

Soothing politics*

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Abstract

Political issues are particularly prone to motivated beliefs as the individual cost of manipulating one's information is negligible in large elections. We consider a political agency model in which voters learn information about some policy-relevant variable, which they can strategically ignore when it impedes their desire to hold optimistic beliefs. We show that voters' excessive tendency to sustain desirable beliefs may result in inefficient political decision-making because the electoral return of political courage is not sufficiently high when voters have poor information. However, voters also infer information from political decisions themselves and their incentives to ignore bad news decrease with the expected efficiency of policy-making. Consequently, there is an efficient equilibrium in which policy-makers are rewarded for selecting optimal policies. Given that politicians and voters' actions are strategic complements, it may coexist with an inefficient equilibrium in which policy-makers abstain from implementing policies that convey undesirable information in order to cater to the electorate's demand for soothing policies.

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1 Introduction

1.1 Motivation and main results

Selective exposure to information is one of the best documented phenomena in social psychology¹ but economists have only just started to incorporate it into their models.² In particular, little research has so far focused on the consequences of manipulation of information for policy-making, although one can suspect selective exposure to have an important impact on policy and hence on welfare: Cass Sunstein [25] for instance sees the ascendance of personalized information (notably through the Internet³) as one of the most important challenges for modern democracies. Representative democracy relies on the electoral process to discipline potentially biased or incompetent policy-makers and thus requires that voters have correct information on the most important policy issues and stakes. Excessive filtering of information could indeed increase the temptation for politicians to posture for electoral purposes, leading to policy distortions.

There are several reasons why people may select the information they acquire. First, there is an argument related to bounded rationality: because time and attention are scarce resources, people rather concentrate their interest on information regarding their favorite topics. Reading and processing information is costly, especially when it is technical and requires a good educational background. Second, and in line with the modeling of this paper, selective information acquisition (or avoidance of information) may be motivated by cognitive needs. We assume that agents are prone to selecting information because they experience emotional utility: they care about their beliefs *per se*. Psychologists have underlined for a long time that people may have an intrinsic preference for beliefs, due notably to self-image concerns or to utility from anticipation: beside physical outcomes, agents get antici-

¹Selective exposure refers to the tendency of people to deliberately (sometimes unconsciously) look for, select or recall mainly information that bolsters their prejudice, self-esteem, political views etc.

²For instance, Mullainathan and Schleifer [22] consider the incentives for the media to report information truthfully when readers look in reality for information biased towards their prior views.

³For instance, the RSS format makes it possible for people to preselect a list of their favorite web sites and keep up with them in an automated manner.

pated utility (savoring or anxiety) from the expectation of these outcomes. As shown by Loewenstein [19], anticipatory utility can lead people to delay the enjoyment of events in order to savour them. In addition, it creates a demand for (potentially inaccurate) self-serving beliefs.

Political issues are particularly prone to belief manipulation: first, politics has a strong emotional and affective dimension, creating a strong demand for self-serving beliefs: many issues are intimately connected with the individual’s identity⁴ or have the potential to cause distress or fear.⁵ Second, the benefits of ignorance (optimism) often outweigh the cost of poor information: on issues involving collective decision-making, the instrumental value of information is indeed low because each single voter is atomistic and has consequently no hope to swing electoral outcomes. To paraphrase Caplan [9], belief manipulation is not “an *ad hoc* anomaly but a predictable response to unusual incentives”.

In this paper, we examine the consequences of belief manipulation on political decisions, with a particular focus on the attitude of voters towards reforms. Structural reforms are often an important source of anxiety, notably because they somewhat reveal that times are hard and cast further uncertainty on what the future has in store. We argue that they are so long and difficult to implement because politicians who reform are not rewarded enough in case voters hold overoptimistic beliefs. In some sense, rejecting reforms is for voters a consistent way of denying the bad news they convey.⁶

We construct a political agency model with retrospective voting where bad politicians may be filtered out according to their past decision (reform or status quo). Policy-makers may be congruent with voters’ preferences (they wish to maximize social welfare) or biased towards the status quo.⁷ They furthermore care about re-election. The ability of voters to screen politicians depends on the quality of their information about another variable known privately to the politician: the state of

⁴Ideology or collective beliefs indeed play an important role on many political issues: immigration, redistribution, foreign policy etc.

⁵For instance, international tensions, terror attacks, alarming reports on the socio-economic situation, risks of pandemia etc.

⁶In France for instance, opposition to structural reforms (pension system, social security or job market reforms) often goes along with the common belief that these reforms are inappropriate.

⁷They may be backed by a lobby for instance.

the world, which determines whether a reform is socially optimal or not. If voters have an incorrect perception of the right political decisions, policy-makers may take inefficient decisions because political courage does not pay off.

More precisely, we consider a game in which voters learn information from two different sources on the state of the world: an external signal and the policy decision itself. Following Benabou-Tirole [3], we assume that voters have imperfect memory and can manipulate their beliefs about the state of the world in a self-serving way by forgetting the signal. Since voters also learn from political decisions, their optimal repression strategies depend on how much they expect to learn. In turn, the policy-maker's incentive to reform (and consequently how much negative or positive information on the state is conveyed) depends on how aware voters are that a reform is actually useful. Therefore, informational complementarities arise endogenously between the quality of voters' information and the information conveyed by the political action, leading to multiple equilibria:

(i) If voters expect that the political decision conveys high-quality information on the state of the world (efficient decision-making), the returns from investing in ignorance are low: one is less likely to lie to oneself if one expects contradicting news to come up later. Voters should abstain from repressing information and thus have relatively accurate beliefs in equilibrium. This in turn provides incentives for the policy-maker to select the optimal policy.

(ii) However, if voters expect inefficient decision-making, i.e. that the political action will convey little information about the state, they have a strong incentive to disregard bad news. This lowers the net gain that politicians derive from behaving courageously and typically creates inefficient decision-making.

Multiplicity of equilibria suggests that there might be different modes, possibly corresponding to different ideologies: in some countries, higher accuracy of voters' beliefs goes along with more efficient policy-making whereas other countries are less reform-minded.

The key feature of the model is the fact that policy-makers base their political decisions on information that may hurt voters' desire to hold optimistic beliefs. In a static context, belief manipulation affects the expected electoral payoff that

politicians get when they undertake reforms. In the long run, politicians still get rewarded for behaving in the socially desirable way, but they have an additional incentive to “soothe” the electorate because they get higher future utility from being reelected when voters are more optimistic.

The fact that politicians cater to the electorate’s demand for soothing policies typically slows down the pace of reforms: first, voters are excessively optimistic, so that politicians are less disciplined and more often stick to the status quo; second, voters are less able to screen politicians, so the average quality of politicians increases only slowly. In soothing equilibria, reforms are thus more likely to be implemented in steps. Each step conveys information that is detrimental to voters in terms of emotional utility but voters’ pessimism is a necessary condition for political efficiency, so each try paves the way for future reforms.

The paper is organized as follows. In section 2, we present and solve the baseline political agency model. In section 3, we derive the political equilibrium when voters have motivated beliefs. In section 4, we discuss the results and consider possible extensions. Section 7 concludes.

