

Strategic Legislative Subsidies: Informational Lobbying and the Cost of Policy

Christopher J. Ellis[†]

University of Oregon

Thomas Groll[‡]

Columbia University

November 2018

Abstract

We analyze the strategic considerations inherent in legislative subsidies and develop an informational lobbying model with costly policy reforms. In contrast to other models of informational lobbying we focus on the implications of a policymaker's and a lobby's resource constraints for lobbying activities. We allow both a policymaker and a lobby to gather information, and each can either fund or subsidize policy making. Our analysis highlights that legislative subsidies are both chosen strategically by lobbyists, and strategically induced by policymakers, dependent upon the circumstances. These involve which resource constraints bind, the policymaker's prior beliefs, the salience of policy, and the policymaker's and lobby's expertise in information gathering. We also illustrate when an interest group may lobby a friendly, opposing, or undecided policymaker. Furthermore, we explain how an interest group may strategically waste resources and when informational lobbying and transfers are complements, substitutes, or independent.

Keywords: Informational Lobbying, Legislative Subsidies, Resource Constraints

*We benefitted greatly from the comments made by the editor and three referees. We thank Christopher Cotton, Matthias Dahm, Arnaud Dellis, Gabriele Gratton, Martin Gregor, Alexander Hertel-Fernandez, Björn Kauder, Michelle Mello, Giacomo Ponzetto, James Snyder, Francesco Trebbi, and Jonathan Woon for helpful discussions and suggestions. We also benefited from seminar participants at Harvard University, Laval University, and Queen's University as well as participants at the IEB Workshop on Corruption, Lobbying and Public Policy 2015, the PET 15, IIPF 2015, MPSA 2016, SEA 2016, and EEA 2017 conferences. A previous version was circulated under the title "Informational Lobbying and Legislative Subsidies". All errors are our own.

[†]Department of Economics, University of Oregon, Eugene, OR; cjellis@uoregon.edu.

[‡]School of International and Public Affairs, Columbia University, New York, NY; tgroll@columbia.edu.

1 Introduction

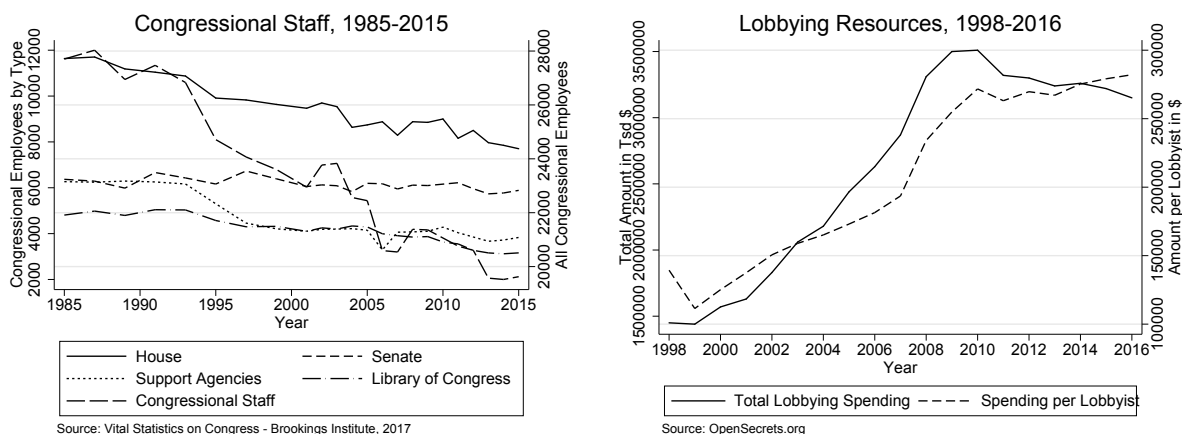
It is well known that the evaluation and implementation of policy is an expensive process. Policymakers faced with finite budgets must therefore decide how to allocate their limited resources between activities associated with information acquisition or policy enactment.¹ This presents opportunities to special interest groups intent on influencing policy decisions.² Furthermore, policymaking is a sequential process such that by strategically supplying information and other resources at different stages special interest groups may influence what a policymaker learns and what policy actions they subsequently take. That interest group exercise such multistage influence is well documented but only partially understood.

In the analysis that follows we formally model lobby and policymaker resource constraints and their implications for the incentives to gather information and support policies. Our setup allows us to gain new insights into the strategic considerations that underlie legislative subsidies. Over and above the simple role of persuasion, we are able to identify three distinct strategic motives for informational lobbying termed the insurance, substitution, and commitment motive. This leads to several contributions. We are able to explain in which circumstances, in terms of their prior beliefs, a policymaker will gather information themselves or will rely on information supplied by a lobby and the policy consequences of these choices. This allows us to make welfare statements involving the frequency of correct policy decisions in equilibrium as compared to those that would be made under optimal information gathering. The equilibrium welfare losses implied can then be quantified. We also provide explanations for when an interest group may lobby a friendly, opposing, or undecided policymaker. Furthermore, we are able to understand the circumstances when the provision of information and other types of resource transfers from a lobby to a policymaker are complements, substitutes, or independent and relate these to the three strategic lobbying motives.

The significance and implications of budget constraints has been recognized by ? as well as ? who point out how constrained policymakers rely heavily on support from lobbies to relax their

¹In 2009 Congress had 535 members, where each House member employed an average of 16 staffers, and each Senator averaged 43 staffers (?, ?). The Congressional Budget Office (CBO) employs about 235 economic and other experts (CBO website). In addition, there are hundreds of experts in various government agencies who write reports or give testimonies.

²Common lobbying activities include legislative testimonies, research reports, campaign contributions, and campaigning. A very common legislative subsidy is legislative drafting (?, ?). For example, lobbyists employed by Genentech, a Roche subsidiary, and two law firms provided talking points to 42 House members, equally distributed across both parties, who submitted them with minor to no changes to the Congressional Record (?). Similarly, lobbyists of Citigroup proposed language to the House Financial Services Committee which turned into a bill of 85 lines with two crucial paragraphs of 70 lines provided by Citigroup. Only two words were changed for proper grammar (?). Lobbies even provide external consultants and staffers on site to relieve ministries' understaffing (?, ?).



(a) Congressional Staff.

(b) Lobbying Resources.

Figure 1: Congressional Capacity and Lobbying.

own resource constraints; and how interest groups become de facto “service bureaus” (?).³ This reliance by policymakers on lobbies for resources seems to be growing and can be explained by increasing policy complexity and decreasing congressional capacity (?). Congressional capacity with respect to congressional staff has been declining as illustrated in Figure 1(a) and congressional workload has been constant with respect to the introduction and passage of bills but increasing in the number of votes and pages in the Federal Register, which hints at greater policy complexity.⁴ There is also growing pressure on the resources legislators have available for policy evaluation and implementation because of the increasing costs of electoral competition fundraising (?).⁵ On the other hand, lobbying spending, total and per lobbyist, has increased as documented in Figure 1(b).⁶ Given these trends it seems that lobbyists are increasingly involved in both making and implementing policies. For example, ? provide a case study of Merck’s extensive involvement in the US policymaking process behind the introduction and mandating of vaccinations for the cervical cancer causing papillomavirus. This has proven to be very politically controversial. In an attempt to advocate for the vaccination, and increase its profits, Merck provided significant policy relevant information and other resources to policymakers. Its advocates lobbied policymakers, mobilized female legislators and physicians, drafted legislation, conducted marketing campaigns, and filled gaps in the provision of vaccinations. Within a year 41 states and the District of Columbia

³? points out that Congress often lacks the ability to gather “the current research-based state of knowledge for the full array of policies”. ? documents how the lack of time and resources for individual Congress members results in stronger reliance on the recommendations of legislative leaders.

⁴Figure 11 and Figure 13 in Supplemental Appendix B.1 document the trends in congressional support agency staff and congressional workload for the time period of 1985 to 2015/16.

⁵Figure 14 in Supplemental Appendix B.1 documents the growing costs of winning Congressional seats.

⁶The number of registered lobbyists has been declining since the Honest Leadership and Open Government Act in 2007. It has been strongly argued that the decline is due to lobbyists dropping just below the reporting thresholds so as to circumvent the costs and restrictions associated with reporting (that is there is a growing number of “shadow lobbyists”). Nevertheless, the reported total amounts of lobbying are mostly constant.

introduced the vaccination, and 24 states proposed legislative bills that would mandate the vaccination for teenage girls. Though there was concern about mandatory vaccination and Merck’s involvement, policymakers admitted that they mostly relied on Merck’s efforts and resources to change policies.

In this study we focus on strategic transfers of information and other resources from an interest group to a policymaker. We distinguish between resources expended for gathering policy relevant information such as research reports, polling and surveys, and testimonies and those expended for making policy such as the costs of legislative drafting, gaining majorities, and following institutional protocols. Both the policymaker and interest group are assumed to face budget constraints. In the case of the interest group resources may be spent on gathering information or for transfers to a policymaker.⁷ The policymaker may spend resources (that may include transfers from the interest group) on information acquisition or policy implementation.⁸ There is no presumption that the policymaker and interest group share common policy goals. We are also agnostic on whether a lobbyist gathers verifiable or non-verifiable information. Rather we apply an information structure which allows for a wide range of observed informational lobbying activities, and captures either a lobby’s expertise in providing (truthful) information of a certain quality, or, a lobby’s credibility in a cheap talk environment.

Our analysis highlights the strategic manipulation of legislative subsidies by interest groups when both they and the policymakers they lobby may face binding budget constraints. Policymakers require resources both to gather information and enact policies, they have initial priors over what policy is desirable and attach a level of salience to each policy issue (?). Two basic forms of manipulation arise: For a policymaker who does not initially favor the lobby’s preferred policy, but can be persuaded to do so by sufficient appropriate information, the lobby either supplies information directly or relaxes the policymaker’s budget constraint to induce them to gather information themselves. This implies that policymakers who *ex post* support the lobbies’ preferred policies were not necessarily *ex ante* “friends” (?, ?). Surprisingly, a resource-constrained policymaker – though at a resource disadvantage initially – may actually gather own information for a wider range of beliefs. The policymaker, anticipating a policy implementation subsidy, bears de facto lower policy costs and takes advantage of the interest group’s incentives and gathers more

⁷These information and resource transfers may be institutionalized or provided through lobbyists. For example, industry sponsorship of clinical trials by drug companies, which provides information to regulators for approval, was over \$14 billion in 2003 with an increasing trend (?). Furthermore, there have been between 10 to 15 thousand lobbyists per year registered under the Federal Lobbying Disclosure Act of 1995 and reported lobbying spending, excluding campaign contributions, has been between \$1.5 to \$3.3 billion. These expenditures exceeded annual campaign contributions.

⁸A policymaker’s ability to gather information is similar to ? and ?.

costly information. For a policymaker who initially favors the lobby’s preferred policy the lobby may manipulate the budget such that the policymaker cannot afford information that may change their position. The strategic incentive to waste resources by generating costly but relatively uninformative signals, and hence preventing the policymaker from strategically extracting resources to acquire information at a later stage, differs from the “money burning” incentive of enhancing credibility in models with costly signaling (??, ??) or gaining attention in models of costly access (??, ?, ??, ?), where the lobby’s expenditure is informative in equilibrium. Furthermore, our results provide a unifying explanation for the seemingly contradictory findings in the literature of whether interest groups lobby undecided, or unbiased, decision-makers (?, ?), target opponents (??, ?), or target supporters (?, ?, ?, ?).⁹

One of our model’s extensions highlights that if an interest group has to bear the cost of both information and policy implementation, then the lobby’s optimal strategy is to provide transfers to the policymaker in stages and not commit all resources up front as is common in costly access models (??, ?, ??).¹⁰ We also illustrate how informational lobbying and legislative subsidies arise endogenously and can be either substitutes (?, ??, ??), complements (??, ?, ??), or independent.

Some studies of financial transfers appear to support the view that they constitute money-for-favors (?, ?) or perhaps even outright bribery.¹¹ In our analysis we show that these payments may involve subsidies that allow the policymaker to engage in information gathering that may then persuade the policymaker to adopt a policy favored by the lobby. The change in the policymaker’s position may then appear empirically as money-for-favors. We do *not* claim that money is non-distortionary, but rather that its role can be different from the one described by the money-for-favors view.

The other related literature that looks at the transfer of resources from lobbyists to policymakers may be divided into three general categories.¹² The first associated primarily with ? considers transfers of information or other resources as “legislative subsidies” whereby special interests subsidize the activities of policymakers with whom they share common interests (?, ?). The idea being that this either permits the realization of the interest group’s desired policies, or influences the policymaker to prioritize policies related to their common goals. In contrast to

⁹See ? for a recent broader review of the empirical literature.

¹⁰? considers a framework in which interest groups make financial contributions before a politician decides on which issues to implement and to become informed about. ? analyzes a setting in which a politician decides about becoming more informed on an issue before receiving monetary contributions from interest groups. They show that a politician may find it optimal to remain uninformed to increase lobbying competition and to extract more contributions.

¹¹For a discussion of the role of campaign contributions and money in U.S. politics see ?, ?, and ?.

¹²See ?, ?, ?, and ? for reviews of the money-for-favors and informational lobbying views. ? provide a review of the first three views. See ? for the seminal work on interest group behavior and organization.

the more pessimistic traditional views of lobbying, this implies that such partnerships between policymakers and special interests enable time and resource constrained policymakers to perform their public duties.¹³ In a second strand, interest groups provide policymakers with information. Many of these models involve private, non-verifiable information and cheap talk games with partitioning equilibria ((θ, θ)), costly signaling ((θ, θ)), private but verifiable information ((θ, θ)), or access-conditional information provision of non-verifiable or verifiable statements ($(\theta, \theta, \theta, \theta, \theta)$). Finally, another strand of the literature focuses on lobbyists' strategic considerations when supplying either information or financial resources to policymakers ((θ, θ, θ)). θ analyze interest groups' trade-offs between providing financial transfers to candidates before and after elections. In their sequential lobbying process interest groups make financial contributions to their initial supporters but then donate to elected opponents to induce a compromise. On the other hand, θ analyze politicians' strategies of how signal to voters about special interest groups' activities when there is an uncertainty about whether they are influenced by information or bribes.

We extend the idea of legislative subsidies and model a sequential lobbying process in which a lobby may subsidize both information gathering and policy implementation. Our informational lobbying setup allows for either private, non-verifiable information or private, verifiable information and recapitulates previous approaches. The lobby's policy implementation subsidy may relax a policymaker's resource constraint such that they then implement a costly policy or, since it is anticipated, incentivize the policymaker to gather information. We do not model money-for-favors in our analysis but we will discuss at the end how policy subsidies may appear as money-for-favors and provide policy recommendations.

The studies closest to our own are θ and θ . However, both focus on purely informational lobbying and policy agendas. Their studies consider a policymaker who is considering multiple policy issues but cannot implement them all. Their focus is on how competitive informational lobbying may affect a policymaker's ranking of proposals when the policymaker's resource constraint is binding. We allow for only one lobby and one policymaker who play a game whereby the interest group makes strategic transfers – of both information and resources – that relax a policymaker's resource constraint and are best responses to the policymaker's expenditures which in turn are a best response to the interest group's transfers. In our analysis we are especially interested in how an interest group chooses to strategically relax the policymaker's resource constraint with

¹³Recent empirical work supports the notion of cooperative partnerships between lobbyists and policymakers. θ focus on the importance of personal relationships between lobbyists and policymakers by analyzing the “revolving door” phenomenon in which politicians and staff members become lobbyists during their careers. They emphasize connections through common work experience and overlaps in party membership. θ show that lobbyists, measured by campaign donations and reported policy issues, follow their political contacts and change their policy issues when those contacts change offices or committees and policy issues.

legislative subsidies and consider the *marginal policy* that could be implemented by a constrained policymaker (?). Obviously this is part of some meta-game whereby policymakers decide which interest groups to interact with and those interest groups in turn choose the policymakers to lobby. We do not formally model this larger game but our analysis can be thought of as providing some understanding of the *form* in which transfers take place and their consequences given that they are in some casual sense sufficiently large to ensure that the game we analyze is played. Despite this qualification we are able to gain several new insights into the lobbying process and explain some of the stylized facts heretofore unexplained in the literature.

2 Model

Our model involves a policymaker, P , and a single lobby, L . The policymaker faces a policy choice between maintaining the status quo, s , or implementing a reform, r . We hence write the policy π as $\pi \in \{\pi^s, \pi^r\}$. The policymaker's payoff depends on their policy action and an unknown state of the world, θ , which either calls for the status quo or a reform – i.e., $\theta \in \{\theta^s, \theta^r\}$. The policymaker's and lobby's expected payoffs depend on the policymaker's prior about the state of the world and the signals received from gathering information. The policymaker's belief is the common prior over the likelihood that the state of the world is θ^r , and thus reform is desirable, written as $\lambda = Pr[\theta = \theta^r]$. The complimentary likelihood is simply $1 - \lambda = Pr[\theta = \theta^s]$, and the lobby knows the policymaker's prior. The policymaker's state-dependent payoff is α if her action corresponds to the state of the world and 0 otherwise. We refer to the parameter α as the salience of the policy in question.¹⁴ A policymaker's policy position is then characterized by their prior belief about the desirability of a policy change and its salience.¹⁵ The lobby's payoff is state-independent and depends exclusively on the policymaker's action – i.e., the lobby receives a payoff

¹⁴This may be motivated in a number of different ways including; the attention the policy is currently being given by the electorate, the actual importance of the issue in some welfare sense, or the importance of the issue in terms of the policymaker's self-interest.

