathbb{W}_{UL}(\rho^-; O)
\end{align*}
\]

Note that if \( L^I > 0 \), \( \mathcal{F}_H(\rho; L^I) > 0 \) and \( \mathcal{F}_H(\rho; L^I) > \mathcal{F}_L(\rho; L^I) \) for any value of \( \rho \). This is because \( \mathcal{P}_H(\rho) > \mathcal{P}_L(\rho) \) from property 2; \( \mathcal{U}_{TH}(\rho) > \mathcal{U}_{UH}(\rho) \); \( \mathcal{U}_{UL}(\rho) > \mathcal{U}_{UL}(\rho) \); \( \mathcal{W}_{O}(\rho^+; I) > \mathcal{W}_{UO}(\rho^-; O) \); and \( \mathcal{W}_{U}(; I) > \mathcal{W}_{U}(; I) \).

I treat \( L^I \) as a free parameter. If \( L^I \to \infty^+ \), \( \mathcal{F}_H(\rho; L^I) \to \infty^+ \) and \( \mathcal{F}_L(\rho; L^I) \to \infty^+ \). If \( L^I \to \infty^- \), then \( \mathcal{F}_H(\rho; L^I) \to \infty^- \) and \( \mathcal{F}_L(\rho; L^I) \to \infty^- \).

In addition, both functions are monotonic in \( \mathcal{F}_H(\rho; L^I) \left( \frac{\partial \mathcal{F}_H(\rho; L^I)}{\partial \rho} > \frac{\partial \mathcal{F}_H(\rho; L^I)}{\partial \rho} < 0 \right) \), meaning that there is a unique root for each function.

Given that \( \mathcal{F}_H(\rho; L^I) > \mathcal{F}_L(\rho; L^I) \) for all \( \rho \), if we defined as \( L^I \) the level of political like-mindedness at which the media are indifferent between reporting truthfully a low signal or not, and analogously, \( \mathcal{F}_H \) the level of political pull at which the media are indifferent between reporting a high signal or not, then it must be that \( L^I > L^I \).

Taking proposition 4, we know that if \( L^I > L^I \), then \( \pi^H(\rho) = \frac{1}{2} - \frac{(1-\rho)(\rho - \rho^q)}{\pi^H(\rho)} \) and \( \pi^L = \frac{p}{2} \). If \( \mathcal{F}_H(\rho; L^I) < \mathcal{F}_L(\rho; L^I) \), instead, then \( \pi^H = \pi^L = \pi \).

Note that this equilibrium implies that \( \mathcal{F}_L(\rho; L^I) \) is decreasing in \( \rho \), at least in its boundaries. If one diminishes by an infinitely small amount \( L^I \), then \( \pi^H(\rho) \) jumps up to \( \pi \), which is equivalent to an increase in \( \rho \) up to one. To the left of \( L^I \), \( \mathcal{F}_L(\rho; L^I) \) is positive, meaning that \( \mathcal{F}_L(\rho; L^I) \) is increasing in \( \rho \). The only way of having \( L^I \) as equilibrium is \( \mathcal{F}_L(\rho; L^I) \) as a decreasing function of \( \rho \). Using the implicit function theorem, this implies that \( L^I \) is an increasing function of \( \rho \).

Now consider the other extreme, around \( \mathcal{F}_H(\rho; L^I) \). By decreasing \( L^I \) by an infinitesimal amount, \( \mathcal{F}_H(\rho; L^I) \) falls and becomes negative. At the same time, in equilibrium, \( \pi^L(\rho) \) “falls” from \( \pi \).
a decreasing function of $\rho$. Invoking the implicit function theorem again, this implies that $\mathcal{L}_H$ is an increasing function of $\rho$.

Taken together, this means that the higher the media’s reputation as independent press, the larger the thresholds in absolute value. It is also direct to show that the higher $\rho$ the more these thresholds grow apart (the rate at which $\mathcal{L}_H$ increases is smaller, due to the economy’s asymmetry essentially).

We also know that if $\mathcal{F}_H(\rho; \mathcal{L}_L^I) > 0$ when $\mathcal{L}_L^I = 0$, then it must be that $\mathcal{L}_H < 0$. As for $\mathcal{L}_L$ it may be either negative or positive depending on the parameters of the economy. Indeed, the thresholds are contingent on whether past competency had been high or low, for instance.

It is straightforward from inspection of $\mathcal{F}_H(\rho; \mathcal{L}_L^I)$ and $\mathcal{F}_L(\rho; \mathcal{L}_L^I)$, that these functions are decreasing (increasing) in $a_H$.

\[ \square \]