1.2 Related literature

This paper is based on and connects two different blocks of the literature:

(i) In line with a strand of the behavioral economics literature, we allow agents to manipulate their beliefs for self-serving motives. Strategic manipulation of information has been widely discussed both by psychologists and economists, starting with Freud and his theory of unconscious repression. Festinger’s theory of cognitive dissonance [16] posits that an individual holding two conflicting elements of cognition experiences a psychological tension he can only escape by reducing the dissonance between these two elements, notably by repressing dissonant information. In economics, the first paper is by Akerlof and Dickens [1], who show that workers in a dangerous job may prefer to remain ignorant of the exact risk they face at work, despite the instrumental value of this information. Modeling beliefs explicitly, Carrillo and Mariotti [11] show that strategic ignorance may help a time-inconsistent

agent overcome his procrastination problem. Benabou and Tirole [3] introduce a memory management game in which an agent who needs to be confident about his ability chooses whether or not to repress discouraging news and show that individuals may end up in self-traps. Other papers in which belief manipulation is driven by anticipatory utility include Caplin-Leahy [10], Köszegi [18], Benabou-Tirole [5] and Brunnermeier-Parker [7].

(ii) Second, our paper relates to the literature on the political economy of reforms. In a political agency setting, reelection concerns of policy-makers are shown to have a potential disciplining effect on “bad politicians” but can also induce “good” policy-makers to posture in order to increase their electoral prospects, sometimes at the expense of social welfare. For instance, Harrington [17] shows in a model where voters have heterogeneous beliefs about the best policy that a politician may manipulate policy for reelection purposes. Maskin and Tirole [21] show that a politician who wants to display his congruence with the electorate may pander to public opinion by selecting the most popular action, i.e. the policy perceived to be right by a majority of voters. Another class of models has politicians attempting to signal their competence: Canes-Wrone *et al.* [8] consider a situation where an imperfectly informed politician sometimes selects an action contrary to what his private information suggests in order to maximize his chances of appearing as perfectly informed. In Majumdar and Mukand [20], reputational concerns may lead to a politician either indulging in hazardous experimentation of new policies or being excessively conservative.

As compared to the extant literature, the first contribution of this paper is to introduce behavioral decision-making into the realm of political economy. A substantial body of experimental and empirical evidence casts doubt on the assumption of rational voters (see Caplan [9] for a review). However, to our knowledge, very few economic papers have focused on the impact of behavioral decision-making on political outcomes.⁸ As noticed by Besley [6], it is important for economists to “un-

⁸Among them, Benabou and Tirole [4] consider agents manipulating information in order to sustain desirable beliefs on the relative impact of luck and effort on outcomes and show that, in the aggregate, two political equilibria with different levels of taxation and redistribution may coexist. Schuett and Wagner [24] consider hindsight-biased voters and show that the presence of the bias disciplines politicians and sometimes enhances social welfare.

derstand when simple and sensible behavioral rules lead to large policy distortions”. Unlike many models where non-adoption of useful policies is due to dispersion of information (Harrington), communication failures or to free-riding,⁹ we assume that perfect information is freely available and disregard communication issues. Our model in some sense mirrors a model of costly acquisition with voters being willing to pay to “unlearn” relevant information. A critical behavioral feature of politics is that voters tend to “favor politicians who generate some utility for them during their term in office” (Besley, 2006). In this context, policy-makers distort their policies to soothe the electorate rather than pander to it, although they do not care about voters’ emotional utility *per se*. What is new in our model is that the political action conveys information that affects the well-being of voters in the current period (utility from anticipation). The policy choice thus has a double informational content: as stressed by the political agency literature, it is relevant to voters to screen good politicians; as suggested by the economics and psychology literature, it may boost or jeopardize voters’ optimism.

2 A model of political accountability

We construct a model of political agency in which a policy-maker tries to develop a reputation for being congruent with the electorate in order to increase his chances of reelection.

There are two periods and two states of the world: $\omega \in \{H, L\}$ with $\Pr(\omega = H) = 1 - \Pr(\omega = L) = q$. In each period, the policy-maker in office, who has private information on the realization of ω , chooses to undertake a reform ($X = 1$) or not ($X = 0$).¹⁰

⁹Voters would never incur any positive cost to acquire useful information because they have a zero probability to influence the outcome of the election, so that the instrumental value of information is zero.

¹⁰We denote ω_2 and X_2 period 2 state of the world and action, and drop subscripts in period 1 variables for notational convenience.

2.1 Preferences of voters

From the point of view of the electorate, the reform has a cost of c and yields a state-dependent benefit of b_L in state $\omega = L$ and b_H in state $\omega = H$. We assume $b_L > c > b_H$, meaning that reform is the socially optimal policy only in bad states ($\omega = L$). There is a mass of voters with identical preferences. On top of the payoff derived when a reform is undertaken, voters get a state-dependent utility a_ω so that a representative voter's payoff $u(\omega, X)$ is given by:

	$\omega = H$	$\omega = L$
$X = 1$	$a_H + b_H - c$	$a_L + b_L - c$
$X = 0$	a_H	a_L

2.2 Preferences of policy-makers

Policy-makers bear the whole cost of reform c but only partially internalize the benefit they create for voters.

Let $U_\alpha(\omega, X) = X(\alpha b_\omega - c)$ denote the utility of a politician when he selects policy $X \in \{0, 1\}$ in state $\omega \in \{H, L\}$.

Politicians differ across their degree of congruence α .

$$\alpha \in \{\underline{\alpha}, \bar{\alpha}\} \text{ with } \Pr(\alpha = \bar{\alpha}) = 1 - \Pr(\alpha = \underline{\alpha}) = \pi \text{ and } \bar{\alpha} > \underline{\alpha} > 0.$$

Let us assume that $\bar{\alpha}b_L - c > 0 > \bar{\alpha}b_H - c$ and $0 > \underline{\alpha}b_L - c > \underline{\alpha}b_H - c$.

- Type $\alpha = \bar{\alpha}$ is congruent with voter's preferences: he has the same preference ranking over political decisions.¹¹
- Type $\alpha = \underline{\alpha}$ has a bias against reform: the benefit he derives from reform never outweigh its cost.¹²

Beside this intrinsic preference, the politician gets utility δ in case of reelection. The term δ captures both the continuation gross utility from implementing one's

¹¹For simplicity, it is possible to consider $\bar{\alpha} = 1$.

¹²Alternatively, the politician needs to give up the contribution he captures from some lobby when undertaking a reform, hence his bias towards the status quo.

preferred action in period 2 and possible private benefits from being in office ("ego rents", perks...). We assume that $|\bar{\alpha}b_\omega - c| > \delta > |\underline{\alpha}b_\omega - c|$. Consequently, type $\bar{\alpha}$ behaves like a "commitment type" who always implements the socially optimal action, as the intrinsic benefit he gets from doing so dwarfs his reelection concerns. However, type $\underline{\alpha}$ may go against his natural bias towards the status quo if it significantly increases his probability of reelection. Notice that we implicitly assume that δ is independent of α .¹³

2.3 Timing

Period 1

- 1a. The random variables $\omega \in \{H, L\}$ and $\alpha \in \{\underline{\alpha}, \bar{\alpha}\}$ are independently realized and privately observed by the policy-maker.
- 1b. The policy-maker selects $X \in \{0, 1\}$.