¹⁵This is essentially our point of departure from ? who pioneered the importance of recognizing resource constraints in lobbying. They assume that policymakers have agendas that are either closer or further from those of the lobby's and that the lobbies then subsidize the efforts of those policymakers that attempt to advance their common cause. There is no best or correct policy from a public interest perspective. We take a different view of policymakers. We assume that there is a correct policy in the sense of being in the public interest. We also assume that abstracting from all other arguments all policymakers would choose this policy should they know it. This does not mean that policymakers agree on which policy is best, nor that they all place equal weight on getting the policy right on one issue versus another. We model these issues by explicitly defining the policymaker's initial priors and the salience of a particular policy. In a sense the first part of our analysis can be considered as providing a microfoundation for the policy agendas analyzed by ?. Given that there is a correct policy in our model, information then plays the role of changing beliefs not preferences (although we can interpret the change in preferences modeled by ? as a shorthand for the process of Bayesian updating with given preferences we model). We then extend the idea by recognizing that resources can be transferred from lobbies to policymakers at different stages in the policymaking process, this leads to the possibilities for strategic interaction that our work focuses on. In short the important results of ? are nested in our model, but are not its exclusive possibilities.

of 1 if the policymaker implements a reform and 0 otherwise. The policymaker has a resource endowment of $y^P \geq 0$ that may be spent on gathering information about the policy matter at a fixed cost of $e^P > 0$ and/or on implementing reform at a fixed cost of $c > 0$.¹⁶ Maintaining the status quo is costless. To make the problem interesting, we assume $\alpha > \max\{c, e\}$. The lobby has an endowment of $y^L \geq 0$ that can be used for gathering information at a fixed cost of $e^L > 0$, or to finance a variable transfer to the policymaker, denoted $\tau \geq 0$. Any parts of endowments that are not spent are retained as private benefits. These elements capture costly information collection by both the lobby and the policymaker as well as the means by which policy changes are financed. The results that follow do not depend in any significant way on the discreteness of information and the cost of gathering it.¹⁷

Employing the payoffs and budget constraints, we have that the policymaker maximizes

$$E[U^P(\pi, \theta)] + y^P + \tau - fe^P - gc, \quad (2.1)$$

and the lobby maximizes

$$E[U^L(\pi)] + y^L - he^L - \tau, \quad (2.2)$$

where $U^P(\pi, \theta)$ and $U^L(\pi)$ are as described above and f , g , and h are indicator variables such that $f, g, h \in \{0, 1\}$. If the policymaker or the lobby gathers information, then $f = 1$ or $h = 1$; if the policymaker enacts a reform, then $g = 1$.

Information gathered by the lobby and policymaker takes the form of the signals x and z respectively. Each of these signals is binary and correlated with the state of the world – i.e., $x \in \{x^r, x^s\}$ and $z \in \{z^r, z^s\}$. Conditional beliefs, based on a common prior and any publicly observed signals, are then $\lambda(x, z) = \Pr[\theta = \theta^r | x, z]$. The information signals are noisy but informative, that is correct signals are more likely than incorrect ones. We denote the signal functions as $\Pr[x = x^r | \theta^r] = \epsilon^L$, $\Pr[z = z^r | \theta^r] = \epsilon^P$, $\Pr[x = x^s | \theta^s] = \eta^L$, and $\Pr[z = z^s | \theta^s] = \eta^P$ with $\epsilon^k, \eta^k \in (\frac{1}{2}, 1]$ with $k = L, P$. These signals and likelihoods may be interpreted as arising in two possible informational environments, they may reflect: expertise in gathering private, verifiable information, or credibility in providing private non-verifiable information. In an environment of verifiable information the information signals can be interpreted as the *accuracy* of the information

¹⁶These two assumptions ensure that the policymaker has an incentive to invest in information and policies. The costs of a policy change can include – but are not limited to – the staffing resources for legislative research and drafting, communicating policy positions to constituents, organizing a winning coalition with costly promises of reciprocity, and budgetary implications for rolling out the policy change.

¹⁷This follows quite directly from the discreteness of the policy choice. Suppose for example that a policymaker can choose to purchase more signals or more informative ones. They would make this choice up to the point where the new information could effect their priors sufficiently to change their ultimate policy choice. Less information would be wasteful as it would not change their policy choice and more would not be expected to produce a different decision. Hence continuous information acquisition adds little to the model. The same argument applies to the lobby's acquisition of information.

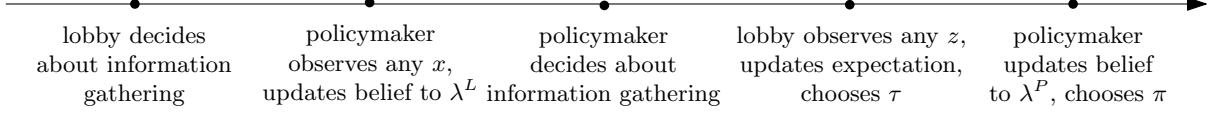


Figure 2: Sequence of Play.

technologies possessed by the lobby and policymaker.¹⁸ That the accuracy of the signals differ across agents and states allows the lobby to strategically effect not just the quantity but also the quality of information that the policymaker acts upon.¹⁹ The players' information gathering depends on their expected signals conditional on their beliefs at the respective stages of the game.²⁰ We denote the posterior beliefs as $\lambda^L \in \{\lambda, \lambda(x)\}$ after any information gathering by the lobby and $\lambda^P \in \{\lambda, \lambda(x), \lambda(z), \lambda(x, z)\}$ at the game's last stage.²¹

The sequence of play is illustrated in Figure 2 and is as follows: First, the lobby chooses whether to gather information, $h \in \{0, 1\}$ at the cost e^L , given the policymaker's prior λ . The policymaker observes the lobby's public signal x and makes an appropriate inference. The policymaker then chooses whether to gather information, $f \in \{0, 1\}$ at cost e^P , and generate a publicly observable signal z . The lobby and policymaker having observed the signal form an appropriate inference. The lobby then chooses a subsidy amount τ . Finally, the policymaker chooses her policy π .²² We solve the game backwards for the *Perfect Bayesian Equilibrium*. The equilibrium involves solutions for the policy choice, the lobby's subsidy, the policymaker's information gathering, and the lobby's information gathering.²³

3 Purely Informational Lobbying with Homogeneous Costs and Signal Accuracies

To help set up our analysis and develop sharp intuitive results, we first consider the model's predictions when neither the lobby nor the policymaker faces a binding resource constraint and where the signal costs and accuracies are the same both across states and actors – i.e., $e^P = e^L \equiv e$

¹⁸Our setting is equivalent to an interest group that gathers verifiable information and a policymaker who can observe this (?). A lobby finds it in their best interest to disseminate information as a policymaker would otherwise infer that a lobby is withholding unfavorable information.

¹⁹Alternatively, the lobby's signal likelihoods can be interpreted as the lobby's *credibility* in providing private, non-verifiable information in a cheap-talk environment in which a policymaker may doubt the lobby's truth-telling incentives.

²⁰Details of these signal likelihoods may be found in the Supplemental Appendix B.2.1

²¹We state the detailed posterior beliefs in the Supplemental Appendix B.2.2.

²²We choose this sequence of play both because it seems realistic to us and because it allows us to explore all the strategic lobbying possibilities. Were the policymaker to choose information gathering first, then the lobby would take the policymaker's posterior after own information gathering as given, leaving no mechanism for the lobby to strategically manipulate it. In the Supplemental Appendix B.5.2 we consider an alternative timing of transfers when the lobby may have to subsidize both the policymaker's information gathering and policy implementation.

²³The details of all proofs can be found in the Appendix or Supplemental Appendix.

and $\eta^L = \eta^p = \epsilon^L = \epsilon^P \equiv \mu$. We may think of this as a situation where both the lobby and policymaker have the option of commissioning a report from a third party at a given price. In later sections we explore different resource constraints and reintroduce heterogeneity in signal costs and accuracies.

3.1 The Policy Choice

At the last stage of the lobbying game the policymaker has a posterior λ^P and chooses whether to keep the status quo or to implement a reform. Reform is costly and therefore is only chosen when its expected payoff exceeds that of the status quo. We define the policymaker's reform implementation threshold λ^* as the probability the policymaker attaches to the state being "reform" such that they are indifferent between reform and status quo. Hence, they choose reform if

$$\lambda^P \geq \frac{1}{2} + \frac{c}{2\alpha} \equiv \lambda^*. \quad (3.1)$$

We see that the policymaker's reform implementation threshold is higher the more costly is reform, or the lower is the policy salience.

3.2 The Policymaker's Information Choice

The policymaker knows that they will implement reform in the final round if (3.1) is satisfied, and also the expected payoffs they will experience based on this choice. Their information choice then depends on its cost and the potential impact of that information on their beliefs. This in turn depends on the likelihoods and accuracy of the signals they may receive and their beliefs at this stage. These beliefs depend on the initial prior updated using Bayes' rule according to any informational signals that have been generated by the lobby.

The policymaker's options are to (i) never gather information and never reform, (ii) never gather information but always reform, or (iii) gather information and decide based on the signal. Consider first the case when the policymaker would neither gather information nor reform. In this case the policymaker is termed *negatively convinced*, and their prior is such that they view reform as undesirable and the policy issue not worth further costly investigation. In the second case the policymaker is termed *positively convinced* since their prior is such that they will always reform and view further information as unnecessary. The third case describes the range of beliefs for which the policymaker is not convinced and would be willing to gather costly information. This range is further divided into subintervals dependent on the policy choice the policymaker would make based only on their prior. If they would choose reform in the absence of new information,

then we term them *optimistic*; on the other hand, if they would choose status quo in the absence of new information, we term them *pessimistic*. Let $\underline{\lambda}$ and $\bar{\lambda}$ denote the upper and lower thresholds of the range of priors for which the policymaker investigates. Formally, we have

$$\underline{\lambda} = \frac{(1-\mu)(\alpha+c)+e}{\alpha+c(1-2\mu)} \text{ and } \bar{\lambda} = \frac{\mu(\alpha+c)-e}{\alpha+c(2\mu-1)}. \quad (3.2)$$

The lower threshold $\underline{\lambda}$ is defined as the belief for which the policymaker is indifferent between cases (iii) and (i). Similarly, the upper threshold $\bar{\lambda}$ is defined as the belief for which the policymaker is indifferent between the cases (iii) and (ii). We illustrate the four ranges with their respective thresholds and the policymaker's policy criterion in Figure 3.

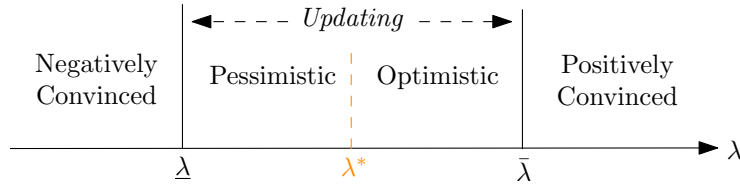


Figure 3: Policymaker's Beliefs and Information Choice.

For the analysis to be of interest requires

Lemma 1. *The policymaker gathers information if $\underline{\lambda} < \min\{\bar{\lambda}, 1\}$, which is equivalent to $(\alpha^2 - c^2)(2\mu - 1) - 2\alpha e > 0$.*

That this interval exists requires that; the information signals, μ , are sufficiently accurate, policy salience compared to the reform cost is sufficiently high, $\alpha > c$, and that the cost of information, e , is sufficiently low. The comparative statics of changes in the model's parameters on the threshold values for gathering information can be summarized as follows

$$\underline{\lambda} = \lambda \left(\begin{matrix} \alpha \\ (-) \end{matrix}, \begin{matrix} c \\ (+) \end{matrix}, \begin{matrix} e \\ (+) \end{matrix}, \begin{matrix} \mu \\ (-) \end{matrix} \right) \text{ and } \bar{\lambda} = \lambda \left(\begin{matrix} \alpha \\ (+/-) \end{matrix}, \begin{matrix} c \\ (+) \end{matrix}, \begin{matrix} e \\ (-) \end{matrix}, \begin{matrix} \mu \\ (+) \end{matrix} \right). \quad (3.3)$$

Further, if we define $\Lambda \equiv \bar{\lambda} - \underline{\lambda}$, then we may obtain

$$\Lambda = \Lambda \left(\begin{matrix} \alpha \\ (+) \end{matrix}, \begin{matrix} c \\ (-) \end{matrix}, \begin{matrix} e \\ (-) \end{matrix}, \begin{matrix} \mu \\ (+) \end{matrix} \right). \quad (3.4)$$

The signs under the variables indicate the direction of the comparative statics.²⁴ A greater salience makes a policymaker that is indifferent between choosing the status quo and gathering information more likely to gather information as getting the policy right becomes more important to them. More interesting is that a policymaker—just indifferent between gathering information and choosing

²⁴The derivations of the thresholds are in Appendix A.1.1 and the quantitative comparative statics are in B.3.1.

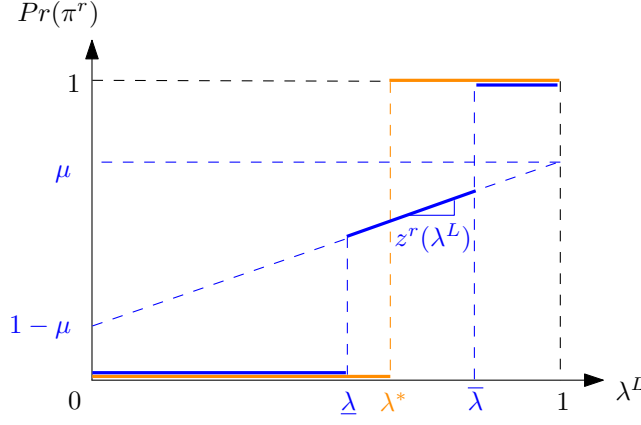


Figure 4: Policymaker's Thresholds and Probability of Reform.

reform immediately—responds ambiguously to a change in the policy salience. A greater salience implies that a policymaker gains more from the right policy, which would increase the threshold $\bar{\lambda}$, but also raises the payoff of reform relative to the status quo making the choice more attractive, hence tending to reduce the threshold. However, we can state clearly that an increase in policy salience increases the range of beliefs for which the policymaker gathers information.

The effect of an increase in the reform cost is to shift the range of beliefs for gathering information to the right and to decrease this range, making the policymaker both more conservative and less informed in their policy choice. This is because the expected net benefit from reform is lower but the expected benefit from the status quo remains the same, so the belief for which the policymaker is indifferent between the status quo and gathering information that can lead to reform must be higher; similarly, the belief for which they are indifferent between gathering information and reform must also be higher such that the whole range of beliefs for gathering information shifts, although it also shrinks due the greater policy costs. If the information cost increases, then the policymaker gathers information for a narrower range of initial beliefs. This is simply because the net expected benefits of gathering information decline for all beliefs.

An increase in signal accuracy, μ , causes the policymaker to engage in information gathering for a wider range of priors. This follows because an increase in signal accuracy increases the expected value of a signal at all priors.

Since we know that the policymaker will not choose reform for $\lambda < \underline{\lambda}$, always chooses reform for $\lambda > \bar{\lambda}$, and will choose according to the signal they receive for $\underline{\lambda} \leq \lambda \leq \bar{\lambda}$, we can illustrate the probability of reform as in Figure 4.

Given that the lobby understands how information affects the likelihood of reform, and given the initial priors, we may now examine how the lobby makes its information gathering decision.

3.3 The Lobby's Information Choice

We now turn to the lobby's decision whether or not to engage in costly informational lobbying. The lobby correctly anticipates the policymaker's strategies and considers the following questions. Can they induce the policymaker to change their information gathering and policy choices, and do they want to given the cost?²⁵ Recall that the lobby's expected payoffs are increasing in the probability that the policymaker will implement a reform. There are two basic ways the lobby might accomplish this: First, it might gather costly information which, if it is a reform signal, induces the policymaker to update their prior to a value above the threshold $\bar{\lambda}$, guaranteeing that the policymaker will not gather any additional information and will implement reform with probability one. Second, the lobby might gather information which, if it is a reform signal, raises the policymaker's prior above $\underline{\lambda}$ but below $\bar{\lambda}$ which induces the policymaker to gather more information which, if it is also a reform signal, will induce them to implement the reform policy. Hereafter, we only consider the interesting cases, where the lobby's choices can change the probability of reform, these are illustrated in Figure 5.

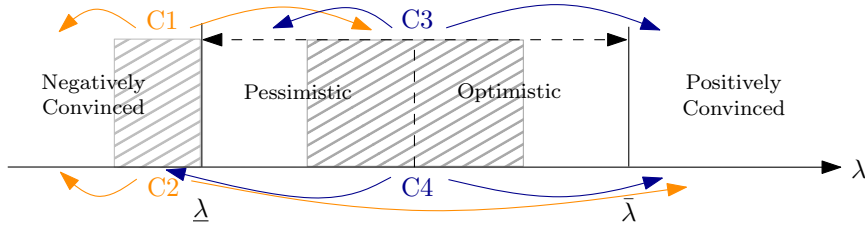


Figure 5: The Lobby's Information Choices.

For the case denoted C1 the policymaker's prior is sufficiently low such that unless they receive information from the lobby they will not gather information and will keep the status quo. If the lobby receives a status quo signal, then clearly the policymaker keeps the status quo. If, however, the lobby receives a reform signal, then the policymaker updates and their prior moves into the range over which they will gather information themselves, as indicated by the arrow on the diagram pointing rightwards from C1, their policy is then determined by this second signal.

Cases C2-C4 can be interpreted similarly. In case C2 a reform signal gathered by the lobby is sufficient to make the policymaker "positively convinced" and triggers a reform. In case C3 a status quo signal generated by the lobby will not prevent the policymaker gathering information and basing their policy that signal, but a reform signal has the same effect as in case C2, immediate

²⁵The policymaker and lobby will never gather information or choose reform if $\lambda^* > \lambda(x^r, z^r)$, which implies that even the most optimistic information signals will not convince the policymaker. Similarly, neither the lobbyist nor the policymaker will gather information and the policymaker will always choose reform if $\lambda^* \leq \lambda(x^s, z^s)$, which implies that even the most pessimistic information signals cannot push the likelihood of the state being reform low enough to keep the status quo.

reform. Information gathering by the lobby is a form of insurance in this case since a single reform signal drawn by either the lobby or policymaker leads to a reform policy, but two status quo signals are required for the status quo policy to be chosen. Finally, in case C4 if the lobby decides to gather information the signal, either status quo or reform, causes the policymaker to choose not to gather information, and is alone sufficient to determine the policymaker's policy. However, should the lobby decline to gather information the policymaker does so with the same expected outcome. It follows that the lobby will leave the cost of information to the policymaker and there will be no lobbying in equilibrium. Notice that the lobby will never choose to gather information when neither signal will shift the policymaker's priors out of the unconvinced region as this signal would be redundant with the policy determined by the subsequent policymaker's signal.

Proposition 1. *For the homogeneous case the lobby may engage in informational lobbying only when the policymaker is initially negatively convinced or optimistic, that is if,*

- (i) C1; $\lambda \leq \underline{\lambda} \leq \lambda(x^r) \leq \bar{\lambda}$ and $(1 - \mu)^2 + \lambda(2\mu - 1) \geq e$,
- (ii) C2; $\lambda \leq \underline{\lambda} \leq \bar{\lambda} \leq \lambda(x^r)$ and $1 - \mu + \lambda(2\mu - 1) \geq e$, or
- (iii) C3; $\underline{\lambda} < \lambda(x^s) < \lambda^* < \lambda < \bar{\lambda} < \lambda(x^r)$ and $\mu - \mu^2 \geq e$.