\textbf{Proof.} Any equilibrium in the first period game is defined as in 2. Consider first any dishonest media with $\mathcal{L}_L^I > \mathcal{L}_L^{\text{max}}$. If so, the media will always send an optimistic message during an electoral period and therefore

\begin{align*}
\forall_{TH}(\rho) &= U_{TH} + \delta p W_{TH} \left[ \frac{p \rho}{\pi_H(\rho)} ; \mathcal{L}_L^I \right] + \delta (1-p) W_{TH} \left[ \frac{(1-p) \rho}{1-\pi_H(\rho)} ; \mathcal{L}_L^I \right] \\
\forall_{UH}(\rho) &= U_{UH} + \delta p W_{TH} \left[ \frac{(1-p) \rho}{1-\pi_L(\rho)} ; \mathcal{L}_L^I \right] + \delta (1-p) W_{TH} \left[ \frac{p \rho}{\pi_L(\rho)} ; \mathcal{L}_L^I \right]
\end{align*}

and

\begin{align*}
\forall_{TL}(\rho) &= U_{TL} + \delta p W_{TH} \left[ \frac{p \rho}{\pi_L(\rho)} ; \mathcal{L}_L^I \right] + \delta (1-p) W_{TH} \left[ \frac{(1-p) \rho}{1-\pi_L(\rho)} \right] \\
\forall_{UL}(\rho) &= U_{UL} + \delta p W_{TH} \left[ \frac{(1-p) \rho}{1-\pi_H(\rho)} ; \mathcal{L}_L^I \right] + \delta (1-p) W_{TH} \left[ \frac{p \rho}{\pi_H(\rho)} ; \mathcal{L}_L^I \right]
\end{align*}

Now suppose $\mathcal{F}_H(\rho; \mathcal{L}_L^I) > 0$ and $\mathcal{F}_L(\rho; \mathcal{L}_L^I) > 0$, which imply $\pi_L(\rho) = \pi_H(\rho) = p$. But then

\[ \mathcal{F}_L(\rho; \mathcal{L}_L^I) = U_{TL} - U_{UL} < 0 \]

A contradiction.

Of course, as usual, as long as $\rho \geq \frac{1}{2}$ there always exists a unique equilibrium with no information in which the media randomizes and $\pi_L(\rho) = \pi_H(\rho) = \frac{1}{2}$.

Now consider the case $\mathcal{F}_H(\rho; \mathcal{L}_L^I) < 0$ and $\mathcal{F}_L(\rho; \mathcal{L}_L^I) > 0$. Then $\pi_H(\rho) = p$ and $\pi_L(\rho) = \frac{1-p(1-p)}{2-p}$. This would imply in turn

\begin{align*}
\forall_{TH}(\rho) &= U_{TH} + \delta p W_{TH} [\rho] \\
\forall_{UH}(\rho) &= U_{UH} + \delta p W_{TH} \left[ \frac{(1-p) \rho}{1-\pi_L(\rho)} ; \mathcal{L}_L^I \right] + \delta (1-p) W_{TH} \left[ \frac{p \rho}{\pi_L(\rho)} ; \mathcal{L}_L^I \right]
\end{align*}

In addition

\begin{align*}
\forall_{TL}(\rho) &= U_{TL} + \delta p W_{TH} \left[ \frac{p \rho}{\pi_L(\rho)} ; \mathcal{L}_L^I \right] + \delta (1-p) W_{TH} \left[ \frac{(1-p) \rho}{1-\pi_L(\rho)} \right] \\
\forall_{UL}(\rho) &= U_{UL} + \delta W_{TH} [\rho]
\end{align*}

Taken together these results imply

\begin{align*}
\mathcal{F}_H(\rho; \mathcal{L}_L^I) &= U_{TH} - U_{UH} + \delta W_{TH} - \delta p W_{TH} \left[ \frac{(1-p) \rho}{1-\pi_L(\rho)} ; \mathcal{L}_L^I \right] - \delta (1-p) W_{TH} \left[ \frac{p \rho}{\pi_L(\rho)} ; \mathcal{L}_L^I \right]
\end{align*}

and

\[ \square \]
\[ F_L(\rho; \mathcal{L}) = U_{TL} - U_{UL} + \delta \rho W_{TH} \left[ \frac{\rho}{\pi^L(\rho)} \right] + \delta(1-p) W_{TH} \left[ \frac{(1-p)\rho}{1 - \pi^L(\rho)} \right] - \delta W_{TH} [\rho] \]

Clearly, \( F_H(\rho; \mathcal{L}) > F_L(\rho; \mathcal{L}) \), a contradiction.

Evidently, the reverse operation is consistent, and indeed an equilibrium. An analogous proof shows that when dishonest media has political motive such that \( \mathcal{L}_{I} < \mathcal{L}_{\min} \), the unique equilibrium with information transmission is one in which \( \pi^H(\rho) = 1 - \rho(1-p) \) and \( \pi^L(\rho) = p \).

Now consider dishonest media with political motive such that \( \mathcal{L}_{\max} < \mathcal{L}_{I} < \mathcal{L}_{\min} \). In that case, we know from proposition 5 that in equilibrium, during the election period, \( \pi^H(\rho) = \pi^L(\rho) = p \). But following the same procedure as in the preceding case, we find that the media will always strictly prefer to send high messages.

Furthermore, this result applies to any \( \mathcal{L} \) lying within any of the intervals defined in property 3.

This implies that, in equilibrium, there is a unique threshold, \( \mathcal{L}^* < \mathcal{L}_{\min} \), above which the media always reports a high state, and below which she always reports the low state.

That this threshold is \( \mathcal{L}^* < 0 \) and increasing in the media’s reputation is evident, and follows proof of 5.

\[ \square \]

References