Period 2

- 2a. An election opposing the incumbent policy-maker to a random challenger takes place.
- 2b. The newly-elect politician observes period-2 state ω_2 and selects $X_2 \in \{0, 1\}$.
- 2c. Voters observe both their period 1 and period 2 payments $u(\omega, X)$ and $u_2(\omega_2, X_2)$.

2.4 Electoral competition

We assume that the incumbent politician who runs for reelection faces an opponent whose prior probability of being congruent $\tilde{\pi}$ is itself random and drawn from a uniform distribution on $[0, 1]$. The realization of $\tilde{\pi}$ is learnt by voters at the beginning of period 2. Voters vote sincerely and elect the candidate most likely to be congruent. For instance, voters are policy-motivated and anticipate that the winner

¹³This can be easily obtained by normalizing payoffs in a way that continuation utilities are type-independent. Actually, as long as type $\bar{\alpha}$ is a commitment type who always selects the optimal policy, i.e. is patient enough, we can focus on the continuation payment of type $\underline{\alpha}$ without loss of generality.

will implement his preferred policy in period 2 because he no longer has reelection concerns.¹⁴

At the time the election takes place, voters hold beliefs on the incumbent's type that depend on his action X , which we denote $\hat{\pi}_X = \Pr(\alpha = \bar{\alpha}|X)$. The reelection probability (viewed ex ante) of the incumbent when he selects action X thus equals

$$\Pr(\tilde{\pi} \leq \hat{\pi}_X) = \hat{\pi}_X.$$

2.5 Equilibrium

As a politician of type $\bar{\alpha}$ always selects the optimal decision, we focus on the behavior of the status-quo biased type. Denoting x_H and x_L the probability that he undertakes reform ($X = 1$) in states $\omega = H$ and $\omega = L$, we define an equilibrium in the following way:

An equilibrium of the game is defined by $(x_H^*, x_L^*, \hat{\pi}_1(x_H^*, x_L^*), \hat{\pi}_0(x_H^*, x_L^*))$ such that:

- i) $x_L^* \in \arg \max_{x_L} x_L(\underline{\alpha}b_L - c + \delta\hat{\pi}_1(x_H^*, x_L^*)) + (1 - x_L)\delta\hat{\pi}_0(x_H^*, x_L^*)$
- ii) $x_H^* \in \arg \max_{x_H} x_H(\underline{\alpha}b_H - c + \delta\hat{\pi}_1(x_H^*, x_L^*)) + (1 - x_H)\delta\hat{\pi}_0(x_H^*, x_L^*)$
- iii) $\hat{\pi}_1(x_H^*, x_L^*) = \frac{\pi(1-q)}{\pi(1-q) + (1-\pi)(qx_H^* + (1-q)x_L^*)}$
- iv) $\hat{\pi}_0(x_H^*, x_L^*) = \frac{\pi q}{\pi q + (1-\pi)(q(1-x_H^*) + (1-q)(1-x_L^*))}$.

Reelection probabilities $\hat{\pi}_0(x_H^*, x_L^*)$ and $\hat{\pi}_1(x_H^*, x_L^*)$ are Bayesian updateings consistent with equilibrium behavior (x_H^*, x_L^*) . They depend on q because voters do not observe the realization of ω at the time of the election, so they update their beliefs on α on the basis of their prior beliefs on ω . This feature will play a critical role in the remainder of the paper.

Lemma 1 *In any equilibrium, $x_H^* = 0$.*

¹⁴This is an artifact of the two-period modeling and would not be true more generally. What matters for our theory is that the reelection probability increases with perceived congruence, which would be true even in more general settings.

Proof: From $\underline{\alpha}b_L - c > \underline{\alpha}b_H - c$, we derive that the equilibrium is monotonic: $x_H^* \leq x_L^*$.

Furthermore, $x_H^* > 0 \Rightarrow x_L^* = 1$ and $x_L^* < 1 \Rightarrow x_H^* = 0$.

We remark that $\hat{\pi}_0(x_H^*, x_L^*) - \hat{\pi}_1(x_H^*, x_L^*)$ has the same sign as $qx_H^* - (1-q)(1-x_L^*)$.

If $x_H^* > 0$, then $x_L^* = 1$, which implies $\hat{\pi}_0(x_H^*, x_L^*) > \hat{\pi}_1(x_H^*, x_L^*)$.

$\underline{\alpha}b_H - c < 0$ in turn implies that $x_H^* = 0$. A contradiction. \square

Proposition 1 *There exists a unique perfect Bayesian equilibrium in which the politician always selects the status quo with positive probability $1-x^*$.¹⁵ Furthermore, there exists a threshold $\pi^a \in [0, 1)$ such that $x^* = 0$ if and only if $\pi \geq \pi^a$.*

Proof: Let us recall that the marginal incentive to select $X = 0$ is equal to

$$\delta[\hat{\pi}_0(x^*) - \hat{\pi}_1(x^*)] - (\underline{\alpha}b_L - c).$$

Uniqueness is derived from the fact that $\hat{\pi}_0(x^*) - \hat{\pi}_1(x^*)$ is increasing in x^* .

$x^* = 1$ is impossible because $\hat{\pi}_1(1) = \hat{\pi}_0(1) = \pi$ and $\underline{\alpha}b_L - c < 0$.

$x^* = 0$ is an equilibrium whenever

$$-(\underline{\alpha}b_L - c) - \delta \frac{1 - \pi}{q + (1 - q)(1 - \pi)} > 0.$$

The latter term is increasing in π . Recalling that $\delta > -(\underline{\alpha}b_L - c)$ by assumption, it is positive for $\pi = 1$ and negative for $\pi = 0$. \square

Reelection concerns play a disciplining role. As the politician is known to have a potential bias towards the status quo, the mere fact of implementing a reform conveys good news about his expected quality. When he is sufficiently patient, or when the bias is sufficiently small, reelection concerns lead the biased politician to sometimes go against his bias. However, these concerns are not sufficient to perfectly discipline him, in that there is always a positive probability that the politician indulges in his bias. The disciplining effect is higher for intermediate values of π , because attempts to convince voters of one's congruence are more effective when there is more prior uncertainty on the politician's type.

¹⁵In order to simplify notation, we drop the argument x_H^* in functions $\hat{\pi}_X$, recalling it always equals 0 and replace x_L^* by x^* .

Proposition 2 *The equilibrium probability x^* is a decreasing function of q .*

Proof: $\hat{\pi}_1(x^*)$ is independent of q because a reform $X = 1$ perfectly identifies the state as being $\omega = L$. However, $\hat{\pi}_0(x^*)$ depends on q since $X = 0$ can arise even in state $\omega = L$. It is straightforward to show that $\hat{\pi}_0(x^*)$ is increasing in q . The more likely the good state, the less likely it is that $X = 0$ comes from a biased type. Overall, the marginal reputation gain from reforming $\hat{\pi}_1(x^*) - \hat{\pi}_0(x^*)$ is decreasing in q , which proves the result. \square

The efficiency of political decision-making critically depends on the level of optimism of voters. Whenever they are optimistic about ω , the expected reputational cost of selecting the status quo is relatively low because voters perceive it to be likely to be the right decision. The policy-maker may even become completely unresponsive to reelection concerns, i.e. never reform at all, when voters' optimism exceeds some critical value. However, when voters are pessimistic, they correctly interpret the status quo as being more likely to come from a biased politician than from a truly good state. In that case, the prospect of being ousted in the next election becomes sufficiently serious to discipline biased policy-makers.