The second part of each of the statements (i)-(iii) in Proposition 1 simply tells us when the expected benefits from informational lobbying exceed the costs. Cases C1 and C2 are where there is a pure *persuasion motive* for informational lobbying whereas C3 involves an *insurance motive*. We may now turn our attention to the further possibilities introduced when resource constraints bind.

4 Informational Lobbying with Policy Implementation Subsidies: Binding Resource Constraints

In this section we investigate the strategic implications of binding resource constraints. There can be incentives for a lobby to transfer resources to a policymaker if this raises the probability of reform. Furthermore, there may be a strategic incentive for the policymaker to change their information gathering activities so as to extract these resource transfers. Here therefore we have a combination of informational lobbying and legislative subsidies. We begin with probably the most interesting and realistic case where a policymaker faces a binding resource constraint and is being lobbied by a resource rich lobby. To be precise, we assume that the policymaker's resource constraint binds such that they cannot afford to both gather information and pay to implement

the reform policy. Further, the lobby is resource rich in the sense that it can afford to gather information and supply a policy implementation subsidy to the policymaker should they choose to do so.²⁶ We shall show then that the key effect of the policymaker’s resource constraint binding is, somewhat surprisingly, to cause them to gather information for priors for which they would not do so if unconstrained.

4.1 Policy Choice and Implementation Subsidy

To understand the implications of a binding policymaker resource constraint, it is necessary to consider the policy choice and the resource transfer that flows to them from the lobby. The policymaker wishes to choose reform if their belief at the last stage is above the policy implementation threshold as described in (3.1). The lobby correctly anticipates the policymaker’s preferred policy, and, in the case where they prefer reform, knows whether or not the policymaker has the required resources. The lobby thus knows the transfer that would be just sufficient to allow the policymaker to implement reform, hence this involves

$$\tau^* = \begin{cases} e + c - y^P & \text{iff } z = z^r \text{ and } 1 \geq e + c - y^P \\ 0 & \text{otherwise.} \end{cases} \quad (4.1)$$

If the policymaker has not spent resources on information gathering or does not want to reform, then the lobby has no incentive to relax the policymaker’s constraint and the transfer is zero. The lobby only contributes when the policymaker has gathered information – leaving them requiring a subsidy to implement a reform – and when the signal received indicates that the state is reform. Notice that a policy subsidy is then more likely the greater is the likelihood that the policymaker will receive a reform signal and the smaller is the transfer needed to subsidize a reform.

4.2 The Policymaker’s Information Choice

Given that a policymaker knows that they will receive a subsidy from the lobby if they receive a reform signal but cannot afford to implement reform they are *de facto* unconstrained and face a similar problem to that analyzed above in Section 3.2. However, there is one key difference, the policymaker now has a strategic incentive to gather information because this increases the expected implementation subsidy from the lobby. This impacts the policymaker’s updating choice.

²⁶Mathematically, we have $\max\{c, e^P\} \leq y^P < c + e^P$ for the policymaker’s constraint and $y^L \geq e^L + c$ for the lobby’s constraint. In this section we continue to maintain the symmetry of signal accuracies and costs. This has no qualitative implications for what follows.

Proposition 2. *The resource constrained policymaker's updating thresholds $(\underline{\lambda}', \bar{\lambda}')$ lie outside those of an unconstrained policymaker $(\underline{\lambda}, \bar{\lambda})$ – i.e., $\underline{\lambda}' < \underline{\lambda}$ and $\bar{\lambda}' > \bar{\lambda}$, which implies $\Lambda' > \Lambda$.*

This is perhaps somewhat counter-intuitive, a resource constrained policymaker engages in costly information gathering for a *wider* set of beliefs than an unconstrained one. The reason is that the constrained policymaker has a strategic incentive to spend on information so as to extract an expected subsidy from the lobby.²⁷ Unconstrained policymakers that gather information and implement reform face the full cost of policy implementation. However, if they are constrained, they can anticipate an implementation subsidy from the lobby in the same circumstances. Hence, the expected cost of reform is lower when the policymaker is constrained, and hence the incentive to gather information greater.²⁸

Clearly, there is also an impact on the probability of reform. Figure 6 illustrates the likelihood that a resource constrained policymaker will enact a reform and compares this to the unconstrained case. The thresholds $\underline{\lambda}'$ and $\bar{\lambda}'$ are for a constrained policymaker, whereas the thresholds $\underline{\lambda}$ and $\bar{\lambda}$ are for an unconstrained policymaker.

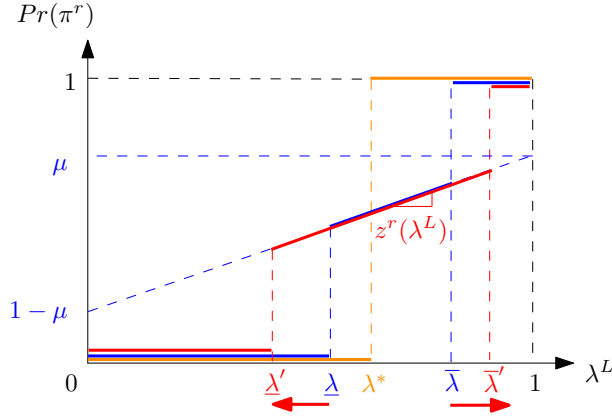


Figure 6: Policymaker's Thresholds and Probability of Reform.

$\bar{\lambda}$ are for the unconstrained policymaker as in Figure 4. The likelihood of reform is zero for priors $\lambda^L < \underline{\lambda}'$, one for priors $\lambda^L > \bar{\lambda}'$, and follows the probability of receiving a reform signal for all other beliefs. Hence, we see that the resource constraint makes reform more likely over the interval $[\underline{\lambda}', \underline{\lambda}]$ and less likely over the interval $[\bar{\lambda}, \bar{\lambda}']$. The intuition here is quite simple; the expected subsidy makes the policymaker more willing to expend resources on information as this will not reduce their ability to implement a reform. The range of initial priors for which they gather information thus increases.

We now consider the comparative static effects of changes in the models parameters on the

²⁷ An increase in the expected subsidy is equivalent to a decrease in the expected implementation cost, hence this result also follows from $\frac{\partial \Lambda}{\partial c} < 0$ in expression (3.4).

²⁸ The welfare implications of a binding policymaker's constraint can be found in Supplemental Appendix B.5.3.

range of beliefs for gathering information. We may write

$$\underline{\lambda}' = \lambda \left(\begin{matrix} \alpha \\ (-) \end{matrix}, \begin{matrix} c \\ (0) \end{matrix}, \begin{matrix} e \\ (+/-) \end{matrix}, \begin{matrix} \mu \\ (-) \end{matrix}, \begin{matrix} y^P \\ (+) \end{matrix} \right) \text{ and } \bar{\lambda}' = \lambda \left(\begin{matrix} \alpha \\ (+/-) \end{matrix}, \begin{matrix} c \\ (+) \end{matrix}, \begin{matrix} e \\ (-) \end{matrix}, \begin{matrix} \mu \\ (+) \end{matrix}, \begin{matrix} y^P \\ (-) \end{matrix} \right). \quad (4.2)$$

The signs under the variables again indicate the comparative static effects.²⁹ For the upper bound, $\bar{\lambda}'$, these are the same as in the unconstrained case and follow from the same intuition. However, for the lower bound, $\underline{\lambda}'$, there are some differences reflecting the constrained policymaker's extra strategic incentives. First, an increase in reform costs has no effect on the constrained policymaker's lower bound. This is because an increase in the cost is matched dollar-for-dollar by an increase in the policy implementation subsidy. Second, an increase in the policymaker's information cost unambiguously reduces the range of beliefs for which there is information gathering in the unconstrained case, but has an ambiguous effect on the range here. This reflects that an increase in the information cost is partially offset by the anticipated subsidy.

Next we turn to the lobby's information choice. In deciding whether or not to gather information the lobby is aware of the consequences on the policymaker's information gathering, the potential need for a policy implementation subsidy, and the subsequent likelihood of reform.

4.3 The Lobby's Information Choice

As before the lobby's incentives to gather information come from the effect information has on the probability that the policymaker will implement a reform. Here there is the additional complication that in equilibrium this may also trigger the need for the lobby to pay a subsidy to the policymaker. As established above, and illustrated in Figure 6, the existence of a possible subsidy increases the range of beliefs for which the policymaker gathers information. This feeds back and affects the lobby's choices. Applying the same logic as in the unconstrained case, we may state

Proposition 3. *For the homogeneous case with a constrained policymaker informational lobbying arises for the same cases as for the unconstrained policymaker although the thresholds $(\underline{\lambda}', \bar{\lambda}')$ differ. If*

(i) $\lambda \leq \underline{\lambda}' \leq \lambda(x^r) \leq \bar{\lambda}'$ and $\frac{(\mu^2\lambda + (1-\mu)^2(1-\lambda))(1-c+y^P)}{(\mu^2\lambda + (1-\mu)^2(1-\lambda)+1)} \geq e$, then informational lobbying occurs and there are implementation subsidies if $z = z^r$;

(ii) $\lambda \leq \underline{\lambda}' \leq \bar{\lambda}' \leq \lambda(x^r)$ and $1 - \mu - \lambda(1 - 2\mu) \geq e$, then there is only informational lobbying;

(iii) $\lambda(x^s) \leq \underline{\lambda}' < \lambda < \lambda^* \leq \lambda(x^r)$ and $1 - e - c + y^P > 0$; then there is no informational lobbying but there are implementation subsidies if $z = z^r$;

²⁹The derivations of the thresholds are in Appendix A.1.3 and the quantitative comparative statics are in B.3.2.

- (iv) $\lambda(x^s) \leq \underline{\lambda}' \leq \lambda \leq \bar{\lambda}' \leq \lambda(x^r)$ and $1 - e - c + y^P > 0$, then there is no informational lobbying but there are implementation subsidies if $z = z^r$;
- (v) $\underline{\lambda}' < \lambda(x^s) < \lambda^* < \lambda \leq \bar{\lambda}' \leq \lambda(x^r)$ and $\frac{2(\lambda-1)\mu(c-y^P)+\mu^2(c-y^P-1)-(y^P-c)(1-\lambda)+\mu}{\lambda-\mu^2-2(\lambda-1)\mu} \geq e$, then both informational lobbying and implementation subsidies occur.

The three cases where informational lobbying occurs in Proposition 3 are essentially the same as the cases C1-C3 in Proposition 1 of the unconstrained case and follow for the same strategic considerations. The obvious difference of course is the presence of implementation subsidies in the constrained case. The need for implementation subsidies has two interesting effects, first, as already noted, the range of priors for which the policymaker would choose to gather information expands, second the conditions under which the lobby would find lobbying economically worthwhile change. This second effect arises both because implementation subsidies are costly, and because the change in the policymaker's information gathering behavior changes the circumstances under which these costs are incurred.

There are two cases where there are only policy implementation subsidies. Part (iii) of Proposition 3 follows by comparing the likelihood of reform with and without the lobby gathering information. If they gather information and receive the signal x^s then the status quo policy is immediately chosen. If they receive the signal x^r then the policymaker gathers information and this determines the policy triggering an implementation subsidy if $z = z^r$. Hence both signals x^r and z^r are required to give a reform policy. If the lobby does not gather information the policymaker does, and there is reform if z^r is received. The lobby then supplies an implementation subsidy. It follows that in this case information gathering by the lobby is expensive and *lowers* the probability of reform. Hence they only supply an implementation subsidy when required. In part (iv) a single signal determines the policy choice, as both a reform or status quo signals push beliefs into one of the “convinced” ranges. The lobby thus chooses between gathering information or supplying an implementation subsidy. In expected terms the latter is cheaper. Hence part (iv).

Part (v) of the proposition is perhaps the most interesting since it is observationally equivalent to “damage control” as discussed by ? and ??. Here too the lobby makes a financial contribution to the policymaker after the arrival of unfavorable information, x^s , but the role of the implementation subsidy is to relax the policymaker's resource constraint such that they can afford to both gather information and enact a reform if they so choose. This second round of information gathering by the policymaker acts as insurance to the lobby against an initially negative signal since $\lambda^* < \lambda(x^s, z^r)$. Here damage control is an implementation subsidy that effectively purchases the lobby two tries at receiving a decisive reform signal.

Our results in this section yield some novel insights into implementation subsidies; first, there is no ex-ante relationship between the policymaker's prior and implementation subsidies; however, after information gathering, subsidies are offered to policymakers who shifted their policy choice to reform after receiving a reform signal, ex-post the lobbyist's friends.

4.3.1 A Comparison of Lobbying of a Constrained and Unconstrained Policymaker

A comparison between the constrained and unconstrained cases provides some insights into both which policymakers are lobbied and when lobbying occurs at all. We know from Propositions 1 and 3 that the lobby gathers information so as to influence either negatively convinced or optimistic policymakers. They supply information to policymakers with priors in the former group so as to get them to consider reform, and to the latter group as they are relatively easy to persuade. The tightening of resource constraints changes the range of priors that define these two lobbied groups. As the policymaker's resource constraint binds the lobby stops supplying information to policymakers just below the margin between being negatively convinced and pessimistic. The range of negatively convinced policymakers being supplied by the lobby with information shrinks. However the reverse is true for the optimistic group. As the policymaker's resource constraint binds the lobby starts supplying information to policymakers with priors just above the margin between being optimistic and positively convinced. Hence this range expands.

Now we consider the extensive margin where the lobby decides whether to lobby or not. Employing the cost benefit conditions from Propositions 1 and 3, we have

Proposition 4. *The lobby will engage in informational lobbying*

- (i) *In the case C1; of both unconstrained and constrained policymakers if $e < [\mu^2\lambda + (1-\mu)^2(1-\lambda)](1+y^p - c - e) < [\mu^2\lambda + (1-\mu)^2(1-\lambda)]$, and of only the unconstrained policymakers if $[\mu^2\lambda + (1-\mu)^2(1-\lambda)](1+y^p - c - e) < e < \mu^2\lambda + (1-\mu)^2(1-\lambda)$;*
- (ii) *In the case C2; of both unconstrained and constrained policymakers if $1 - c + y^p > e$;*
- (iii) *In the case C3; of both unconstrained and constrained policymakers if $e < \mu(1-\mu) - \mu(1-\mu)(e+c-y^p) < \mu(1-\mu)$, and of only the unconstrained one if $\mu(1-\mu) - \mu(1-\mu)(e+c-y^p) < e < \mu(1-\mu)$.*

In simple terms proposition 4 tells us that the cost of policy implementation subsidies when policymakers are resource constrained reduces the information gathering cost at which the lobby is just indifferent between lobbying or not. Taken together Propositions 1, 3, and 4 allow us

to broadly conclude that as policymaker's resource constraints bind the lobby switches some of their persuasion activities from their ex-ante enemies to their ex-ante friends, but engages in informational lobbying for a narrower range of parameters.

4.4 Tightening the Policymaker's Constraint Further

Now suppose that we tighten the policymaker's constraint further such that they can afford to gather information but cannot afford to implement policy.³⁰ Deriving the lower and upper information thresholds for this case, as we did for Proposition 2 and denoting the resulting bounds $\underline{\lambda}''$ and $\bar{\lambda}''$, we can state that

Lemma 2. *If $c > y^P > e$ and $y^L > e + c$, then $\underline{\lambda}'' = \underline{\lambda}'$ and $\bar{\lambda}'' > \bar{\lambda}'$, which implies $\Lambda'' > \Lambda'$.*

The intuition behind this is very similar to the previous case except that a policymaker who gathers information may now anticipate full rather than partially support for their implementation costs. Hence, there is an incentive to gather information for a wider range of beliefs. The policymaker's choices are of course anticipated by the lobby, which now provides reform subsidies for a wider range of initial priors and makes these subsidies larger. Clearly then the range of parameter values for which the lobby finds lobbying optimal decreases.

4.5 Tightening the Lobby's Constraint

Finally, suppose the lobby's resource constraint is binding such that the lobby can either afford to gather information or pay a policy subsidy but not both. Further, the combined resources of the lobby and policymaker are insufficient to pay for two information signals and implement a reform – i.e., $e + c > y^L \geq \max\{e^L, c + e - y^P\}$ and $2e + c > y^P + y^L$. Clearly then there will never be two rounds of information gathering. However, the policymaker's updating thresholds are unaffected by the tightening of the lobby's resource constraint and depend only on the policymaker's constraint as before. The implications are that, given that two signals cannot be gathered in equilibrium, a lobby faced by a negatively convinced policymaker will only choose to gather information if signal accuracy is sufficient to shift the policymaker's priors into the positively convinced range. Further, the lobby no longer has the option of gathering information as insurance against a status quo signal and thus does not lobby optimistic policymakers.

It is interesting to note however that the likelihood of lobbying a negatively convinced policymaker and of a reform outcome in this case actually increases. The reason is that a lobby can

³⁰In the Supplemental Appendix B.5.2 we consider a *very constrained policymaker* who has insufficient funds for information gathering, $e^P > y^P$, and discuss contributions in stages by the lobby which subsidy a policymaker's information gathering and reform efforts.

induce an immediate reform with a less precise information signal as the policymaker’s threshold for immediate reform is no longer the upper threshold when the policymaker can gather information $(\bar{\lambda}, \bar{\lambda}', \text{ or } \bar{\lambda}'')$, but rather the policymaker’s policy implementation threshold (λ^*) which is lower. In other words, being resource constrained yields a lobby a strategic advantage in lobbying a constrained negatively convinced policymaker. If the lobby generates a reform signal the policymaker will give them the “benefit of the doubt” although they would prefer more information. We shall discuss further strategic considerations arising from the lobby facing a binding resource constraint when we introduce heterogeneously accurate signals below.

5 Welfare and the Quality of Policymaker’s Decision Making

In the preceding sections we explored some implications of resource constraints for lobbying behavior. We did not however consider the welfare properties of the equilibrium outcomes. In this section we assume that the benefit to the policymaker of selecting the correct policy is of an order of magnitude sufficiently large such that this is the policymaker’s only consideration. Formally, we equate welfare with salience becoming extremely large, that is $\alpha \rightarrow \infty$.³¹ Higher expected welfare is then associated with a higher frequency of the policymaker making a correct policy decision. An analysis of how frequently the policymaker makes the correct policy decision requires a further assumption. So far we have only assumed that the policymaker and lobby share a common prior. Now we need to assume that this is the true prior which we denote $\hat{\lambda}$.³²

We know that there are three possibilities for policy decisions in our analysis, they may be based on none, one, or two information signals. More accurately, if the policymaker received no informational signal, then the policy choice depends solely on their prior; if they receive one signal, then that signal is decisive; if they receive two signals, then there are two possibilities, they choose reform only if both signals are reform or they choose status quo only if both signals are status quo. Given these policy choice “rules” we can calculate for which ranges of true priors each choice rule yields the highest frequency of the correct policy, that is the highest welfare. Further, we can compare these to the equilibrium outcomes; and when they differ, allowing us to calculate the welfare losses. We illustrate the results in Figure 7.