In any equilibrium, the policy-maker's expected welfare is increasing in q , independently of his type and of the relevant state. Denoting $\tilde{U}_\alpha(\omega) = E_{x^*}[\tilde{U}_\alpha(\omega, X) + \delta\hat{\pi}_X]$ the expected total utility of the politician, we notice that in an equilibrium involving $x^* > 0$:

$$\tilde{U}_\alpha(H) = \tilde{U}_{\underline{\alpha}}(L) = \delta\hat{\pi}_0 = \underline{\alpha}b_L - c + \delta\hat{\pi}_1 = \underline{\alpha}b_L - c + \delta\frac{\pi}{\pi + (1 - \pi)x^*}$$

and

$$\tilde{U}_{\bar{\alpha}}(L) = \bar{\alpha}b_L - c + \delta\frac{\pi}{\pi + (1 - \pi)x^*},$$

which are both increasing in q since $\frac{\partial x^*}{\partial q} \leq 0$.

An increase of q consequently has the same marginal impact on the expected welfare of all types of policy-maker. This is true as long as $x^*(q) > 0$. When q becomes large enough to drive x^* to 0, the expected payment of a reformist no longer

depends on q , since he perfectly reveals himself as congruent in this equilibrium. Still, it is easy to show that all types prefer an equilibrium involving $x^* = 0$ than $x^* > 0$, so it is clear that politicians would like to have voters believe that the state $\omega = H$ is more likely.

This raises the issue of political communication and propaganda: policy-makers, even when perfectly honest, have an incentive to convince voters that good states are more likely. Of course, voters should be aware of such incentives and carefully listen to optimistic speeches. But by no means voters can distinguish among politicians those who are more likely to send credible messages, as in the current setting the interest of all politicians with respect to voters' beliefs are all aligned.

The goal of this paper is to endogeneize voters' optimism in a model where excessive optimism is driven by selective avoidance of information. We examine the interplay between strategic ignorance and the efficiency of political decisions.

3 Endogenous optimism

Let us assume that voters now have access to some external source of information on ω . This information may be coming from policy-makers themselves through political communication, from the media or any other source of information (social interaction, observing a signal from some other country etc.) For simplicity, we assume that this signal is perfectly informative about ω . We follow Benabou and Tirole [3] in assuming that voters have imperfect memory and can strategically choose the probability with which they recall news revealing that $\omega = L$ (see Figure 1). The recollection σ they have from the signal thus has conditional distribution: $Pr(\sigma = \emptyset | \omega = H) = 1$ and $Pr(\sigma = L | \omega = L) = \lambda$.

Voters select themselves λ , going from complete avoidance of conflicting information ($\lambda = 0$) to full awareness ($\lambda = 1$). $\sigma = L$ thus perfectly identifies the state as being $\omega = L$, whereas no recollection $\sigma = \emptyset$ only provides imperfect information.

The fact that the decision of λ is not taken *ex ante* but only upon observing $\omega = L$ implies that voters don't internalize the externality that repression of information

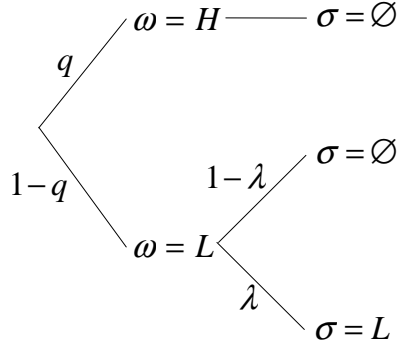


Figure 1: The game of selective memory

has on their welfare when the state is $\omega = H$. The reliability of recollection is lower when voters forget bad news with a high probability. Formally,

$$Pr(\omega = H | \sigma = \emptyset) = \frac{q}{q + (1 - q)(1 - \lambda)}.$$

The reason why voters want to disregard relevant information is that it allows them to remain optimistic. Voters experience anticipatory utility, i.e. they get present utility from the prospect of future outcomes, where this emotional utility is increasing in expected payoffs. More specifically, the utility that voters derive from period 1's decision $u(\omega, X)$ is obtained with delay (i.e. in period 2), but voters experience in period 1 savoring utility equal to a fraction s of their expected payoff $s \cdot u(\omega, X)$.

We assume that $a_H > a_H + b_H - c > a_L + b_L - c > a_L$, meaning that $u(H, X) > u(L, X)$ for all X : utility is always higher in the good state no matter what. Consequently, emotional utility is higher when the perceived probability of the good state increases. This provides a clear incentive to disregard news revealing that $\omega = L$.

3.1 Timing

Period 1

- 1a. The random variables $\omega \in \{H, L\}$ and $\alpha \in \{\underline{\alpha}, \bar{\alpha}\}$ are independently realized

and privately observed by the policy-maker.

- 1b. Voters learn an external signal perfectly revealing ω . Upon learning that $\omega = L$, voters choose $\lambda = Pr(\sigma = L|\omega = L)$, the probability with which they recall bad news (see Figure 1).
- 1c. The policy-maker selects $X \in \{0, 1\}$.
- 1d. The signal σ is realized according to the conditional distribution chosen in 1b. (see Figure 1).
- 1e. Voters observe X and σ , update their beliefs on ω and experience anticipatory utility $s.E_\omega[u(\omega, X)|\sigma, X]$.

Period 2

- 2a. An election opposing the incumbent policy-maker to a random challenger takes place.
- 2b. The newly-elect politician observes period-2 state ω_2 and selects $X_2 \in \{0, 1\}$.
- 2c. Voters get both their period 1 and period 2 utilities $u(\omega, X)$ and $u_2(\omega_2, X_2)$.

In the same spirit as Lemma 1,¹⁶ one can show that the biased policy-maker always selects $X = 0$ in state $\omega = H$. So we only focus on the behavior of the biased policy-maker in state $\omega = L$. His strategy is a probability of reform x . Figure 2 depicts the extensive form of the game.

3.2 Updating of beliefs

From voters' point of view, there are two dimensions of uncertainty (ω and α) and two sources of information (the external signal, rather its recollection σ , and X). At the time they choose λ , voters don't know if they will learn positive ($X = 0$) or fear-inducing information ($X = 1$) from the policy. They have to form an anticipation, that depends on x in two ways: lower x increases the probability

¹⁶See Lemma 2, proven in the Appendix.

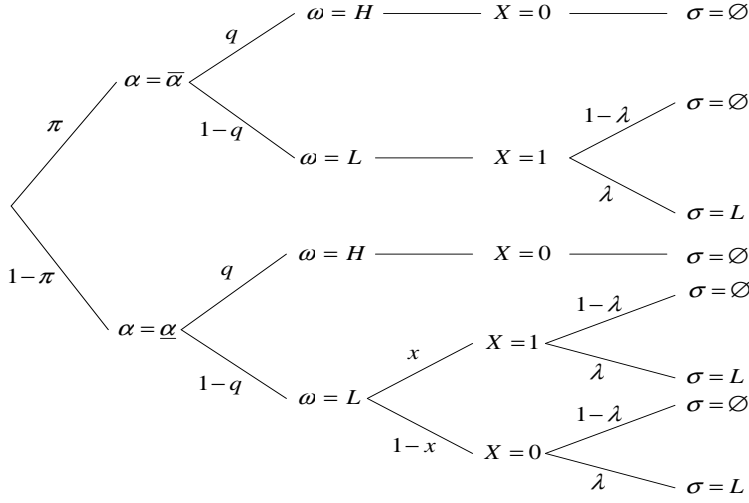


Figure 2: Extensive form of the game

of good news $X = 0$, but observing $X = 0$ is less good news when x decreases since the status quo is known to be more likely to come from $\omega = L$. Let us denote $\hat{q}_{\sigma,X} = Pr(\omega = H|\sigma, X)$ and $\hat{\pi}_{\sigma,X} = Pr(\alpha = \bar{\alpha}|\sigma, X)$ posterior beliefs on ω and α following recollection σ of the signal and policy X . These probabilities are derived from Bayes' rule (see Figure 2):

- After a signal $\sigma = L$
 - $\hat{q}_{L,X} = 0$ for all X
 - $\hat{\pi}_{L,1} = \frac{\pi}{\pi+(1-\pi)x}$
 - $\hat{\pi}_{L,0} = 0$
- After a signal $\sigma = \emptyset$
 - $\hat{q}_{\emptyset,1} = 0$
 - $\hat{q}_{\emptyset,0} = \frac{q}{q+(1-q)(1-\pi)(1-\lambda)(1-x)}$
 - $\hat{\pi}_{\emptyset 1} = \frac{\pi}{\pi+(1-\pi)x}$
 - $\hat{\pi}_{\emptyset 0} = \frac{\pi q}{\pi q+(1-\pi)(q+(1-q)(1-\lambda)(1-x))}$.

We remark that both a recollection $\sigma = L$ and the reform decision ($X = 1$) perfectly reveal $\omega = L$ and that the reputation of a policy-maker following $X = 1$ is the same regardless of σ .

3.3 Anticipatory utility

At stage 1e., voters observe σ and X and derive anticipatory utility equal to:

- $s.(a_L + b_L - c)$ after $\sigma = L$ and $X = 1$
- $s.a_L$ after $\sigma = L$ and $X = 0$
- $s.(a_L + b_L - c)$ after $\sigma = \emptyset$ and $X = 1$
- $s.(\hat{q}_{\emptyset,0}a_H + (1 - \hat{q}_{\emptyset,0})a_L)$ after $\sigma = \emptyset$ and $X = 0$.

When they select λ , voters do not know which policy will be implemented. However, since they know at this stage that $\omega = L$, their perceived probability that $X = 0$ equals $(1 - \pi)(1 - x)$, so the marginal expected benefit from forgetting bad news is given by:

$$s(1 - \pi)(1 - x)\hat{q}_{\emptyset,0}(a_H - a_L) \geq 0.$$

This benefit is traded against the cost of repressing dissonant information, which we assume linear with constant marginal cost equal to m .¹⁷

3.4 Equilibrium

A perfect Bayesian equilibrium of the game is a vector of strategies (x^*, λ^*) and beliefs $\hat{\pi}_{\sigma,X}(x^*, \lambda^*)$ and $\hat{q}_{\sigma,X}(x^*, \lambda^*)$, where λ^* is solution of

$$\max_{\lambda} (1 - \lambda) \{s(1 - \pi)(1 - x^*)\hat{q}_{\emptyset,0}(x^*, \lambda^*)(a_H - a_L) - m\} \quad (1)$$

¹⁷As each voter is atomistic and has consequently no hope to swing the result of the election, there is no instrumental cost of being ill-informed.

and x^* is solution of

$$\max_x x \{ \underline{a}b_L - c + \delta\lambda^*\hat{\pi}_{L,1}(x^*, \lambda^*) + \delta(1 - \lambda^*)\hat{\pi}_{\emptyset,1}(x^*, \lambda^*) - \delta\lambda^*\hat{\pi}_{L,0}(x^*, \lambda^*) - \delta(1 - \lambda^*)\hat{\pi}_{\emptyset,0}(x^*, \lambda^*) \} \quad (2)$$

(2) is derived remarking that, whenever $\omega = L$, the equilibrium probability that voters have a recollection $\sigma = L$ of the signal is λ^* .¹⁸

3.4.1 Voters' optimal awareness strategies

Let us first compute the best response of voters λ^* when the biased politician is expected to reform with probability x when $\omega = L$. Recalling that

$$\hat{q}_{\emptyset,0}(x, \lambda^*) = \frac{q}{q + (1 - q)(1 - \pi)(1 - \lambda^*)(1 - x)},$$

λ^* depends on the sign of $\frac{sq(1-\pi)(1-x)(a_H-a_L)}{q+(1-q)(1-\pi)(1-\lambda^*)(1-x)} - m$.

The latter term is increasing in λ^* and q , and decreasing in x , so there is a unique interior solution $\lambda^*(x)$ such that $\lambda^*(x)$ is continuous, $\frac{\partial \lambda^*(x)}{\partial x} \geq 0$ and $\frac{\partial \lambda^*}{\partial q} \leq 0$.

Furthermore, there exists a threshold $\bar{x}(m) < 1$ such that $x > \bar{x}(m) \Rightarrow \lambda^*(x) = 1$. When x becomes large enough, the probability of a reform that reveals $\omega = L$ increases, which lowers the returns from investing in ignorance. Similarly, for π large enough, $\lambda^*(x) = 1$ for all x . Notice also that if m is low enough, then $\lambda^*(0) = 0$.

3.4.2 Political incentives

Let us now consider the optimal x^* as a function of λ . Remarking that

$$\hat{\pi}_{L,1}(x^*, \lambda) = \hat{\pi}_{\emptyset,1}(x^*, \lambda) = \frac{\pi}{\pi + (1 - \pi)x^*}$$

and

$$\hat{\pi}_{L,0}(x^*, \lambda) = 0,$$

¹⁸We implicitly assume that recollections σ are perfectly correlated across voters.

x^* depends on the sign of

$$\underline{\alpha}b_L - c + \delta \frac{\pi}{\pi + (1 - \pi)x^*} - \delta(1 - \lambda) \frac{\pi q}{\pi q + (1 - \pi)(q + (1 - q)(1 - \lambda)(1 - x^*))}.$$

This function is decreasing in x^* and increasing in λ . So there exists a unique best response function $x^*(\lambda)$ for a given λ . This function is continuous and is such that $\frac{\partial x^*(\lambda)}{\partial \lambda} \geq 0$ and $\frac{\partial x^*(\lambda)}{\partial q} \leq 0$.