On the vertical axis we have the frequency with which the policymaker chooses the correct policy, $Pr(\pi = \theta)$, on the horizontal axis we have the true prior, $\hat{\lambda}$. The blue line in the diagram

³¹We provide a general welfare analysis including the cost of information and potential distortions in the Supplemental Appendix B.5.3.

³²We could weaken this assumption and assume a functional relationship between the true and common priors $\lambda = f(\hat{\lambda})$, this has many interesting possibilities but adds unnecessary complexity here.

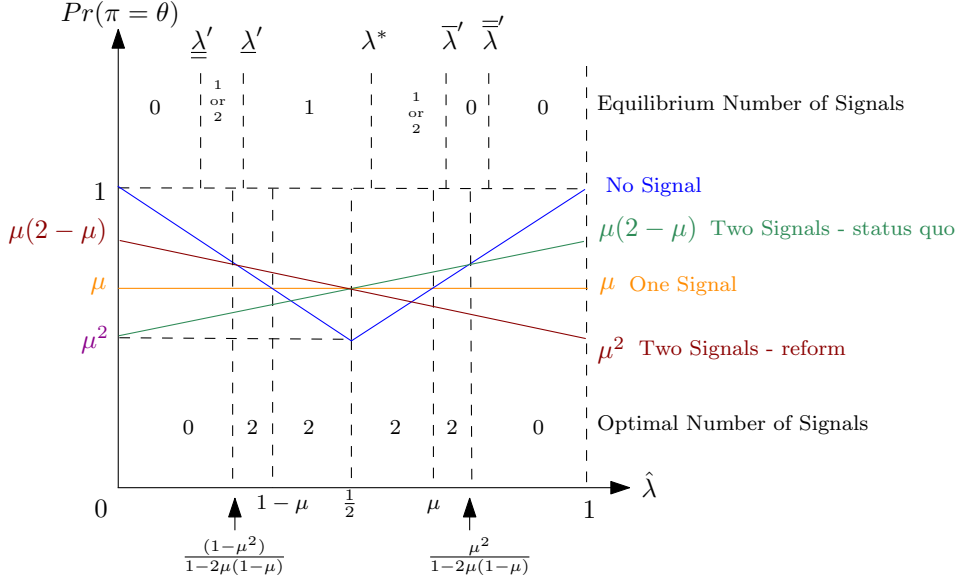


Figure 7: Information Signals and Frequency of Correct Policy Choice for $\alpha \rightarrow \infty$.

gives the frequency of correct policy decisions if these are based only on the prior and the orange line does the same for policy decisions based on a single signal. The green and red lines give correct policy choice frequencies with two signals, the former when status quo is chosen only if both signals are status quo, and the latter when reform is chosen only if both signals are reform.³³ On the horizontal line denoted “Optimal Number of Signals” we provide this number for each range of priors. On the horizontal line denoted “Equilibrium Signals” we indicate the number of signals gathered in equilibrium in the model for the different prior ranges. Notice that as $\alpha \rightarrow \infty$ we have $\underline{\lambda} \rightarrow \underline{\lambda}' \rightarrow 1 - \mu$, $\lambda^* \rightarrow \frac{1}{2}$, $\bar{\lambda} \rightarrow \bar{\lambda}' \rightarrow \mu$, the reason for these convergences is that the policymaker cares only about maximizing the probability of choosing the correct policy and is not motivated to strategically manipulate transfers.³⁴ Further, notice that $\underline{\lambda} = \frac{1 - \mu^2}{1 - 2\mu(1 - \mu)}$ is the true prior at which a reform signal is just sufficient to produce a posterior for which the policymaker would be unconvinced, that is it updates to $\underline{\lambda}$.³⁵

Generally, Figure 7 tells us that the more extreme are the true priors the more frequently will policies based on these priors be correct, and the more persuasive should be information signals if they are to induce the policymakers to act other than in accordance with their initial priors. As the priors become less extreme they are less reliable as a basis for policy choice and therefore the information signals are more likely to increase the frequency of a correct choice and should be given greater weight.

³³These are written $\lambda\mu^2 + (1 - \lambda)[\mu + (1 - \mu)\mu]$ when two reform signals are required for the reform policy to be chosen, and $\lambda[\mu + (1 - \mu)\mu] + (1 - \lambda)\mu^2$ when two status quo signals are required for the status quo policy to be chosen.

³⁴Taking the limits as $\alpha \rightarrow \infty$ of (3.1), (3.2), (A.2), and (A.10).

³⁵ $\bar{\lambda} = \frac{\mu^2}{1 - 2\mu(1 - \mu)}$ defines the intersection of the blue and purple lines in Figure 7.

Now we can evaluate the welfare properties of the various equilibria in the lobbying game. Consider first policymakers that are “very negatively convinced”, with true priors in the range $\hat{\lambda} \in [0, \underline{\lambda}')$, the highest frequency of correct policy decisions is obtained when the policymaker makes the policy choice on the basis of their original prior. They always choose status quo and this is very likely to be correct. This is exactly what happens in equilibrium in the model for priors in this range. For the remainder of the negatively convinced range, $\hat{\lambda} \in [\underline{\lambda}', \lambda')$, the frequency of correct policy decisions is highest with two information signals and where reform is chosen only if both of these signals are reform. Here the frequency of correct decisions is given by $\lambda\mu^2 + (1 - \lambda)\mu(2 - \mu)$ and this is exactly what arises in equilibrium (one signal can be an equilibrium outcome but only if this signal is status quo, $x = x^s$). For priors in the pessimistic range, $[\lambda', \lambda^*)$ it remains the case that the frequency of correct policy decisions is highest with two information signals and where reform is chosen only if both of these signals are reform, but this is not the equilibrium outcome. In this range the lobby does not engage in informational lobbying despite this increasing the likelihood of a correct policy decision. The quality loss from the lobby’s failure to engage in informational lobbying is then $\mu(1 - \mu)[1 - 2\lambda\mu] > 0$.³⁶ Over the range $[\lambda^*, \bar{\lambda}')$ the highest frequency of correct policy decisions requires that two signals be generated and reform chosen if one is reform. This is the outcome generated by the insurance incentives in equilibrium for this range of true priors. However, over the range $[\bar{\lambda}', \bar{\bar{\lambda}}')$ there is no informational lobbying and no information gathering by any agent in equilibrium, despite the fact that the highest frequency of correct policy decisions is achieved when two signals are gathered and reform is chosen if one of those signals is a reform signal. In this case the quality loss is given by $(1 - \lambda)\mu^2 + \lambda\mu(2\mu - 1) > 0$. Over the range $[\bar{\bar{\lambda}}, 1]$ the lobby does not engage in informational lobbying, no information is gathered in equilibrium, and this is welfare maximizing.

Figure 7 reveals that for significant ranges of true priors the lobby engages in informational lobbying when it should and indeed the equilibrium involves the welfare maximizing amount of information gathering. The “problematic” ranges are $[\lambda', \lambda^*)$ and $[\bar{\lambda}', \bar{\bar{\lambda}}')$ and arise from the lobby’s incentives to strategically avoid information gathering.

Since the policymaker only cares about choosing the correct policy in this part of the analysis, that is we assume that $\alpha \rightarrow \infty$, they do not engage in any distortionary strategic behavior. Suppose now we relax this assumption but continue to maintain that social welfare is given by the frequency of correct policy decisions. In essence we reintroduce the policymaker’s incentives to extract resources from the lobby. The question then is what does this imply for social welfare?

³⁶Since $\lambda < \frac{1}{2}$ and $\mu < 1$.

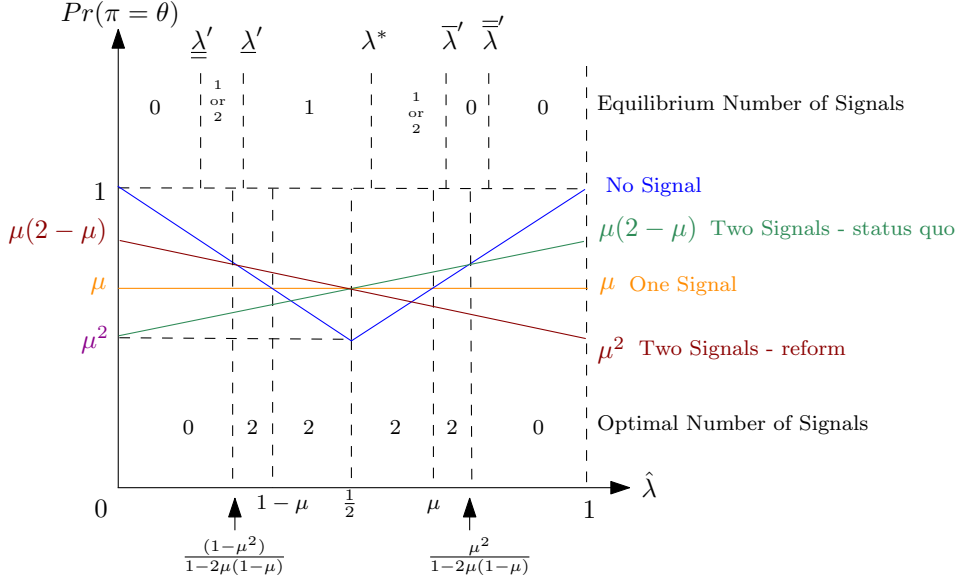


Figure 8: Information Signals and Frequency of Correct Policy Choice for α Finite.

Figure 8 provides some answers to this question.^{37,38}

The effects of reintroducing the policymaker's incentives to strategically extract resources in the form of implementation subsidies from the lobby can be seen best by comparing Figures 7 and 8. A key observation here is that as the policymaker cares relatively less about choosing the correct policy and more about resources, then the range of information gathering expands into the ranges of priors where, in a welfare sense, the policy choice should be based only on the priors. It follows that the frequency of correct policy decisions declines. That is $\underline{\lambda}'$ and $\bar{\lambda}'$ shift leftwards and $\bar{\lambda}'$ and $\bar{\bar{\lambda}}'$ move rightwards.

6 Heterogeneous Signal Accuracies and Costs

In the analysis above, by assuming that all signals were equally accurate and costs identical, we were able to explore the lobby's incentives to strategically manipulate the quantity of information gathering in equilibrium. However, there are clearly scenarios where signal accuracies differ across states and between the signals gathered by the lobby and policymaker.³⁹ It follows that information *quality* can also be strategically manipulated in the lobbying process. Here we focus on the novel results arising from the heterogeneity in signal accuracies and costs. Unless otherwise stated it may be assumed that the conclusions reached in the prior analysis of the homogeneous

³⁷The diagram drawn and results derived are for the case where c is not too large, a restriction that only effects our results concerning changes in the upper limit of information gathering, $\bar{\lambda}'$.

³⁸The diagram is derived by employing our comparative statics results concerning the information gathering thresholds $\underline{\lambda}'$ and $\bar{\lambda}'$ and the reform implementation threshold λ^* .

³⁹For example, a lobby that specializes in a particular industry or issue might receive more accurate signals than the staff of a policymaker that have to evaluate a wider range of issues.

case (except for a few minor quantitative details) continue to hold. We thus do not provide a repetitive taxonomy of results here.⁴⁰

We noted in the homogeneous case that the lobby has both a persuasion motive for lobbying and an insurance motive. When signal accuracies and costs are heterogeneous two further strategic lobbying motives arise and that the insurance motive becomes applicable to a wider range of initial priors. We also note that the relationships between the lobby’s lobbying instruments and information gathering by the policymaker are more complex with heterogeneous costs and signal accuracies. We discuss this in the sections that follow.

6.1 Lobbying of Pessimistic Policymakers: The Insurance Motive

In the homogeneous case we noted that a lobby would only have an insurance motive to lobby optimistic policymakers. The signal x^r guaranteed reform, whereas the signal x^s could be “overturned” by the policymaker receiving the signal z^r giving the lobby a second chance at reform. This argument could not be made for a pessimistic policymaker as homogeneous signals implied that a signal x^s could not be overturned by the signal z^r ; that is the policymaker’s posterior would remain in the pessimistic region. This need not be the case with heterogeneous signals. To see this consider the following; suppose that $\eta^L \rightarrow \frac{1}{2}$ but $\epsilon^L \rightarrow 1$ and that $\lambda \in [\underline{\lambda}, \lambda^*]$. Now we can choose $\eta^p = \epsilon^p$ such that we have $\underline{\lambda} < \lambda(x^s) < \lambda < \lambda^* < \lambda(x^s, z^r) < \bar{\lambda} < \lambda(x^r)$ which is precisely the configuration required for the lobby’s insurance motive to operate. The key is that a lobby’s status quo signal is sufficiently uninformative that it does not move the policymaker’s belief out of the unconvinced region, whereas a reform signal is sufficiently informative so as to guarantee the policymaker is positively convinced. This result that a lobby will engage in informational lobbying of a pessimistic policymaker holds whether or not they are constrained.⁴¹

6.2 The Substitution Motive

For all unconvinced policymakers there are circumstances where a lobby’s signal is decisive in determining policy; that is if the lobby gathers information, the signal pushes the policymaker’s updated belief into one of the convinced regions, $\lambda(x^s) < \underline{\lambda} < \lambda < \bar{\lambda} < \lambda(x^r)$.⁴² The lobby then can simply choose to substitute their own information gathering for that of the policymaker. A choice that is not made in equilibrium with homogeneous costs and signal accuracies.

⁴⁰We refer the interested reader to Appendix A.2 for derivations.

⁴¹Again this looks like “damage control” as discussed by ? and ??, but the implementation subsidy is not a payoff to the policymaker for ignoring a status quo signal, rather it is the indirect cost to the lobby of the policymaker gathering information that offsets an earlier negative signal.

⁴²Clearly, this is true as $\eta^L = \epsilon^L \rightarrow 1$, and more generally will require the lobby’s signals be sufficiently informative relative to the policymaker’s signals.

If the policymaker is unconstrained and receives no implementation subsidy, then the lobby will engage in informational lobbying simply when the likelihood of their receiving a reform signal exceeds that of the policymaker, vis $\lambda\epsilon^L + (1 - \lambda)(1 - \eta^L) > \lambda\epsilon^P + (1 - \lambda)(1 - \eta^P)$.

When the policymaker is constrained such that they cannot afford both information gathering and policy implementation, and hence can expect an implementation subsidy from the lobby, then the lobby will substitute its own information gathering for the policymakers if this is expected payoff maximizing. That is if $\lambda\epsilon^L + (1 - \lambda)(1 - \eta^L) - e^L > \lambda\epsilon^P + (1 - \lambda)(1 - \eta^P)[1 - c - e^P + y^P]$. Which tends to hold if the lobby gathers information at a lower cost, e^L is small, or if the policymaker is less constrained, $c + e^P - y^P$, is smaller.

6.3 Lobbying of Constrained Optimistic Policymakers: The Commitment Motive

In almost all equilibria with homogeneous signals and an unconvinced resource-constrained policymaker information gathering was performed only by the policymaker and the lobby supplied an implementation subsidy.⁴³ If signal accuracies are heterogeneous, there can also be a commitment motive that leads to information gathering by the lobby. The idea is that by depleting their own resources on information gathering the lobby is unable to fund an implementation subsidy to the policymaker. The policymaker then has no incentive to engage in information gathering as they could not then afford to implement the policy. They thus make their policy choice on the basis of their belief updated on the signal generated by the lobby. There are two variants of the equilibria with a commitment motive. The first is a case of *pure commitment* where the lobby strategically depletes its resources by gathering information yet the policymaker's belief remains in the range above λ^* whatever the signal generated by the lobby, that is $\lambda^* < \lambda(x^s) < \lambda < \lambda(x^r)$. This guarantees the policymaker will choose the reform policy. The second case might be termed *impure commitment*, here the signal generated by the lobby may lead to either a reform or status quo policy choice, that is $\lambda(x^s) < \lambda^* < \lambda < \lambda(x^r)$; however, here by strategically preventing information gathering by the policymaker the lobby raises its own expected payoff. The mechanism is as before, by gathering information the lobby depletes its own resources and cannot fund both information gathering and an implementation subsidy to the policymaker. The policymaker thus doesn't gather information. This leads to a smaller expected transfer to the policymaker relative to the case where they gather information and can thus be expected payoff maximizing for the lobby. A clear case where the expected transfer declines is where the policymaker's information

⁴³The exception being when the insurance motive was in effect.

gathering cost, e^P , is sufficiently large.

The strategic incentive to waste resources in this scenario is different to the traditional notion of “burning money” in signaling and access models where a lobby is trying to enhance its credibility with costly signals (??, ??) or trying to get the policymaker’s attention with contributions (??, ?, ??, ?). Somewhat surprisingly, if the lobby does not choose to gather information, then the range of priors for which the policymaker investigates is unchanged from the unconstrained case. This follows from the fact that the policymaker correctly anticipates a policy subsidy that will relax their budget constraint in the last stage of the game.

7 Implications of the Analysis

Here we relate our results to the open questions in the literature, to the empirical facts, and to the anecdotal evidence concerning current lobbying practices. We conclude that several of our predictions are in line with the evidence and that our theoretical model explains why some aspects of lobbying have proven to be controversial amongst well informed experts in the field.

7.1 Who is Lobbied and When?

Consider first the question of which policymakers get lobbied. Our results indicate that ex-ante there is relatively little that can be said about which policymaker will get lobbied simply on the basis of their prior policy positions. Clearly, policymakers with priors sufficiently extreme such that no available information signal will change their policy choice are not subject to informational lobbying. However, extremist “friends”, our positively convinced policymakers, are given implementation subsidies if they require them. The reason why sweeping ex-ante statements cannot be made is because the lobby’s decision of whether or not to lobby depends on the policymaker’s priors, the availability and location of resources in the lobbying process and the relative accuracy and costs of information gathering. However, if we provide a more nuanced answer to this question, we are able to conclude that lobbies lobby policymakers that they expect to become or confirm as their friends ex-post. Broadly, they engage in informational lobbying with policymakers whose probability of choosing reform is increased by being lobbied, and supply implementation subsidies to those who would choose reform were their resource constraints loosened.

In an informational environment where the lobby and policymaker receive similar homogeneous signals, perhaps from a given “expert” source (such as an expert body or think tank), we know that negatively convinced and optimistic policymakers will be subject to informational lobbying. If informational signals are sufficiently accurate such that the insurance motive is in operation, we

predict a discontinuity in informational lobbying. There will be range of intermediate unconvinced pessimistic policymaker priors for which the lobby will offer no information. However, only ex-post friends, those that support reform, are given policy implementation subsidies.