Notice that unlike in the first section, it is now possible to have an equilibrium involving perfect discipline $x^* = 1$. This is possible because, in such an equilibrium, sticking to the status quo reveals the politician as being biased whenever voters recall the signal and observe $\sigma = L$.¹⁹ Actually, $x^* = 1$ whenever $\delta\lambda\pi > c - \underline{\alpha}b_L$.

This result that the politician is disciplined by reelection concerns contrasts with the analogous result derived in the first section. Here, the politician is disciplined only when he has a good reputation (a high π), because the possibility for voters of detecting bad states creates the threat of electoral punishment in case he indulges in his bias. Good politicians are those who have most to lose from being caught misbehaving. On the contrary, in the first section, the disciplining effect comes from the fact that the policy-maker wants to enhance his reputation in order to increase his probability of reelection. Such incentives are powerful enough to have a disciplining effect only for politicians with a low prior reputation.

Since best-response functions $x^*(\lambda)$ and $\lambda^*(x)$ are continuous and upward-sloping, we derive the following result:

Proposition 3 *The game admits at least one, and potentially multiple equilibria.*

Existence is derived from the fact that best reply functions are both continuous on $[0, 1]$. To figure out a situation involving multiple equilibria, let us imagine that $\pi > \frac{c - \underline{\alpha}b_L}{\delta}$, so $x^*(1) = 1$. Since $\lambda^*(1) = 1$, there is an equilibrium with perfect recall and efficient reform. Imagine furthermore that q is large enough so that $x^*(\lambda^*(0)) = 0$.²⁰ If those two equilibria coexist, by continuity of the best reply

¹⁹Those are arbitrary out-of-equilibrium beliefs because the status quo is never be observed in state L , but they are clearly reasonable as the congruent type has a dominant strategy.

²⁰ $\frac{dx}{dq} = \frac{\partial x^*}{\partial \lambda} \frac{\partial \lambda^*}{\partial q} + \frac{\partial x^*}{\partial q} < 0$ so under very simple assumptions, we can find q large enough to get

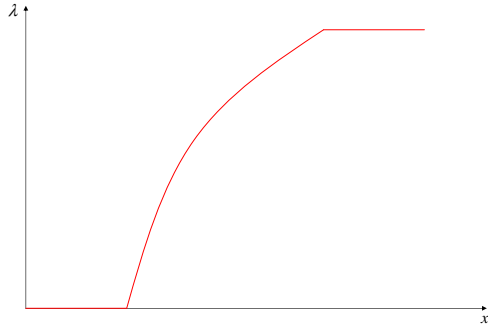


Figure 3: $\lambda^*(x)$

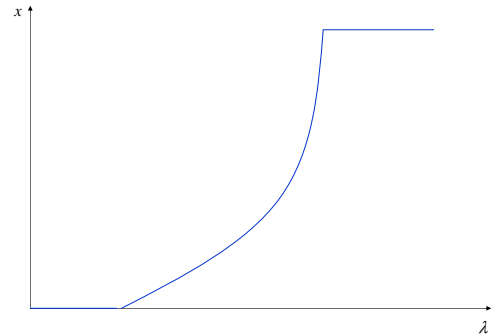


Figure 4: $x^*(\lambda)$

functions, there must be a third equilibrium (x^*, λ^*) with $0 < x^* < 1$ and $0 < \lambda^* < 1$.

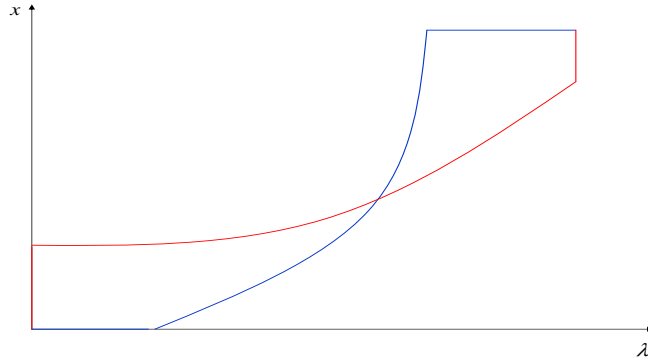


Figure 5: Three equilibria

The result that there might be multiple equilibria stems from the fact that voters' and politicians' actions are strategic complements: if voters expect a high x , the returns from investing in ignorance are low since they anticipate that a reform is likely to arise, which reveals $\omega = L$ anyway. Consequently, there is less repression and voters are better informed on average. This gives the biased policy-maker an incentive to reform when needed for fear of being caught and ousted in the next election. Conversely, if voters expect inefficient decision-making (low x), the gain

$x^*(\lambda^*(0)) = 0$. There is no reason why those equilibria may not coexist as the existence condition for the efficient equilibrium does not depend on q .

they could get by turning away undesirable information gets higher and they end up less informed. This lowers the disciplining effect of reputation on politicians.

3.5 Welfare

Let us compare the expected welfare of the different players under different equilibria. Since beliefs form a martingale, we have:

$$E_{\sigma, X}[\hat{q}_{\sigma, X}] = q.$$

This implies that savoring utility only differs across equilibria through the efficiency of political decision-making. Voters are better off under equilibria with higher x , because political decisions are more efficient, which raises their expected utility (both outcome and savoring of future outcome). The reason why they may fail to reach such good equilibria *ex post* is because, once they learn bad news about ω , they have an incentive to forget it, which creates *an externality across information states* (Benabou and Tirole): in state $\omega = H$ voters are victims of their own tendency to repress bad news in state $\omega = L$ in that repression of bad news makes good news less reliable.

As regards policy-makers, we expect from the result of the previous section that they prefer an equilibrium with low λ^* . This is actually true in state $\omega = L$ but happens to be wrong when $\omega = H$. To see this, let us write expected payments as a function of λ^* , considering an interior equilibrium involving $0 < x^* < 1$ and $0 < \lambda^* < 1$:

$$\tilde{U}_{\alpha}(H) = \delta \hat{\pi}_{\emptyset, 0} = \delta \frac{\pi q}{\pi q + (1 - \pi)(q + (1 - q)(1 - x^*(\lambda^*))(1 - \lambda^*))}$$

$$\tilde{U}_{\bar{\alpha}}(L) = \bar{\alpha} b_L - c + \delta \hat{\pi}_{\sigma, 1} = \bar{\alpha} b_L - c + \delta \frac{\pi}{\pi + (1 - \pi)x^*(\lambda^*)}$$

$$\tilde{U}_{\underline{\alpha}}(L) = \underline{\alpha} b_L - c + \delta \hat{\pi}_{\sigma, 1} = \underline{\alpha} b_L - c + \delta \frac{\pi}{\pi + (1 - \pi)x^*(\lambda^*)}.$$

As it is easy to see from the fact that $\frac{\partial x^*}{\partial \lambda} \geq 0$, $\tilde{U}_{\alpha}(L)$ is decreasing in λ^* , whereas

$\tilde{U}_\alpha(H)$ is increasing in λ^* . In contrast with the first section, in which we only considered what was the preferred q for politicians, voters' optimism here comes at a cost. It is no longer possible that voters disregard information that $\omega = L$ without casting doubt on the reliability of $\sigma = \emptyset$, because voters make Bayesian inferences and do not take no recollection at face value. The higher λ , the more observing $\sigma = \emptyset$ is actual good news. From the politician's perspective, an increase in λ has the following effect: in bad states, better information increases the probability of getting caught whenever failing to implement a reform. There is therefore a clear disciplining effect for the biased politician, which comes at a cost, since he can less easily indulge in his bias. This also has a cost for the congruent type, whose reelection probability after reform decreases because his biased counterpart is known to be better disciplined. Politicians thus clearly prefer that voters have strong repression strategies whenever $\omega = L$. However, in state H , both types of politicians never reform. In that case, better information of voters is good for politicians. There are actually two effects: a higher λ actually increases voters' perceived probability that the state is H (credibility of the signal), which increases the probability of reelection after $X = 0$ everything else being equal; furthermore, a higher λ implies a higher x^* , so the biased politician would be disciplined were the state to be $\omega = L$, which increases the reputation from not reforming. While it is ambiguous whether policy-makers prefer that voters are *ex post* optimistic (lower λ^*), it is clear that they prefer voters to be *ex ante* more optimistic (higher q), as in section 1.

3.6 Political turnover

Proposition 4 *The degree of optimism of voters does not affect political turnover. However, the expected quality of the election winner is decreasing in λ .*

Proof: In any equilibrium, the *ex ante* expected probability of reelection of the incumbent is always equal to π . This is due to the facts that beliefs on α follow a martingale and that the probability of reelection is linear in (equal to) these beliefs.

The expected quality of the winner of the election $E(\pi_2)$ is, for given σ and X :

$$\begin{aligned}
& Pr(\hat{\pi}_{\sigma,X} \geq \tilde{\pi})\hat{\pi}_{\sigma,X} + Pr(\hat{\pi}_{\sigma,X} < \tilde{\pi})E(\tilde{\pi}|\hat{\pi}_{\sigma,X} < \tilde{\pi}) \\
&= \hat{\pi}_{\sigma,X}^2 + \frac{(1 - \hat{\pi}_{\sigma,X})(1 + \hat{\pi}_{\sigma,X})}{2} = \frac{1}{2} + \frac{\hat{\pi}_{\sigma,X}^2}{2}.
\end{aligned}$$

This yields, taking expectations on σ and X :

$$\begin{aligned}
E(\pi_2) &= \frac{1}{2} + [q + (1 - q)(1 - \pi)(1 - \lambda)(1 - x)]\frac{\hat{\pi}_{\sigma,0}^2}{2} + (1 - q)[\pi + (1 - \pi)x]\frac{\hat{\pi}_{\sigma,1}^2}{2} \\
&= \frac{1}{2}\left[1 + \frac{\pi^2 q^2}{q + (1 - q)(1 - \pi)(1 - \lambda)(1 - x)} + \frac{(1 - q)\pi^2}{\pi + (1 - \pi)x}\right].
\end{aligned}$$

Assuming that the equilibrium is interior ($0 < x^* < 1$), i.e.

$$(1 - \lambda)\frac{\pi q}{q + (1 - q)(1 - \pi)(1 - \lambda)(1 - x)} = \frac{\alpha b_L - c}{\delta} + \frac{\pi}{\pi + (1 - \pi)x},$$

we derive that

$$E(\pi_2) = \frac{1}{2} \left\{ 1 + \pi q \left[\pi + \frac{\alpha b_L - c}{\delta} (\pi + (1 - \pi)x) + (1 - \lambda)(1 - q)\pi^2 \right] \right\},$$

which is decreasing in λ since $\frac{\partial x^*(\lambda)}{\partial \lambda} \geq 0$. □

The intuition for this result is simple: as voters are less informed in an equilibrium with lower λ , they are less able to screen politicians and are consequently more likely to reelect a politician of lower quality.

3.7 Comparative statics

Proposition 5 *The equilibrium is more efficient (x^* is higher) when m and δ increase and when s and q decrease.*

The effects of m , s and δ are obvious. The effect of an increase of q goes through two channels: an increase of q makes repression of bad news more valuable, since

$\sigma = \emptyset$ is likely to be actual good news even if the level of repression λ is high. In addition, a higher q decreases the disciplining role of reputation, because status-quo-biased politicians take little risk by indulging in their bias because no reform is perceived as being the most-likely-to-be-optimal action.

The effect of an increase of π is a priori less clear, because posterior beliefs (and thus reelection probabilities) on α are typically non-monotonic in π . However, we can show that there is at least a range of values for which a higher π improves expected efficiency of policies. First, a higher π lowers the benefits of repressing information since the probability of a reform which reveals the truth anyway increases. Second, at least for π large enough, politicians are better disciplined when π increases because they have more to lose when convicted of misbehavior.

4 Discussion

4.1 Constitutional design

Starting from Barro [2], the literature in political economy has extensively stressed the disciplining role played by elections in representative democracy. Career concerns make politicians accountable for their behavior to the extent that policy-makers foster their reelection prospects by implementing socially desirable policies. However, this requires that voters have correct information on which is the right policy. As soon as information is imperfect, politicians have some leeway to indulge in their bias. Here, voters do not always observe *ex post* whether the chosen policy was optimal and the quality of voters' information is endogenous. In that context, we show that the disciplining role played by elections has less bite when voters manipulate their beliefs in a self-serving way. In a similar vein, we could have considered a model in which reelection concerns provide incentives to pander to public opinion, as in Canes-Wrone *et al.* [8] or in Maskin and Tirole [21]. In such a framework, we would derive the analogous result that incentives to pander to public opinion increase when voters have less precise information. In the old debate on the best democratic organization among direct democracy, representative democracy and independent

judicial power, our result provides a case for judicial power since both direct and representative democracy becomes less efficient under manipulation of beliefs. In that light, it is interesting to notice that politicians often proceed in roundabout ways by delegating authority to some independent or supranational institution (like the European Union), and then blame them so as to cater to the electorate.

4.2 Instrumental value of information

For simplicity, we have assumed in the model that information has no instrumental value for voters. Better information would allow voters to better screen politicians, but since each voter is atomistic and has no hope to swing the outcome of the election, he typically free-rides on the information of others. An interesting extension would be to endogenize the cost of ignorance in such a way that it varies with the expected efficiency of policies. For instance, in a model of savings, ignoring fear-inducing information that one should put aside precautionary savings has an instrumental cost, but this cost endogenously depends on the expected efficiency of policies regarding public insurance or public retirement schemes.

4.3 Political communication: soothing politics

Another interesting avenue for future research concerns political communication. Our results indicate that policy-makers are better off when facing optimistic voters, although this might come at some cost whenever optimism is a by-product of selective exposure. In our simple model, the only way politicians can try to influence voter beliefs is through political actions. In a static setting, political actions are driven by the sole tradeoff between static preferences and reelection concerns, so the desire to soothe the electorate does not affect decision-making. We can think of two kinds of extensions to allow politicians to influence voter beliefs.