In a heterogeneous informational and/or cost environment, one for example where the lobby and policymaker have their own separate information sources, there will tend to be more informational lobbying than in a homogeneous environment. In such an environment both the commitment, substitution and insurance motives for informational lobbying operate. Most noticeable are the insurance and substitution motives which induce the the lobby to engage in informational lobbying of pessimistic policymakers.

? review empirical studies on lobbying activities and show that many conclude that lobbies mostly lobby policymakers who favor their preferred policy. However, they also note that there are empirical studies that show that lobbies approach opposing policymakers in an attempt to change their initial positions (??, ?), this is generally consistent with our analysis of both informational lobbying and implementation subsidies. In our analysis a lobby engages in informational lobbying with an opposing policymaker to gain their support or to induce them to gather further information. If the policymaker is also resource constrained and does not have sufficient resources for a policy change, then the lobby, if its resources are sufficient, would also provide an implementation subsidy and actually support the policymaker throughout the political process. This is also consistent with ?’s case study of Merck discussed in the introduction.

Other empirical studies document that undecided, or moderate, policymakers are lobbied (??, ?). In our analysis a lobby approaches these policymakers when informational lobbying is relatively inexpensive and persuasive enough to determine their policy choice. Implementation subsidies, as a sole lobbying strategy, would be provided if a moderate policymaker has, from the lobby’s perspective, an accurate information technology but not sufficient resources to implement reform. Finally, there is also the evidence that lobbies support friendly policymakers (?, ?, ?, ?, ?, ?). In our analysis friendly policymakers are lobbied via policy subsidies when they have insufficient resources to implement a policy, which is similar to ?.

7.2 Resource-Constrained Lobby: A Strategic Disadvantage?

? famously asked, “why is there so little money in politics?” this is a question that has been frequently repeated both in the context of campaign contributions and lobbying expenditures.⁴⁴ In the context of our model of lobbying the answer is that having limited resources can be a strate-

⁴⁴For recent discussions of money in lobbying and politics see ? and ?.

gic advantage. Most obviously, an unconstrained policymaker never receives an implementation subsidy from a lobby but a constrained one does. From the perspective of a lobby, when faced with an optimistic policymaker, resources, either their own or the policymakers, are undesirable. In the absence of more information a policymaker would choose reform, but resources buy more information. The only contexts where more resources in the lobbying process are desirable from the lobby's perspective is when they allow the purchase of a second signal that acts as insurance to an induced information gathering by an initially negatively convinced policymaker.

The answer to the question whether the lobby gains or loses a strategic advantage when it is resource-constrained is, "it depends." Specifically, it depends specifically on the policymaker's prior and the accuracy of information signals. When the policymaker is negatively convinced and the information technology not very effective (Case C1), then a constrained lobby is worse off as a potential reform is no longer feasible with given resources. However, when the policymaker is negatively convinced and the information technology is at least intermediate (case C2), then the constrained lobby gains as the necessary threshold to induce a reform is λ^* instead of $\bar{\lambda}'$. Furthermore, when the insurance motive is in play (case C3), then the resource-constrained lobby is worse-off as a second information signal is no longer feasible; but when the substitution and commitment motives are in play (case C4 and case C4'), then the resource-constrained lobby again gains from the lower threshold to induce reform of λ^* instead of $\bar{\lambda}'$.

7.3 Relationships Between Information and Implementation Subsidies

We have identified persuasion, commitment, insurance, and substitution motives for informational lobbying. While an implementation subsidy is made whenever the policymaker has the ex-post will but not resources to enact reform. These different motives arise with different combinations of resource constraints, signal accuracies, and signal costs implying different predicted relationships between the lobby's lobbying instruments and policymaker's information gathering. These can be thought of as substitutes, complements, or independent in the sense that the choice of information gathering by the lobby influences information gathering by the policymaker, and both influence implementation subsidies.

We can state that information gathering by the lobby and policymaker are complements whenever the insurance or persuasion motives are in operation; they are substitutes whenever the commitment or substitution motives are in operation; and they are independent otherwise.⁴⁵The

⁴⁵Complementarity between money and information in lobbying is common in costly access models (??, ?, ??) or costly signaling models (?, ??). Substitutability often arises in models where each instrument may have a different effectiveness depending on information or policymakers' preferences (?, ??, ??).

| Case | Beliefs | Lobby Signal | Policymaker Unconstrained | | Policymaker Constrained | | Policymaker and Lobby Constrained | |
|------|--|-----------------|------------------------------|--------------------|----------------------------|--------------------|---|---------------------|
| | | | PM Info | Info R'ship | PM Info | Info R'ship | PM Info | Info R'ship |
| C1 | $\lambda < \underline{\lambda} \leq \lambda(x^r) < \bar{\lambda}$ | x^s | × | Ind | × | Ind | | n/a |
| | | x^r | ✓ | Compl ⁺ | ✓ | Compl ⁺ | | |
| C2 | $\lambda < \underline{\lambda} < \bar{\lambda} \leq \lambda(x^r)$ | x^s | × | Ind | × | Ind | × | Ind |
| | | x^r | × | Ind | × | Ind | × | Ind |
| C3 | $\underline{\lambda} \leq \lambda(x^s) \leq \lambda \leq \bar{\lambda} \leq \lambda(x^r)$ | x^s | ✓ | Compl [*] | ✓ | Compl [*] | | n/a |
| | | x^r | × | Ind | × | Ind | | |
| C4 | $\lambda(x^s) \leq \underline{\lambda} \leq \lambda \leq \bar{\lambda} \leq \lambda(x^r)$ | x^s | × | Subs ^{**} | × | Subs ^{**} | × | Subs ^{**} |
| | | x^r | × | Subs ^{**} | × | Subs ^{**} | × | Subs ^{**} |
| C4' | $\underline{\lambda} < \lambda^* < \lambda(x^s) < \lambda < \{\bar{\lambda}, \lambda(x^r)\}$ | x^s | | | | | × | Subs ^{***} |
| | | x^r | | n/a | | | × | Subs ^{***} |

Legend: Compl - Complements, Subs - Substitutes, Ind - Independent, ⁺ - Persuasion motive, ^{*} - Insurance motive, ^{**} - Substitution motive, ^{***} - Commitment motive, n/a - not applicable, $\lambda \in \{\lambda, \lambda'\}$ as defined appropriately for each case.

Table 1: Relationships between Policymaker's and Lobby's Information Gathering.

details may be found in Table 1. Cases C1-C4 are exactly as introduced in Figure 5, case C4' is the situation where the commitment motive is in operation.

In a similar vein the details of the circumstances when the lobby supplies an implementation subsidy may be found in Table 2. Table 2 allows us to describe when a policymaker is lobbied and how. First, consider when a lobby uses both lobbying instruments. These are represented by the grey shaded cells in the table with checkmarks (✓) within them. This occurs in two circumstances in both of which the lobby is resource rich and the policymaker constrained; in the case C1 the lobby faces an initially negatively convinced policymaker and gathers information to try to persuade them to consider reform. If they receive a reform signal, this induces the policymaker to gather information; and if they too receive a reform signal, enact a reform policy financed by an implementation subsidy; in the case C3 the lobby faces an unconvinced policymaker and gathers information because of the insurance motive; if they receive a status quo signal, then the policymaker gathers information; and if this signal is reform, enacts a reform policy financed by an implementation subsidy. Next consider when the lobby employs only informational lobbying, these are represented by the green shaded cells in the table. We can see that for ten of the seventeen sub-cases analyzed there is only informational lobbying. Whenever the lobby gathers information that gives a signal leading to the policymaker being either positively or negatively convinced, loosely when the lobby's signal is very persuasive, then no implementation subsidy is required. Alternatively, if the lobby's signal leaves the policymaker unconvinced but they themselves generate a status quo signal, then there will be no implementation subsidy and there will be no reform policy. The only other case is C4' where a lobby deliberately gathers poor quality information as a commitment device so as to not supply an implementation subsidy. Here an optimistic policymaker adopts a reform policy essentially on the basis of their original prior.

There are several cases where a lobby only provides an implementation subsidy. These are

| | | Implementation Subsidy | | | | |
|---|---|------------------------|--------------|-------------------|-------------------|---------------------------|
| Case | Beliefs | Lobby Signal | PM Signal | No Constraints | PM Constrained | PM & Lobby Constrained |
| C1 | $\lambda < \underline{\lambda} \leq \lambda(x^r) < \bar{\lambda}$ | x^s | X | X | X | X |
| | | x^r | z^s | X | X | n/a |
| | | | z^r | X | ✓ | |
| | | x^{r*} | X | n/a | X | |
| C2 | $\lambda < \underline{\lambda} < \bar{\lambda} \leq \lambda(x^r)$ | x^s | X | X | X | X |
| | | x^r | X | X | X | X |
| C3 | $\underline{\lambda} \leq \lambda(x^s) \leq \lambda \leq \bar{\lambda} \leq \lambda(x^r)$ | x^s | z^s | X | X | n/a |
| | | x^r | z^r | X | ✓ | |
| | | | x^r | X | X | X |
| | | X | z^s | X | X | X |
| C4 | $\lambda(x^s) \leq \underline{\lambda} \leq \lambda \leq \bar{\lambda} \leq \lambda(x^r)$ | x^s | X | X | X | X |
| | | x^r | X | X | X | X |
| | | X | z^s | X | X | X |
| | | | z^r | X | ✓ | ✓ |
| C4' | $\underline{\lambda} < \lambda^* < \lambda(x^s) < \lambda < \lambda(x^r) < \bar{\lambda}$ | x^s | X | n/a | ✓ | X |
| | | x^r | X | | | X |
| | | | | | | |
| Legend: n/a - not applicable, * - when $\lambda(x^r) > \lambda^*$, $\lambda \in \{\lambda, \lambda'\}$ as defined appropriately for each case. | | | | | | |

Table 2: Relationships Between Information Gathering and Implementation Subsidies.

represented by the orange shaded cells in the table with checkmarks (✓) within them. These are cases where the policymaker is initially unconvinced and will gather information themselves if the lobby does not provide any. If either the policymaker is more likely than the lobby to generate a reform signal and/or the cost of their information gathering is lower, then the lobby will prefer to supply an implementation subsidy rather than information to a constrained policymaker.

7.4 Conclusion

We have analyzed a model of informational lobbying that combines various features of observed lobbying activities and politics. A policymaker can gather their own costly information or rely on the information provided by a lobby; and the policymaker can use their own resources to implement a policy change or use legislative subsidies supplied by the lobby. Incorporating these wider trade-offs into our analysis, we show that legislative subsidies have a role beyond the traditional view of allowing policymakers to consider more policies. Legislative subsidies in the form of information and implementation subsidies can allow unconvinced policymakers to gather their own information and subsequently reconsider their positions by strategically taking advantage of interest groups' resources. However, we also illustrated how lobbies with different endowments can gain strategic advantages in the policy making process and take advantage of resource-constrained policymakers.

Our study has also shown that a lobby engages in informational lobbying to influence a policymaker who is either negatively convinced or inclined to gather further information, and provides policy implementation subsidies to a policymaker who is *ex ante* either negatively convinced or willing to gather further information – rather than to their initial “friends”. Allowing for a wider space of strategies, we explain many observed lobbying activities and identify under which cir-

cumstances information and policy implementation subsidies are complements, substitutes, or independent. Furthermore, we showed that tracking only financial records such as campaign contributions and lobbying reports' revenues by policymaker name, and correlating this information with changes in policymakers' positions, may appear to reveal bribery or capture when in fact this is a consequence of further information acquisition funded by lobbies' policy subsidies.

Our model provides several novel implications for the understanding of lobbying, and, we believe that it can be extended in various ways. One interesting extension would be to consider the lobby's and policymaker's choice of expertise, and how expertise is allocated across lobbies and policymakers who may rely partially or fully on lobbies. Another extension would be to consider how lobbies collect funds and thus resource constraints may arise endogenously.

References

- ANSOLABEHERE, S., J. M. DE FIGUEIREDO, AND J. M. SNYDER (2003): "Why is There so Little Money in U.S. Politics," *Journal of Economic Perspectives*, 17, 105–130.
- AUSTEN-SMITH, D. (1995): "Campaign Contributions and Access," *American Political Science Review*, 89, 566–581.
- (1998): "Allocating Access for Information and Contributions," *Journal of Law, Economics, and Organization*, 14, 277–303.
- AUSTEN-SMITH, D. AND J. S. BANKS (2000): "Cheap Talk and Burned Money," *Journal of Economic Theory*, 91, 1–16.
- (2002): "Costly Signaling and Cheap Talk in Models of Political Influence," *European Journal of Political Economy*, 18, 263–280.
- AUSTEN-SMITH, D. AND J. WRIGHT (1994): "Counteractive Lobbying," *American Journal of Political Science*, 38, 25–44.
- (1996): "Theory and Evidence for Counteractive Lobbying," *American Journal of Political Science*, 40, 543–564.
- BANK, H. (2008): "Kallas will Leihbeamte aus der Kommission entfernen," *Lobby Control*, online, April 15 2008.
- BAUMGARTNER, F. R., J. M. BERRY, M. HOJNACKI, D. C. KIMBALL, AND B. L. LEECH (2009): *Lobbying and Policy Change: Who Wins, Who Loses, and Why*, Chicago, IL: The University of Chicago Press.
- BENNEDSEN, M. AND S. FELDMANN (2006): "Informational Lobbying and Political Contributions," *Journal of Public Economics*, 90, 631–656.

- BERTRAND, M., M. BOMBARDINI, AND F. TREBBI (2014): “Is It Whom You Know or What You Know? An Empirical Assessment of the Lobbying Process,” *American Economic Review*, 104, 3885–3920.
- BLANES I VIDAL, J., M. DRACA, AND C. FONS-ROSEN (2012): “Revolving Door Lobbyists,” *American Economic Review*, 102, 3731–3748.
- BULL, J. AND J. WATSON (2004): “Evidence Disclosure and Verifiability,” *Journal of Economic Theory*, 118, 1–31.
- (2007): “Hard Evidence and Mechanism Design,” *Games and Economic Behavior*, 58, 75–93.
- CONGLETON, R. D., A. L. HILLMAN, AND K. A. KONRAD, eds. (2008): *40 Years of Research on Rent Seeking*, vol. 1-2, Berlin, Germany: Springer.
- COTTON, C. (2009): “Should We Tax or Cap Political Contributions? A Lobbying Model with Policy Favors and Access,” *Journal of Public Economics*, 93, 831–842.
- (2012): “Pay-to-Play Politics: Informational Lobbying and Contribution Limits when Money Buys Access,” *Journal of Public Economics*, 96, 369–386.
- (2016): “Competition for Attention: Lobbying Time-Constrained Politicians,” *Journal of Public Economic Theory*, 18, 642–665.
- COTTON, C. AND A. DELLIS (2016): “Informational Lobbying and Agenda Distortion,” *Journal of Law, Economics, and Organization*, 32.
- COTTON, C. AND C. LI (2018): “Clueless Politicians,” *Journal of Law, Economics, and Organization*, 34, 425–456.
- CRAWFORD, V. P. AND J. SOBEL (1982): “Strategic Information Transmission,” *Econometrica*, 50, 1431–1451.
- CURRY, J. M. (2015): *Legislating in the Dark: Information and Power in the House of Representatives*, Chicago, IL: Chicago University Press.
- DAHM, M. AND N. PORTEIRO (2008a): “Informational Lobbying under the Shadow of Political Pressure,” *Social Choice and Welfare*, 30, 531–559.
- (2008b): “Side Effects of Campaign Finance Reform,” *Journal of the European Economic Association*, 6, 1057–1077.
- DALEY, B. AND E. SNOWBERG (2009): “Even if it is not Bribery: The Case for Campaign Finance Reform,” *Journal of Law, Economics, and Organization*, 27, 324–349.
- DE FIGUEIREDO, J. M. AND C. M. CAMERON (2008): “Endogenous Cost Lobbying: Theory and Evidence,” *mimeo*.
- DE FIGUEIREDO, J. M. AND B. K. RICHTER (2014): “Advancing the Empirical Research on Lobbying,” *Annual Review of Political Science*, 17, 163–185.
- DELLIS, A. AND M. OAK (2016): “Overlobbying and Pareto-Improving Agenda Constraint,” *mimeo*.
- DRUTNAM, L. (2015): *The Business of America is Lobbying: How Corporations Became Politicized and Politics Became More Corporate*, New York, NY: Oxford University Press.
- EGGERS, A. C. AND J. HAINMUELLER (2009): “MPs for Sale? Returns to Office in Postwar British Politics,” *American Political Science Review*, 103, 513–533.
- ESTERLING, K. M. (2004): *The Political Economy of Expertise: Information and Efficiency in American National Politics*, Ann Arbor, MI: University of Michigan Press.
- FELLI, L. AND A. MERLO (2007): “If You Cannot Get Your Friends Elected, Lobby Your Enemies,” *Journal of the European Economic Association*, 5, 624–635.

- GATHMANN, F. AND N. WEISENSEE (2007): “Lobbyisten-Liste enthüllt Einfluss in Ministerien,” *Spiegel Online*, online, July 26 2007.
- GREGOR, M. (2017): *State, Institutions and Democracy - Contributions in Political Economy*, Springer International Publishing, chap. Lobbying Mechanisms, 17–52.
- GROLL, T. AND C. J. ELLIS (2014): “A Simple Model of the Commercial Lobbying Industry,” *European Economic Review*, 70, 299–316.
- (2017): “Repeated Lobbying by Commercial Lobbyists and Special Interests,” *Economic Inquiry*, 55, 1868–1897.
- GROSSMAN, G. AND E. HELPMAN (1994): “Protection for Sale,” *American Economic Review*, 84, 833–850.
- (2001): *Special Interest Politics*, Cambridge, MA: MIT Press.
- HALL, R. L. (1996): *Participation in Congress*, New Haven, CT: Yale University Press.
- HALL, R. L. AND A. V. DEARDORFF (2006): “Lobbying as Legislative Subsidy,” *American Political Science Review*, 100, 69–84.
- HALL, R. L. AND K. C. MILER (2008): “What Happens After the Alarm? Interest Group to Legislative Overseers,” *Journal of Politics*, 70, 990–1005.
- HALL, R. L. AND F. W. WAYMAN (1990): “Buying Time: Moneyed Interests and the Mobilization of Bias in Congressional Committees,” *American Political Science Review*, 84, 797–820.
- HOJNACKI, M. AND D. KIMBALL (1998): “Organized Interests and the Decision of Whom to Lobby in Congress,” *American Political Science Review*, 92, 775–790.
- HOJNACKI, M. AND D. C. KIMBALL (1999): “The Who and How of Organizations’ Lobbying Strategies in Committee,” *Journal of Politics*, 61, 999–1024.
- (2001): “PAC Contributions and Lobbying Contacts in Congressional Committees,” *Political Research Quarterly*, 54, 161–180.
- HUNEEUS, F. AND I. S. KIM (2018): “The Effects of Firms’ Lobbying on Resource Misallocation,” *mimeo*.
- IGAN, D. AND P. MISHRA (2014): “Wall Street, Capitol Hill, and K Street,” *Journal of Law and Economics*, 57, 1063–1084.
- KOLLMAN, K. (1997): “Inviting Friends to Lobby: Interest Groups, Ideological Bias, and Congressional Committees,” *American Journal of Political Science*, 41, 519–544.
- LESSIG, L. (2011): *Republic, Lost: How Money Corrupts Congress and a Plan to Stop It*, New York, NY: Hachette Book Group.
- LIPTON, E. AND B. PROTESS (2013): “Banks’ Lobbyists Help in Drafting Financial Bills,” *The New York Times*, May 23 2013.
- LOHMANN, S. (1995): “Information, Access, and Contributions: A Signaling Model of Lobbying,” *Public Choice*, 85, 267–284.
- MELLO, M., S. ABIOLA, AND J. COLGROVE (2012): “Pharmaceutical Companies’ Role in State Vaccination Policymaking: The Case of Human Papillomavirus Vaccination,” *American Journal of Public Health*, 102, 893–898.
- MIAN, A., A. SUFI, AND F. TREBBI (2010): “The Political Economy of the US Mortgage Default Crisis,” *American Economic Review*, 100, 1449–1496.
- (2013): “The Political Economy of the Subprime Mortgage Credit Expansion,” *Quarterly Journal of Political Science*, 8, 373–408.
- MILGROM, P. AND J. ROBERTS (1986): “Relying on the Information of Interested Parties,” *RAND Journal of Economics*, 17, 18–32.

- MOSES, H., E. R. DORSEY, D. H. M. MATHESON, AND S. O. THIER (2005): “Financial Anatomy of Biomedical Research,” *Journal of the American Medical Association*, 294, 1333–1342.
- NOWNES, A. J. (2013): *Interest Groups in American Politics: Pressure and Power*, New York, NY: Routledge, 2nd ed.
- OLSON, M. (1965): *The Logic of Collective Action: Public Goods and the Theory of Groups*, Cambridge, MA: Harvard University Press.
- PEAR, R. (2009): “In House, Many Spoke With One Voice: Lobbyists,” *The New York Times*, November 15 2009.
- PERSSON, T. AND G. TABELLINI (2000): *Political Economics: Explaining Economic Policy*, Cambridge, MA: MIT Press.
- PETERSEN, R. E., P. H. REYNOLDS, AND A. H. WILHELM (2010): “House of Representatives and Senate Staff Levels in Member, Committee, Leadership, and Other Offices, 1977-2010,” *Congressional Research Service*, Washington, DC.
- POTTERS, J. AND F. VAN WINDEN (1992): “Lobbying and Asymmetric Information,” *Public Choice*, 74, 269–292.
- RASMUSEN, E. (1993): “Lobbying When the Decisionmaker Can Acquire Independent Information,” *Public Choice*, 77, 899–913.
- SCHNAKENBERG, K. E. (2017): “Informational Lobbying and Legislative Voting,” *American Journal of Political Science*, 61, 129–145.
- SCHNAKENBERG, K. E. AND R. TURNER, IAN (2018): “Signaling with Reform: How the Threat of Corruption Prevents Informed Policymaking,” *mimeo*.
- TULLOCK, G. (1972): “The Purchase of Politicians,” *Western Economic Journal*, 10, 354–355.

A Appendix

A.1 Proofs

A.1.1 Proof of Lemma 1

The lower threshold $\underline{\lambda}$ follows from the policymaker's trade-off between the expected payoff from costly information with uncertain information signal and policy outcome and the expected payoff from the costless status quo without information choice. Note that the policymaker considers the posterior belief about the state of the world, $\lambda^P(z)$, for the expected payoff associated with the expected information signal, $z(\lambda)$.⁴⁶ The policymaker gathers information if

$$z^r(\lambda^L) [y^P - c + \lambda^P(z^r)\alpha] + z^s(\lambda^L) [y^P + (1 - \lambda^P(z^s))\alpha] - e \geq y^P + (1 - \lambda^L)\alpha. \quad (\text{A.1})$$

Applying each information signal's probability with $\epsilon^P = \epsilon^L = \eta^P = \eta^L \equiv \mu$, the updating choice reduces to

$$\lambda^L \geq \frac{(1 - \mu)(\alpha + c) + e}{\alpha + c(1 - 2\mu)} \equiv \underline{\lambda}, \quad (\text{A.2})$$

which defines the lower updating threshold. Note that $\underline{\lambda} > 0$ because of $\alpha > c$ and $0 < 1 - 2\mu < 1$.

The upper threshold $\bar{\lambda}$ follows from the policymaker's trade-off between the expected payoff from costly information with uncertain information signal and policy outcome and the expected payoff from a costly reform without gathering information. The policymaker gathers information if

$$z^r(\lambda^L) [y^P - c + \lambda^P(z^r)\alpha] + z^s(\lambda^L) [y^P + (1 - \lambda^P(z^s))\alpha] - e \geq y^P - c + \lambda^L\alpha. \quad (\text{A.3})$$

Solving for λ^L , we can write for $\epsilon^P = \epsilon^L = \eta^P = \eta^L \equiv \mu$

$$\lambda^L \leq \frac{\mu(\alpha + c) - e}{\alpha + c(2\mu - 1)} \equiv \bar{\lambda}, \quad (\text{A.4})$$

which defines the upper updating threshold.

Existence of Updating Range The updating range exists iff $\underline{\lambda} < \min\{\bar{\lambda}, 1\}$. Solving for $\underline{\lambda} < \bar{\lambda}$, we get

$$(\alpha^2 - c^2)(2\mu - 1) - 2\alpha e > 0. \quad (\text{A.5})$$

That this interval exists requires that: μ is sufficiently high, $\alpha > c$, and e is sufficiently low. For a numerical example consider $\alpha = 0.8$, $c = e = 0.1$, and $\mu = 0.75$ for $\underline{\lambda} \approx 0.433$, $\lambda^* = 0.5625$, and $\bar{\lambda} \approx 0.676$.

⁴⁶In other words, the policymaker solves the Monty Hall problem rationally.

A.1.2 Proof of Proposition 1

The lobby's lobbying decision follows from the policymaker's thresholds $\underline{\lambda}$ and $\bar{\lambda}$ described in Lemma 1 and the four possible informational lobbying cases of C1, C2, C3, and C4. For all four cases we apply $\epsilon^P = \epsilon^L = \eta^P = \eta^L \equiv \mu$ and $e^P = e^L \equiv e$.

For the first case C1 with $\lambda \leq \underline{\lambda} \leq \lambda(x^r) \leq \bar{\lambda}$ the lobbyist finds it beneficial to gather information if $x^r(\lambda)z^r(\lambda(x^r)) \geq e$, which using (B.1) and (B.5) implies

$$(\mu - 1)^2 + \lambda(2\mu - 1) \geq e. \quad (\text{A.6})$$

We are using the characterization of (A.6) to describe the lobby's net payoff function from informational lobbying and denote this with $\gamma(\cdot)$ which is then $\gamma_1 = \gamma(\cdot)$ for C1. The comparative

statics for the lobby's net payoff are simply $\gamma_1 = \gamma \left(\underbrace{e}_{(-)}, \underbrace{\mu}_{(+/-)}, \underbrace{\lambda}_{(+)} \right)$.

For case C2 with $\lambda \leq \underline{\lambda} \leq \bar{\lambda} \leq \lambda(x^r)$ a lobby's reform signal would induce a policymaker to implement reform without further gathering of information. The lobby finds it beneficial to provide an information signal if $x^r(\lambda) \geq e^L$, which using (B.1) implies

$$1 - \mu - \lambda(1 - 2\mu) \geq e. \quad (\text{A.7})$$

The comparative statics for the lobby's net payoff are simply $\gamma_2 = \gamma \left(\underbrace{e}_{(-)}, \underbrace{\mu}_{(+/-)}, \underbrace{\lambda}_{(+)} \right)$.

For case C3 with $\underline{\lambda} \leq \lambda(x^s) \leq \lambda \leq \bar{\lambda} \leq \lambda(x^r)$ the policymaker would gather information if the lobby gathered a status quo signal, and would reform without gathering information if the lobby gathered a reform signal. The lobby thus chooses to gather information if $x^r(\lambda) + x^s(\lambda)z^r(\lambda(x^s)) - e^L \geq z^r(\lambda)$. We consider two possibilities: i) an initially pessimistic policymaker, $\underline{\lambda} < \lambda < \lambda^* < \bar{\lambda}$, and ii) an initially optimistic policymaker, $\underline{\lambda} < \lambda^* < \lambda < \bar{\lambda}$.

If the policymaker is initially pessimistic, $\underline{\lambda} < \lambda < \lambda^*$, and the signal likelihoods are identical, then a status quo signal by the lobby cannot be offset by a reform signal gathered by the policymaker: $\lambda(x^s) < \lambda$ and $\lambda(x^s) < \lambda(x^s, z^r) < \lambda$. In other words, the more expected information signal affects a Bayesian policymaker stronger than a less expected event and therefore the status quo signal cannot be offset and the policymaker would not reform, $\lambda(x^s, z^r) < \lambda < \lambda^*$. Hence, the informational lobbying case C3 does not exist for $\underline{\lambda} < \lambda < \lambda^*$.

If the policymaker is initially optimistic, $\underline{\lambda} < \lambda^* < \lambda \leq \bar{\lambda}$, and the signal likelihoods are identical, then a status quo signal by the lobby could be offset by a reform signal gathered by the policymaker: $\lambda(x^s) < \lambda$ but $\lambda(x^s, z^r) > \lambda$ and $\lambda(x^s, z^r) \geq \lambda^*$. In other words, the more

expected information signal affects a Bayesian policymaker stronger than a less expected event and therefore the status quo signal can be more than offset. The lobby thus chooses to gather information if $x^r(\lambda) + x^s(\lambda)z^r(\lambda(x^s)) - e \geq z^r(\lambda)$ with $x^r(\lambda) = z^r(\lambda)$, which implies, using (B.1), (B.2), and (B.6), that

$$\mu - \mu^2 \geq e. \quad (\text{A.8})$$

The comparative statics for the lobby's net payoff are simply $\gamma_3 = \gamma \left(\underbrace{e}_{(-)}, \underbrace{\mu}_{(-)}, \underbrace{\lambda}_{(0)} \right)$.

Finally, for case C4 with $\lambda(x^s) \leq \underline{\lambda} \leq \lambda \leq \bar{\lambda} \leq \lambda(x^r)$, if the lobby gathers information, then the policymaker will not and the signal that the lobby gathered will determine the policy choice. In such a situation the lobby gathers information if $x^r(\lambda) - e \geq z^r(\lambda)$. However, if the signal likelihoods are identical and therefore the probabilities of reform signals, $x^r(\lambda) = z^r(\lambda)$, then the lobby abstains from costly information gathering and only the policymaker collects information.

A.1.3 Proof of Proposition 2

The lower threshold $\underline{\lambda}'$ follows again from the policymaker's trade-off between the expected payoff from costly information with uncertain information signal and policy outcome and the expected payoff from the costless status quo without gathering information. Note that the policymaker anticipates a policy implementation subsidy of $\tau = e + c - y^P$ in the case of a reform signal and zero otherwise. The policymaker gathers information for $\epsilon^P = \epsilon^L = \eta^P = \eta^L \equiv \mu$ if

$$\begin{aligned} z^r(\lambda^L) [y^P - e - c + \tau(z^r) + \lambda^P(z^r)\alpha] + z^s(\lambda^L) [y^P - e + \tau(z^s) + (1 - \lambda^P(z^s))\alpha] &\geq y^P + (1 - \lambda^L)\alpha \\ \Rightarrow z^r(\lambda^L)\lambda^P(z^r)\alpha + z^s(\lambda^L) [y^P - e + (1 - \lambda^P(z^s))\alpha] &\geq y^P + (1 - \lambda^L)\alpha. \end{aligned} \quad (\text{A.9})$$

Applying each information signal's probability, the updating choice reduces to

$$\lambda^L \geq \frac{(1 - \mu)(\alpha + y^P) + \mu e}{\alpha + (y^P - e)(1 - 2\mu)} \equiv \underline{\lambda}', \quad (\text{A.10})$$

which defines the new lower updating threshold.

The upper threshold $\bar{\lambda}'$ follows again from the policymaker's trade-off between costly information and costly reform without gathering information. The policymaker gathers information if

$$\begin{aligned} z^r(\lambda^L) [y^P - e - c + \tau(z^r) + \lambda^P(z^r)\alpha] + z^s(\lambda^L) [y^P - e + \tau(z^s) + (1 - \lambda^P(z^s))\alpha] &\geq y^P - c + \lambda^L\alpha \\ \Rightarrow z^r(\lambda^L)\lambda^P(z^r)\alpha + z^s(\lambda^L) [y^P - e + (1 - \lambda^P(z^s))\alpha] &\geq y^P - c + \lambda^L\alpha. \end{aligned} \quad (\text{A.11})$$

Solving for λ^L , we can write

$$\lambda^L \leq \frac{c + \mu(\alpha - e + y^P) - y^P}{\alpha + (y^P - e)(2\mu - 1)} \equiv \bar{\lambda}', \quad (\text{A.12})$$

which defines the new upper updating threshold.

Comparison of Thresholds For the comparison of the lower thresholds we have for $\underline{\lambda} - \underline{\lambda}' \geq 0$, using (A.2) and (A.10) such that

$$\begin{aligned} \frac{(1-\mu)(\alpha+c)+e}{\alpha+c(1-2\mu)} - \frac{(1-\mu)(\alpha+y^P)+\mu e}{(y^P-e)(1-2\mu)+\alpha} &\geq 0 \\ \frac{\overbrace{(c+e-y^P)}^{(+)} \overbrace{(e(2\mu-1)+2\alpha(1-\mu)\mu)}^{(+)} \overbrace{(\alpha-c(2\mu-1))}^{(+)}}{\underbrace{(\alpha+c(2\mu-1))}_{(a)} \underbrace{(\alpha+(y^P-e)(1-2\mu))}_{(b)}} &\geq 0 \\ (a) : \alpha > c \Rightarrow (+) \quad \text{and} \quad (b) : \alpha > c > y^P - e \Rightarrow (+) \\ \Rightarrow \underline{\lambda} - \underline{\lambda}' > 0 &\Leftrightarrow \underline{\lambda} > \underline{\lambda}'. \end{aligned} \quad (\text{A.13})$$

For the comparison of the upper thresholds we have $\bar{\lambda} - \bar{\lambda}' \geq 0$, using (A.4) and (A.12) such that

$$\begin{aligned} \frac{\mu(\alpha+c)-e}{\alpha+c(2\mu-1)} - \frac{c+\mu(\alpha-e+y^P)-y^P}{\alpha-2e\mu+e+(2\mu-1)y^P} &\geq 0 \\ - \frac{(c+e-y^P)(\alpha+c(2\mu-1)-2\mu(-\alpha\mu+\alpha+e)+e)}{(\alpha+c(2\mu-1))(\alpha-2e\mu+e+(2\mu-1)y^P)} \\ - \frac{\overbrace{(c+e-y^P)}^{(+)} \overbrace{(c(2\mu-1))}^{(+)} \overbrace{(\alpha(1+2\mu^2-2\mu)+e(1-2\mu))}^{(c)}}{\underbrace{(\alpha+c(2\mu-1))}_{(+)} \underbrace{(\alpha+(2\mu-1)(y^P-e))}_{(+)}} &\geq 0 \\ (c) : \alpha > e \text{ and } \frac{1}{2} < \mu \leq 1 \Rightarrow \alpha + 2\mu\alpha^2 - 2\mu\alpha + e - 2\mu e > 0 \\ \Rightarrow \bar{\lambda} - \bar{\lambda}' < 0 &\Leftrightarrow \bar{\lambda} < \bar{\lambda}'. \end{aligned} \quad (\text{A.14})$$

A.1.4 Proof of Proposition 3

The lobby's lobbying decision follows from the policymaker's thresholds described in Proposition 2 and the four possible informational lobbying cases.

For the lobby's problem to lobby a negatively convinced policymaker we have that a reform signal would induce the policymaker to gather information or to implement an immediate reform – i.e., $\lambda < \underline{\lambda}' \leq \lambda(x^r) < \bar{\lambda}'$ and $\lambda < \underline{\lambda}' < \bar{\lambda}' \leq \lambda(x^r)$. For the first case C1 a lobbyist compares the expected payoff from gathering information and a potential second information gathering with the one from no reform with certainty. The lobby gathers information with $\tau(z)$ from (4.1) if

$$\begin{aligned}
x^r(\lambda)z^r(\lambda)(1-\tau(z)) &\geq e \\
\frac{(\mu^2\lambda + (1-\mu)^2(1-\lambda))(1-c+y^P)}{(\mu^2\lambda + (1-\mu)^2(1-\lambda) + 1)} &\geq e.
\end{aligned} \tag{A.15}$$

The comparative statics for the lobby's net payoff are simply $\gamma'_1 = \gamma \left(\underbrace{\mu}_{(+/-)}, \underbrace{\lambda}_{(+)}, \underbrace{y^P}_{(+)}, \underbrace{e}_{(-)}, \underbrace{c}_{(-)} \right)$.

For the other case C2 the trade-off follows the expected payoff from gathering information and a potential immediate reform with no reform with certainty. The lobby gathers information if

$$\begin{aligned}
x^r(\lambda) &\geq e \\
1 - \mu - \lambda(1 - 2\mu) &\geq e,
\end{aligned} \tag{A.16}$$

which is the same as (A.7) as the policymaker would finance the implementation of the reform. The

comparative statics for the lobby's net payoff are therefore simply $\gamma'_2 = \gamma \left(\underbrace{\mu}_{(+/-)}, \underbrace{\lambda}_{(+)}, \underbrace{y^P}_{(0)}, \underbrace{e}_{(-)}, \underbrace{c}_{(0)} \right)$.

For case C3 we consider again two possibilities: i) an initially pessimistic policymaker, $\underline{\lambda} < \lambda < \lambda^* < \bar{\lambda}$, and ii) an initially optimistic policymaker, $\underline{\lambda} < \lambda^* < \lambda < \bar{\lambda}$. In the former case informational lobbying is not existent for the homogeneous case as in the Proof A.1.2. The policymaker would gather information and the lobby would pay an implementation signal if the policymaker received a reform signal and $1 - e - c + y^P > 0$.