A possible extension would consist of introducing a communication stage before the political game. The politician could for instance send a message about the state of the world. Alternatively, and more in line with the modeling of this paper, the politician, even if he cannot prevent voters from learning the true state, could try

to influence voters' incentives to forget information by choosing m . m stands for the cost of repression, that can be a physical, psychological or an opportunity cost: forgetting bad news sometimes requires to make active efforts to ignore facts, to stop some activities in order to avoid negative cues. This cost is also affected by the public salience of information. Extensive public communication renders repression of bad news harder: it seems difficult to forget news about climate change, terror attacks or swine flu because these topics appear permanently in the headlines. It has indeed been underlined by political scientists for a long time that a policy-maker who advertised a lot about the reforms he plans to implement is much more likely to be successful. The question raised in this paper concerns the incentives of politicians to behave in a pedagogic way, i.e. to discourage voters to turn a blind eye to depressing information. The answer is ambiguous, as increasing m decreases average optimism in state L but increases optimism in state H . This would clearly raise signalling issues if the politician is known to have private information on the state at the time at which he communicates. In the same way as voters are trapped, politicians might want to commit to preventing voters from ignoring bad news, but may fail to behave in a pedagogic way as soon as bad news actually appears.

4.4 Dynamics

The second way we could allow policy-makers to influence voters' optimism is to introduce dynamics in the model. In a repeated version of the game,²¹ the continuation value of being in office in each period is increasing in voters' perceived probability that the state is $\omega = H$. Assuming that there is serial correlation of ω ,²² the politician should consider that undertaking reform on the one hand boosts his re-election probability but lowers the continuation value of being reelected on the other hand, as voters become pessimistic upon observing past reforms. Consequently, the result that multiple equilibria coexist should be robust to the introduction of dynamics: in one equilibrium, politicians choose soothing policies, which creates incentives

²¹An explicit formalization of dynamic reform design is in progress.

²²Serial correlation would also give voters a motive to repress information on ω even if payoffs are not delayed, since a signal on the current state conveys information about future payoffs.

for voters to protect their optimistic beliefs and in turn lowers the disciplining effect of elections; in another equilibrium, policy-makers choose informative policies, which is rewarding because voters have correct information.²³ This raises the question of whether we should observe convergence towards a unique equilibrium. Intuitively, it is clear that learning occurs as time goes by because (i) repression of information by voters may not be complete, (ii) the quality of incumbents on average improves over time, (iii) policies convey information even when undertaken by biased politicians. However, in a soothing equilibrium, learning is necessarily slower because (i) repression is more intense, (ii) screening of politicians is less efficient, (iii) political decisions convey little information. This captures in particular the fact that policy-makers often let the situation deteriorate until some information accrues that oblige them to address the problem. Another interesting question is whether gradualism should be preferred to “big bang” reforms.²⁴ The dynamics of the model suggest that it may take time for ideas to get accepted and that current reforms increase the acceptability of future reforms. Consequently, on issues involving anxiety or ideology for which belief manipulation is expected to be a concern, we suggest that reforms should be conducted in steps, so that ideas get embedded gradually.

5 Conclusion

Politicians often must take decisions based on private information that may worry the electorate. Political reforms indeed often convey news that times are hard and that future prospects are dim. We construct a political agency model in which voters learn information on policy-relevant variables from two sources: an external signal and the political decision itself. As they have demand for optimistic beliefs, voters may want to repress worrying news coming from the external signal. This may create inefficient decision-making because reelection concerns have less disciplining power on politicians facing worse informed voters. However, voters also learn relevant in-

²³The possible persistence of multiple equilibrium outcomes and beliefs is reminiscent of papers by Benabou and Tirole [4] and Dessi [13], in which belief manipulation may result in different ideologies persisting over time.

²⁴For a general discussion on this issue, see Roland [23].

formation from political decisions and the quality of what they learn increases as politicians select more efficient policies. Consequently, the return from investing in ignorance is lower when policies are expected to be efficient. On the contrary, incentives of voters to ignore information increase when they expect inefficient policies because the latter are unlikely to convey undesirable information. The model thus involves strategic complementarities between voters' and policy-makers' decisions, which lead to multiple equilibria. In the inefficient equilibrium, insufficient reform is both a by-product and a cause of voters' underlying optimism. This suggests that, in a dynamic framework, we should expect inaccurate beliefs to persist over time, as soothing policies are likely to be pervasive.

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Appendix

Lemma 2 *In the game with imperfect recall, $x_H^*(\lambda) = 0$ for all λ*

Proof: The marginal incentive to reform is, recalling that $\hat{\pi}_{L,0} = 0$:²⁵

- $\underline{\alpha}b_H - c + \delta\hat{\pi}_{\emptyset,1} - \delta\hat{\pi}_{\emptyset,0}$ in state H
- $\underline{\alpha}b_L - c + \delta\lambda\hat{\pi}_{L,1} + \delta(1-\lambda)\hat{\pi}_{\emptyset,1} - (1-\lambda)\delta\hat{\pi}_{\emptyset,0}$,

where

- $\hat{\pi}_{L,1} = \frac{\pi}{\pi+(1-\pi)x_L}$
- $\hat{\pi}_{\emptyset 0} = \frac{\pi(1-q)(1-\lambda)}{\pi(1-q)(1-\lambda)+(1-\pi)(qx_H+(1-q)(1-\lambda)x_L)}$
- $\hat{\pi}_{\emptyset 0} = \frac{\pi q}{\pi q+(1-\pi)(q(1-x_H)+(1-q)(1-\lambda)(1-x_L))}$

The marginal benefit of reform is equal to

$$\underline{\alpha}(b_H - b_L) + \delta\lambda[-\hat{\pi}_{L,1} + \hat{\pi}_{\emptyset,1} - \hat{\pi}_{\emptyset,0}]$$

Since

$$\hat{\pi}_{\emptyset 1} = \frac{\pi(1-q)(1-\lambda)}{\pi(1-q)(1-\lambda) + (1-\pi)(qx_H + (1-q)(1-\lambda)x_L)}$$

is decreasing in λ , we derive that

$$\hat{\pi}_{\emptyset 1} \leq \frac{\pi(1-q)}{\pi(1-q) + (1-\pi)(qx_H + (1-q)x_L)}$$

Furthermore, $\frac{\pi(1-q)}{\pi(1-q)+(1-\pi)(qx_H+(1-q)x_L)} \leq \frac{\pi}{\pi+(1-\pi)x_L} \Rightarrow \underline{\alpha}(b_H - b_L) + \delta\lambda[-\hat{\pi}_{L,1} + \hat{\pi}_{\emptyset,1} - \hat{\pi}_{\emptyset,0}] < 0$.

This implies that the equilibrium is monotonic: $x_H(\lambda) \leq x_L(\lambda)$.

Furthermore, $x_H(\lambda) > 0 \Rightarrow x_L(\lambda) = 1$ and $x_L(\lambda) < 1 \Rightarrow x_H(\lambda) = 0$.

Assume that $x_H(\lambda)$ for some λ . This implies that $x_L(\lambda) = 1$, so $\hat{\pi}_{\emptyset 0} = \pi \geq \hat{\pi}_{\emptyset 0}$.

$\underline{\alpha}b_H - c < 0$ so $x_H(\lambda) = 0$. A contradiction. \square

²⁵In an equilibrium where all types are expected to reform in state L , we consider out-of-equilibrium beliefs $\hat{\pi}_{L,0} = 0$