However, if the policymaker is initially optimistic, $\underline{\lambda} < \lambda^* < \lambda \leq \bar{\lambda}$, and the signal likelihoods are identical, then a status quo signal by the lobby could be offset by a reform signal gathered by the policymaker: $\lambda(x^s) < \lambda$ but $\lambda(x^s, z^r) > \lambda$ and $\lambda(x^s, z^r) \gtrless \lambda^*$. The lobby thus chooses to gather information if

$$\begin{aligned}
x^r(\lambda) + x^s(\lambda)z^r(\lambda(x^s))(1-\tau(z)) - e &\geq z^r(\lambda)(1-\tau(z)) \\
\frac{2(\lambda-1)\mu(c-y^P) + \mu^2(c-y^P-1) - (y^P-c)(1-\lambda) + \mu}{\lambda - \mu^2 - 2(\lambda-1)\mu} &\geq e.
\end{aligned} \tag{A.17}$$

The comparative statics for the lobby's net payoff are simply $\gamma'_3 = \gamma \left(\underbrace{\mu}_{(+/-)}, \underbrace{\lambda}_{(+)}, \underbrace{y^P}_{(-)}, \underbrace{e}_{(-)}, \underbrace{c}_{(+)} \right)$.

Finally, for case C4 with $\lambda(x^s) \leq \underline{\lambda} \leq \lambda \leq \bar{\lambda} \leq \lambda(x^r)$, if the lobby gathers information, then the policymaker will not. In such a situation the lobby gathers information if $x^r(\lambda) - e \geq z^r(\lambda)[1 - e - c + y^P]$. However, if the signal likelihoods are identical and therefore the probabilities of reform signals, $x^r(\lambda) = z^r(\lambda)$, then the lobby abstains from costly information gathering, $-e(1 - x^r(\lambda)) < (y^P - c)x^r(\lambda)$, which implies that only the policymaker gathers information and the lobby would pay an implementation subsidy if z^r and $1 - e - c + y^P > 0$.

A.1.5 Proof of Proposition 4

We have for C1 that $\lambda^L(\lambda, x^s) \in [0, \underline{\lambda}]$ and $\lambda^L(\lambda, x^r) \in [\underline{\lambda}, \bar{\lambda}]$. There is however one main difference from the unconstrained case. If both the lobby and policymaker receive reform signals such that reform is the policymaker's preferred policy choice, then a transfer from the lobby to the policymaker is required if reform is to be implemented. This implies that there are circumstances where a lobby will choose to lobby an unconstrained policymaker but not a constrained one due to the potentially greater cost for the lobby. More precisely, by comparing the lobby's benefits in the unconstrained policymaker case C1 stated in (A.6) with lobby's benefits in the constrained policymaker case C1 stated in (A.15), we get (i) if $e + [\mu^2\lambda + (1 - \mu)^2(1 - \lambda)](c + e - y^p) < [\mu^2\lambda + (1 - \mu)^2(1 - \lambda)]$, then both unconstrained and constrained policymakers are lobbied; but (ii) if $e < [\mu^2\lambda + (1 - \mu)^2(1 - \lambda)] < e + [\mu^2\lambda + (1 - \mu)^2(1 - \lambda)](c + e - y^p)$, then unconstrained policymakers are lobbied but constrained ones are not.

Now consider C2 with $\lambda^L(\lambda, x^s) \in [0, \underline{\lambda}]$ and $\lambda^L(\lambda, x^r) \in [\bar{\lambda}, 1]$. That the policymaker faces a tighter resource constraint has no implications for equilibrium behavior. The lobby chooses to purchase information, and hence lobbies, in this case if $e < \lambda\mu + (1 - \lambda)(1 - \mu)$ as in (A.7), which is the same as the expected cost-benefit calculation in the unconstrained case of (A.16).

Consider next an unconvinced policymaker, one whose initial belief lies in the pessimistic or optimistic ranges, $\lambda \in [\underline{\lambda}, \bar{\lambda}]$. Obviously, as described in the proofs for Proposition 1 and Proposition 3, an initially pessimistic policymaker, $\lambda \in [\underline{\lambda}, \lambda^*]$ which is denoted as C3(a) in Table 7, is not lobbied with information but if constrained, may receive an implementation subsidy. Hence, we consider the relevant comparison for an initially optimistic policymaker, $\lambda \in [\lambda^*, \bar{\lambda}]$ which is denoted as C3(b) in Table 7. Here, as in the unconstrained case, the lobby has the option of purchasing a form of insurance against the unwelcome draw of a status quo signal. When facing an unconstrained policymaker the lobby will choose the insurance of two signals over one if (A.8) holds; but in contrast the lobby when facing a constrained policymaker will choose the insurance of two signals over one if (A.17) holds. Comparing these, we may thus state (i) if $e < \mu(1 - \mu) - \mu(1 - \mu)(e + c - y^p)$, then both constrained and unconstrained policymakers are subject to informational lobbying and the constrained policymaker also receives an implementation subsidy; but (ii) if $\mu(1 - \mu) - \mu(1 - \mu)(e + c - y^p) < e < \mu(1 - \mu)$, then the unconstrained policymaker is subject to informational lobbying but the constrained policymaker is not lobbied.

Finally, in case C4 neither an unconstrained nor a constrained policymaker would be lobbied with information and therefore the comparison is redundant.

A.1.6 Proof of Lemma 2

The lower threshold $\underline{\lambda}''$ follows again from the policymaker's trade-off between the expected payoff from costly information with uncertain information signal and policy outcome and the expected payoff from the costless status quo without gathering information. The policymaker anticipates again a policy implementation subsidy of $\tau = e + c - y^P$ in the case of a reform signal and zero otherwise. The policymaker gathers information for $\epsilon^P = \epsilon^L = \eta^P = \eta^L \equiv \mu$ if

$$\begin{aligned} z^r(\lambda^L) [y^P - e - c + \tau(z^r) + \lambda^P(z^r)\alpha] + z^s(\lambda^L) [y^P - e + \tau(z^s) + (1 - \lambda^P(z^s))\alpha] &\geq y^P + (1 - \lambda^L)\alpha \\ \Rightarrow z^r(\lambda^L)\lambda^P(z^r)\alpha + z^s(\lambda^L) [y^P - e + (1 - \lambda^P(z^s))\alpha] &\geq y^P + (1 - \lambda^L)\alpha. \end{aligned} \quad (\text{A.18})$$

Applying each information signal's probability, the updating choice reduces to

$$\lambda^L \geq \frac{(1 - \mu)(\alpha + y^P) + \mu e}{(y^P - e)(1 - 2\mu) + \alpha} \equiv \underline{\lambda}'', \quad (\text{A.19})$$

which is identical to $\underline{\lambda}'$ of (A.10).

The upper threshold $\bar{\lambda}''$ follows again from the policymaker's trade-off between costly information and costly reform without gathering information. Here the policymaker anticipates now a policy implementation subsidy of $\tau(z^r) = e + c - y^P$ if z^r and of $\tau(z = 0) = c - y^P$ if $\lambda > \bar{\lambda}''$.

The policymaker gathers information if

$$\begin{aligned} z^r(\lambda^L) [y^P - e - c + \tau(z^r) + \lambda^P(z^r)\alpha] + z^s(\lambda^L) [y^P - e + \tau(z^s) + (1 - \lambda^P(z^s))\alpha] \\ \geq y^P - c + \lambda^L\alpha + \tau(z = 0) \\ \Rightarrow z^r(\lambda^L)\lambda^P(z^r)\alpha + z^s(\lambda^L) [y^P - e + (1 - \lambda^P(z^s))\alpha] \geq \lambda^L\alpha. \end{aligned} \quad (\text{A.20})$$

Solving for λ^L , we can write

$$\lambda^L \leq \frac{\mu(\alpha - e + y^P)}{\alpha + (y^P - e)(2\mu - 1)} \equiv \bar{\lambda}'', \quad (\text{A.21})$$

which defines the new upper updating threshold.

Comparing $\bar{\lambda}'$ of (A.12) with $\bar{\lambda}''$ of (A.21), we get

$$\begin{aligned} \bar{\lambda}' - \bar{\lambda}'' &= \frac{c - y^P}{\alpha + (y^P - e)(2\mu - 1)} < 0 \\ \Rightarrow \bar{\lambda}'' &> \bar{\lambda}'. \end{aligned} \quad (\text{A.22})$$

The remaining implication follows straight-forward from $\Lambda'' = \bar{\lambda}'' - \underline{\lambda}' > \Lambda' = \bar{\lambda}' - \underline{\lambda}'$.

A.2 Additional Derivations: Heterogenous Signals and Costs

Here we are solving the lobbying game considering $e^P \gtrless e^L$, $\epsilon^P \gtrless \epsilon^L$, and $\eta^P \gtrless \eta^L$. Varying the resource constraints for the policymaker and lobby, we are solving each game backward and derive 1) the policymaker's policy choice, 2) the lobby's policy implementation subsidy, 3) the policymaker's information choice, and 4) the lobby's information choice.

A.2.1 Policy Choice and Implementation Subsidy

At the last stage of the lobbying game the policymaker has posterior belief λ^P and chooses whether to reform or to keep the status quo. Comparing the payoffs for each and deriving the policy threshold λ^* , we get as before

$$\begin{aligned}\lambda^P \alpha - c &= (1 - \lambda^P) \alpha \\ \lambda^P &\geq \frac{1}{2} + \frac{c}{2\alpha} \equiv \lambda^*.\end{aligned}\tag{A.23}$$

The implementation subsidies for the various constraints follow from $\tau^* = 0$ if the policymaker is unconstrained and τ^* from (4.1) if the policymaker is constrained and recognizing the policymaker's information cost of e^P .

To summarize, we can state that independent of resource constraints the policymaker's policy implementation threshold is λ^* of (3.1) and the lobby's implementation subsidies are similar to the homogeneous case and follow i) $\tau^* = 0$ if $y^P \geq e^P + c$; ii) $\tau^* = e^P + c - y^P$ if $c > y^P \geq e^P$, $z = z^r$, and $1 \geq e^P + c - y^P$; iii) $\tau^* = e^P + c - y^P$ if $c > y^P \geq e^P$, $e^L + c > y^L \geq \max\{e^L, c\}$, $\{x = 0, z^r\}$, and $1 \geq e^P + c - y^P$.

A.2.2 Unconstrained Policymaker and Lobby: Information Choices

Here we derive the policymaker's information and lobby's information problem when $y^P \geq e^P + c$ and $y^L \geq e^L(+c)$.

A) Policymaker's Information Choice The lower threshold $\underline{\lambda}$ follows from the policymaker's trade-off between the expected payoff from costly information with uncertain information signal and policy outcome and the expected payoff from the costless status quo without information choice. Note that the policymaker considers the posterior belief about the state of the world, $\lambda^P(z)$, for the expected payoff associated with the expected information signal, $z(\lambda^L)$. The policymaker gathers information if

$$z^r(\lambda^L) [y^P - c + \lambda^P(z^r)\alpha] + z^s(\lambda^L) [y^P + (1 - \lambda^P(z^s))\alpha] - e^P \geq y^P + (1 - \lambda^L)\alpha. \quad (\text{A.24})$$

Applying each information signal's probability, the updating choice reduces to

$$\lambda^L \geq \frac{(1 - \eta^P)(\alpha + c) + e^P}{\alpha(1 + \epsilon^P - \eta^P) + c(1 - \epsilon^P - \eta^P)} \equiv \underline{\lambda}, \quad (\text{A.25})$$

which defines the lower updating threshold. Note that $\underline{\lambda} > 0$ because of $\alpha > c$.

The upper threshold $\bar{\lambda}$ follows from the policymaker's trade-off between the expected payoff from costly information with uncertain information signal and policy outcome and the expected payoff from a costly reform without gathering information. The policymaker gathers information if

$$z^r(\lambda^L) [y^P - e^P - c + \lambda^P(z^r)\alpha] + z^s(\lambda^L) [y^P - e^P + (1 - \lambda^P(z^s))\alpha] \geq y^P - c + \lambda^L\alpha. \quad (\text{A.26})$$

Solving for λ^L , we can write

$$\lambda^L \leq \frac{\eta^P(\alpha + c) - e^P}{\alpha(1 - \epsilon^P + \eta^P) + c(\epsilon^P + \eta^P - 1)} \equiv \bar{\lambda}, \quad (\text{A.27})$$

which defines the upper updating threshold.

Existence of Updating Range The updating range exists iff $\underline{\lambda} < \min\{\bar{\lambda}, 1\}$. Solving for $\underline{\lambda} < \bar{\lambda}$, we get

$$\left(\alpha - \frac{c}{\alpha}\right)(\eta^P + \epsilon^P - 1) - 2e^P > 0. \quad (\text{A.28})$$

That this interval exists requires that; the information signals, η^P and ϵ^P , are sufficiently accurate, policy salience compared to the reform cost is sufficiently high, that is $c/\alpha < \alpha$, and that the cost of information, e^P , is sufficiently low. This is represented on the diagram by the intercepts of the $E[z]$ being sufficiently high.

Illustration of Payoffs, Reform Probability, and Existence We can illustrate the policymaker's updating thresholds, expected payoffs from gathering or not gathering information, and the likelihood of a policy change. Figure 9 illustrates the policymaker's belief λ^L at this stage after the lobby's information gathering choice for which the policymaker will choose to gather information, and the likelihood that this will then lead to a policy reform. Figure 9 is drawn for the case where there exist a range of beliefs $\lambda^L \in [\underline{\lambda}, \bar{\lambda}]$ for which the policymaker gathers information and is illustrated by the shaded triangle.

In the upper panel of Figure 9 the line denoted $E^p[\pi^s]$ gives the policymaker's expected

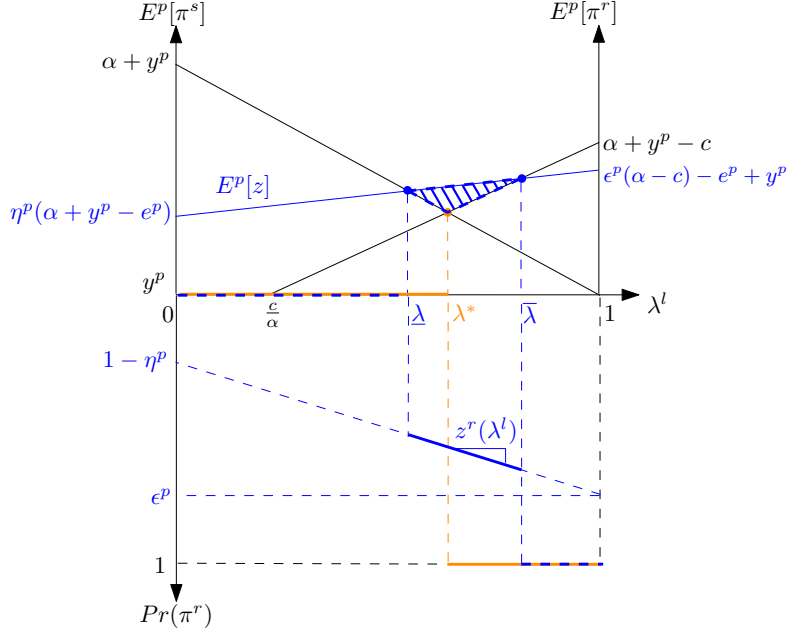


Figure 9: Policymaker's Expected Payoffs and Probability of Reform.

payoff from choosing the status quo policy without gathering information for all possible values of their beliefs at this stage, $\lambda^L \in [0, 1]$. Similarly, the line denoted $E^p[\pi^r]$ gives the policymaker's expected payoff from choosing the reform policy without gathering information for all values of their belief, $\lambda^L \in [0, 1]$. The line denoted $E^p[z]$ gives the policymaker's expected payoff from gathering information, again for all possible beliefs at this stage, $\lambda^L \in [0, 1]$.

The lower panel in Figure 9 is identical – just upside-down – to Figure 4 and describes the policymaker's probability of implementing a reform, denoted $Pr(\pi^r)$, again for all $\lambda^L \in [0, 1]$. This is of course zero for $\lambda^L < \underline{\lambda}$, and equal to one for $\lambda^L > \bar{\lambda}$. Over the range $\lambda^L \in (\underline{\lambda}, \bar{\lambda})$ the probability of reform is equal to the probability of receiving z^r which is increasing in λ^L .

B) Lobby's Information Choice The lobby's lobbying decision follows from the policymaker's thresholds $\underline{\lambda}$ and $\bar{\lambda}$ described in (A.25) and (A.27) as well as the four possible informational lobbying cases of C1, C2, C3, and C4.

For the first case C1 with $\lambda \leq \underline{\lambda} \leq \lambda(x^r) \leq \bar{\lambda}$ the lobbyist finds it beneficial to gather information if $x^r(\lambda)z^r(\lambda(x^r)) \geq e^L$, which using (B.1) and (B.5), implies

$$\epsilon^P \epsilon^L \lambda + (1 - \eta^P)(1 - \eta^L)(1 - \lambda) \geq e^L. \quad (\text{A.29})$$

The comparative statics for the lobby's net payoff are simply $\gamma_1 = \gamma \left(\underbrace{\epsilon^L}_{(+)}, \underbrace{\epsilon^P}_{(+)}, \underbrace{e^L}_{(-)}, \underbrace{\eta^L}_{(-)}, \underbrace{\eta^P}_{(-)}, \underbrace{\lambda}_{(+)} \right)$.

For the case C2 with $\lambda \leq \underline{\lambda} \leq \bar{\lambda} \leq \lambda(x^r)$ a lobby's reform signal would induce a policymaker to implement reform without further gathering of information. The lobby finds it beneficial to

provide an information signal if $x^r(\lambda) \geq e^L$, which, using (B.1), implies

$$1 - \eta^L - \lambda(1 - \epsilon^L - \eta^L) \geq e^L. \quad (\text{A.30})$$

The comparative statics for the lobby's net payoff are simply $\gamma_2 = \gamma \left(\underbrace{\epsilon^L}_{(+)}, \underbrace{\epsilon^P}_{(0)}, \underbrace{e^L}_{(-)}, \underbrace{\eta^L}_{(-)}, \underbrace{\eta^P}_{(0)}, \underbrace{\lambda}_{(+)} \right)$.

In case C3 with $\underline{\lambda} \leq \lambda(x^s) \leq \lambda \leq \bar{\lambda} \leq \lambda(x^r)$ the policymaker will gather information if the lobby gathered a status quo signal, and will reform without gathering information if the lobby gathered a reform signal. The lobby thus chooses to gather information if $x^r(\lambda) + x^s(\lambda)z^r(\lambda(x^s)) - e^L \geq z^r(\lambda)$, which implies, using (B.1), (B.2), and (B.6), that

$$(\epsilon^L - \epsilon^P)\lambda + (\eta^P - \eta^L)(1 - \lambda) + \epsilon^P\eta^L(1 - \lambda) + (1 - \eta^P)(1 - \epsilon^L)\lambda \geq e^L. \quad (\text{A.31})$$

The comparative statics for the lobby's net payoff are simply $\gamma_3 = \gamma \left(\underbrace{\epsilon^L}_{(+)}, \underbrace{\epsilon^P}_{(-)}, \underbrace{e^L}_{(-)}, \underbrace{\eta^L}_{(-)}, \underbrace{\eta^P}_{(+)}, \underbrace{\lambda}_{(+/-)} \right)$.

Finally, in case C4 with $\lambda(x^s) \leq \underline{\lambda} \leq \lambda \leq \bar{\lambda} \leq \lambda(x^r)$, if the lobby gathers information, then the policymaker will not and the signal that the lobby gathered will determine the policy choice. In such a situation the lobby gathers information if $x^r(\lambda) - e^L \geq z^r(\lambda)$, which implies, using (B.1) and (B.3), that

$$(\epsilon^L - \epsilon^P)\lambda + (1 - \lambda)(\eta^P - \eta^L) \geq e^L. \quad (\text{A.32})$$

The comparative statics for the lobby's net payoff are simply $\gamma_4 = \gamma \left(\underbrace{\epsilon^L}_{(+)}, \underbrace{\epsilon^P}_{(-)}, \underbrace{e^L}_{(-)}, \underbrace{\eta^L}_{(-)}, \underbrace{\eta^P}_{(+)}, \underbrace{\lambda}_{(+/-)} \right)$.

We summarize the comparative statics in Table 3 of the Supplemental Appendix.

A.2.3 Constrained Policymaker and Unconstrained Lobby: Information Choices

Here we derive the policymaker's information and lobby's information problem when $c > y^L \geq e^P$ and $y^L \geq e^L + c$.

A) Policymaker's Information Choice The lower threshold $\underline{\lambda}'$ follows again from the policymaker's trade-off between the expected payoff from costly information with uncertain information signal and policy outcome and the expected payoff from the costless status quo without gathering information. Note that the policymaker anticipates a policy implementation subsidy of $\tau = e^P + c - y^P$ in the case of a reform signal and zero otherwise. The policymaker gathers information if

$$\begin{aligned} z^r(\lambda^L) [y^P - e^P - c + \tau(z^r) + \lambda^P(z^r)\alpha] + z^s(\lambda^L) [y^P - e^P + \tau(z^s) + (1 - \lambda^P(z^s))\alpha] &\geq y^P + (1 - \lambda^L)\alpha \\ \Rightarrow z^r(\lambda^L)\lambda^P(z^r)\alpha + z^s(\lambda^L) [y^P - e^P + (1 - \lambda^P(z^s))\alpha] &\geq y^P + (1 - \lambda^L)\alpha. \end{aligned} \quad (\text{A.33})$$

Applying each information signal's probability, the updating choice reduces to

$$\lambda^L \geq \frac{(1 - \eta^P)(\alpha + y^P) + \eta^P e^P}{(1 - \eta^P)(\alpha + y^P - e^P) + \epsilon^P(\alpha + e^P - y^P)} \equiv \underline{\lambda}', \quad (\text{A.34})$$

which defines the new lower updating threshold.

The upper threshold $\bar{\lambda}'$ follows again from the policymaker's trade-off between costly information and costly reform without gathering information. The policymaker gathers information if

$$\begin{aligned} z^r(\lambda^L) [y^P - e^P - c + \tau(z^r) + \lambda^P(z^r)\alpha] + z^s(\lambda^L) [y^P - e^P + \tau(z^s) + (1 - \lambda^P(z^s))\alpha] &\geq y^P - c + \lambda^L \alpha \\ \Rightarrow z^r(\lambda^L) \lambda^P(z^r)\alpha + z^s(\lambda^L) [y^P - e^P + (1 - \lambda^P(z^s))\alpha] &\geq y^P - c + \lambda^L \alpha. \end{aligned} \quad (\text{A.35})$$

Solving for λ^L , we can write

$$\lambda^L \leq \frac{(\alpha + y^P - e^P)\eta^P + c - y^P}{(\alpha + y^P - e^P)\eta^P + (\alpha - y^P + e^P)(1 - \epsilon^P)} \equiv \bar{\lambda}', \quad (\text{A.36})$$

which defines the new upper updating threshold.

Comparison of Thresholds For the comparison of the lower thresholds we have for $\underline{\lambda} - \underline{\lambda}' \gtrless 0$, using (A.25) and (A.34) such that

$$\begin{aligned} \frac{(1 - \eta^P)(\alpha + c) + e^P}{\alpha(1 + \epsilon^P - \eta^P) + c(1 - \epsilon^P - \eta^P)} - \frac{(1 - \eta^P)(\alpha + y^P) + \eta^P e^P}{(1 - \eta^P)(\alpha + y^P - e^P) + \epsilon^P(\alpha + e^P - y^P)} &\gtrless 0 \\ \underbrace{\frac{\overbrace{(c + e^P - y^P)}^{(+)} \overbrace{(e^P(\eta^P + \epsilon^P - 1))}^{(+)} \overbrace{2\alpha(1 - \eta^P)\epsilon^P}^{(+)}}{\underbrace{(\alpha(1 + \epsilon^P - \eta^P) + c(1 - \epsilon^P - \eta^P))}_{(a)} \underbrace{(\alpha(1 + \epsilon^P - \eta^P) + (y^P - e^P)(1 - \epsilon^P - \eta^P))}_{(b)}}}_{(a)} &\gtrless 0 \\ (a): \alpha(1 - \eta^P) + \epsilon(\alpha - c) + c(1 - \eta^P) > 0 &\Rightarrow (a) \rightarrow (+) \\ (b): \alpha > c > y^P - e^P \text{ and } 1 + \epsilon^P - \eta^P > \epsilon^P + \eta^P - 1 &\Rightarrow (b) \rightarrow (+) \\ \Rightarrow \underline{\lambda} - \underline{\lambda}' > 0 &\Leftrightarrow \underline{\lambda} > \underline{\lambda}'. \end{aligned} \quad (\text{A.37})$$

For the comparison of the upper thresholds we have $\bar{\lambda} - \bar{\lambda}' \gtrless 0$, using (A.27) and (A.36) such that

$$\frac{\eta^P(\alpha + c) - e^P}{\alpha(1 - \epsilon^P + \eta^P) + c(\epsilon^P + \eta^P - 1)} - \frac{(\alpha + y^P - e^P)\eta^P + c - y^P}{(\alpha + y^P - e^P)\eta^P + (\alpha - y^P + e^P)(1 - \epsilon^P)} \gtrless 0. \quad (\text{A.38})$$

If $\epsilon^P = \eta^P$, then the comparison of the upper thresholds is

$$\frac{\eta^P(\alpha + c) - e^P}{\alpha(1 - \eta^P + \eta^P) + c(\eta^P + \eta^P - 1)} - \frac{(\alpha + y^P - e^P)\eta^P + c - y^P}{(\alpha + y^P - e^P)\eta^P + (\alpha - y^P + e^P)(1 - \eta^P)}$$

$$\begin{aligned}
&= - \frac{\overbrace{(c + e^P - y^P)}^{(+)} \overbrace{(\alpha + c(2\eta^P - 1) - 2\eta^P(-\alpha\eta^P + \alpha + e^P) + e^P)}^{(+)}}{\underbrace{(\alpha + c(2\eta^P - 1))}_{(+)} \underbrace{(\alpha + (2\eta^P - 1)(y^P - e^P))}_{(+)}} \geq 0 \\
&\quad (c): \\
&\Rightarrow \bar{\lambda} - \bar{\lambda}' < 0 \Leftrightarrow \bar{\lambda} < \underline{\lambda}'. \quad (\text{A.39})
\end{aligned}$$

The comparative statics for $\underline{\lambda}'$ and $\bar{\lambda}'$ can be found in Supplemental Appendix B.3.2.

B) Lobby's Information Choice The lobby's lobbying decision follows from the policymaker's thresholds described in (A.34) and (A.36) as well as the four possible informational lobbying cases of C1, C2, C3, and C4 with the thresholds of $\underline{\lambda}'$ and $\bar{\lambda}'$ instead of $\underline{\lambda}$ and $\bar{\lambda}$.

For the lobby's problem to lobby a politically inactive policymaker we have that a reform signal would induce a policymaker to gather information or to implement an immediate reform – i.e., $\lambda < \underline{\lambda}' \leq \lambda(x^r) < \bar{\lambda}'$ and $\lambda < \underline{\lambda}' < \bar{\lambda}' \leq \lambda(x^r)$. For the first case C1 a lobbyist compares the expected payoff from gathering information and a potential second information gathering with the one from no reform with certainty. The lobby gathers information with τ^* from (4.1) if

$$\begin{aligned}
x^r(\lambda) z^r(\lambda) (1 - \tau(z)) &\geq e^L \\
(\epsilon^P \epsilon^L \lambda + (1 - \eta^P)(1 - \eta^L)(1 - \lambda)) (1 - e^P - c + y^P) &\geq e^L. \quad (\text{A.40})
\end{aligned}$$

The comparative statics for the net payoff are $\gamma_{1'} = \gamma \left(\underbrace{\epsilon^L}_{(+)}, \underbrace{\epsilon^P}_{(+)}, \underbrace{e^L}_{(-)}, \underbrace{\eta^L}_{(-)}, \underbrace{\eta^P}_{(-)}, \underbrace{\lambda}_{(+)}, \underbrace{y^P}_{(+)}, \underbrace{e^P}_{(-)}, \underbrace{c}_{(-)} \right)$.

For the other case C2 the trade-off follows the expected payoff from gathering information and a potential immediate reform with no reform with certainty. The lobby gathers if

$$\begin{aligned}
x^r(\lambda) &\geq e^L \\
1 - \eta^L - \lambda(1 - \epsilon^L - \eta^L) &\geq e^L, \quad (\text{A.41})
\end{aligned}$$

which is the same as (A.30) as the policymaker finances the implementation of the reform. The comparative statics for the net payoff are $\gamma_{2'} = \gamma \left(\underbrace{\epsilon^L}_{(+)}, \underbrace{\epsilon^P}_{(0)}, \underbrace{e^L}_{(-)}, \underbrace{\eta^L}_{(-)}, \underbrace{\eta^P}_{(0)}, \underbrace{\lambda}_{(+)}, \underbrace{y^P}_{(0)}, \underbrace{e^P}_{(0)}, \underbrace{c}_{(0)} \right)$.

For the cases for which the lobby is considering a substitution of the policymaker's information, a lobby's reform signal would induce an immediate reform and a status quo signal would either (C3) not affect the policymaker's choice or (C4') result in an immediate rejection of the reform proposal – i.e., $\underline{\lambda}' \leq \lambda(x^s) \leq \lambda \leq \bar{\lambda}' \leq \lambda(x^r)$ and $\lambda(x^s) \leq \underline{\lambda}' \leq \lambda \leq \bar{\lambda}' \leq \lambda(x^r)$. For the

case of “forgivingness” C3 the lobby compares the expected payoff from gathering information and a potential immediate reform with the expected payoff when only the policymaker gathers information. The lobby gathers information with τ^* from (4.1) if

$$\begin{aligned} x^r(\lambda) + x^s(\lambda)z^r(\lambda(x^s))(1 - \tau(z)) - e^L &\geq z^r(\lambda)(1 - \tau(z)) \\ (1 - \epsilon^L)\lambda(\epsilon^L\epsilon^P\lambda + (1 - \eta^L)(1 - \eta^P)(1 - \lambda))(1 - c - e^P + y^P) - e^L &+ \epsilon^L\lambda + (1 - \eta^L)(1 - \lambda) + \eta^L(1 - \lambda) \\ &\geq (\epsilon^P\lambda + (1 - \eta^P)(1 - \lambda))(1 - c - e^P + y^P) \end{aligned} \quad (\text{A.42})$$

The comparative statics for the net payoff are $\gamma_{3'} = \gamma \left(\underbrace{\epsilon^L}_{(+)}, \underbrace{\epsilon^P}_{(-)}, \underbrace{e^L}_{(-)}, \underbrace{\eta^L}_{(-)}, \underbrace{\eta^P}_{(+)}, \underbrace{\lambda}_{(+-)}, \underbrace{y^P}_{(+/ -)}, \underbrace{e^P}_{(+/ -)}, \underbrace{c}_{(+/ -)} \right)$.

For the last case C4 the lobby compares the expected payoff of gathering information with the risk of rejection and the expected payoff from a policymaker’s information gathering only. The lobby gathers information if

$$\begin{aligned} x^r(\lambda) - e^L &\geq z^r(\lambda)(1 - e^P - c + y^P) \\ \epsilon^L\lambda + (1 - \eta^L)(1 - \lambda) - e^L &\geq (\epsilon^P\lambda + (1 - \eta^P)(1 - \lambda))(1 - c - e^P + y^P). \end{aligned} \quad (\text{A.43})$$

The comparative statics for the payoff are $\gamma_{4'} = \gamma \left(\underbrace{\epsilon^L}_{(+)}, \underbrace{\epsilon^P}_{(-)}, \underbrace{e^L}_{(-)}, \underbrace{\eta^L}_{(-)}, \underbrace{\eta^P}_{(+)}, \underbrace{\lambda}_{(+/ -)}, \underbrace{y^P}_{(-)}, \underbrace{e^P}_{(+)}, \underbrace{c}_{(+)}) \right)$.

We summarize the comparative statics in Table 4 of the Supplemental Appendix.

A.2.4 Constrained Policymaker and Lobby: Information Choices

Here we derive the policymaker’s information and lobby’s information problem when $\max\{c, e^P\} \leq y^P < c + e^P$, $\max\{e^L, e^P + c - y^P\} \leq y^L < e^L + c + e^P - y^P$ and $y^L + y^P - \max\{e^L, e^P\} \geq c$. The last condition ensures that the combined resources are sufficient for one information signal and a reform.

Policymaker’s Information Choice The policymaker’s information problem is similar to the one above and the derived thresholds are identical to $\underline{\lambda}'$ in (A.34) and $\bar{\lambda}'$ in (A.36).

Lobby’s Information Choice A resource constrained lobby can induce a resource constrained policymaker to reform if $\lambda^L(x) \geq \lambda^*$. If the policymaker or the lobby were not constrained, then the policymaker would gather information for $\lambda^L(x) \leq \{\bar{\lambda}, \bar{\lambda}'\}$ even when $\lambda^L(x) \geq \lambda^*$. Hence, the resource constrained lobby can induce a reform at a lower standard. Furthermore, the number of cases of informational lobbying reduces as there can be only one information signal in total.

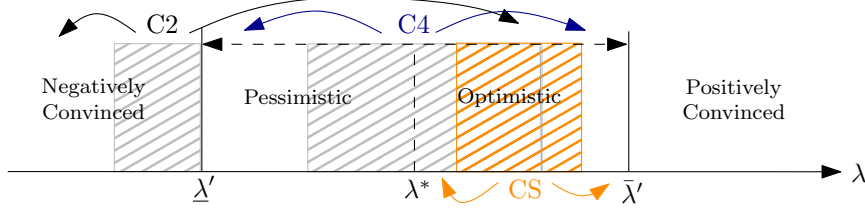


Figure 10: The Lobby's Information Choices – Both Constraints Bind.

Hence, the illustration of informational lobbying case in Figure 5 changes to the one in Figure 10.

For the lobby's problem to lobby a politically inactive policymaker in case C2 we have that a reform signal would induce a reform – i.e., $\lambda < \bar{\lambda}'$. Here, and different to the previous cases, a lobby can induce an immediate reform for lower beliefs with $\lambda^* < \lambda(x^r)$ rather than $\lambda^* < \bar{\lambda}' < \lambda(x^r)$. In other words, a lobby may choose to gather information and receive the benefit of the doubt as the policymaker is unable to gather information. Hence, a lobby may choose to gather information for $\lambda < \underline{\lambda}' < \lambda^* < \{\lambda(x^r), \bar{\lambda}'\}$ if

$$\begin{aligned} x^r(\lambda) &\geq e^L \\ \epsilon^L \lambda + (1 - \mu^l)(1 - \lambda) &\geq e^L, \end{aligned} \quad (\text{A.44})$$

which is the same as (A.30) as the policymaker finances the implementation of the reform. The comparative statics for the net payoff are $\gamma_{2''} = \gamma \left(\underbrace{\epsilon^L}_{(+)}, \underbrace{\epsilon^P}_{(0)}, \underbrace{e^L}_{(-)}, \underbrace{\eta^L}_{(-)}, \underbrace{\eta^P}_{(0)}, \underbrace{\lambda}_{(+)}, \underbrace{y^P}_{(0)}, \underbrace{e^P}_{(0)}, \underbrace{c}_{(0)} \right)$.

For the case C4 the lobby compares the expected payoff of gathering information with the expected payoff from a policymaker's information only. The lobby gathers information if

$$\begin{aligned} x^r(\lambda) - e^L &\geq z^r(\lambda) (1 - e^P - c + y^P) \\ \epsilon^L \lambda + (1 - \eta^L)(1 - \lambda) - e^L &\geq (\epsilon^P \lambda + (1 - \eta^P)(1 - \lambda)) (1 - c - e^P + y^P). \end{aligned} \quad (\text{A.45})$$

The comparative statics for the net payoff are $\gamma_{4''} = \gamma \left(\underbrace{\epsilon^L}_{(+)}, \underbrace{\epsilon^P}_{(-)}, \underbrace{e^L}_{(-)}, \underbrace{\eta^L}_{(-)}, \underbrace{\eta^P}_{(+)}, \underbrace{\lambda}_{(+/-)}, \underbrace{y^P}_{(-)}, \underbrace{e^P}_{(+)}, \underbrace{c}_{(+)} \right)$.

For the special case CS a lobby may actually choose to gather information and diminish own resources to prevent a policymaker's information gathering and realize a reform with certainty – i.e., $\underline{\lambda}' < \lambda(z^s) < \lambda^* < \lambda(x^s) < \lambda < \{\lambda(z^r), \lambda(x^r)\}$. The engages in informational lobbying if

$$\begin{aligned} 1 - e^L &\geq z^r(\lambda) (1 - c - e^P + y^P) \\ 1 - e^L &\geq (\epsilon^P \lambda + (1 - \eta^P)(1 - \lambda)) (1 - e^P - c). \end{aligned} \quad (\text{A.46})$$

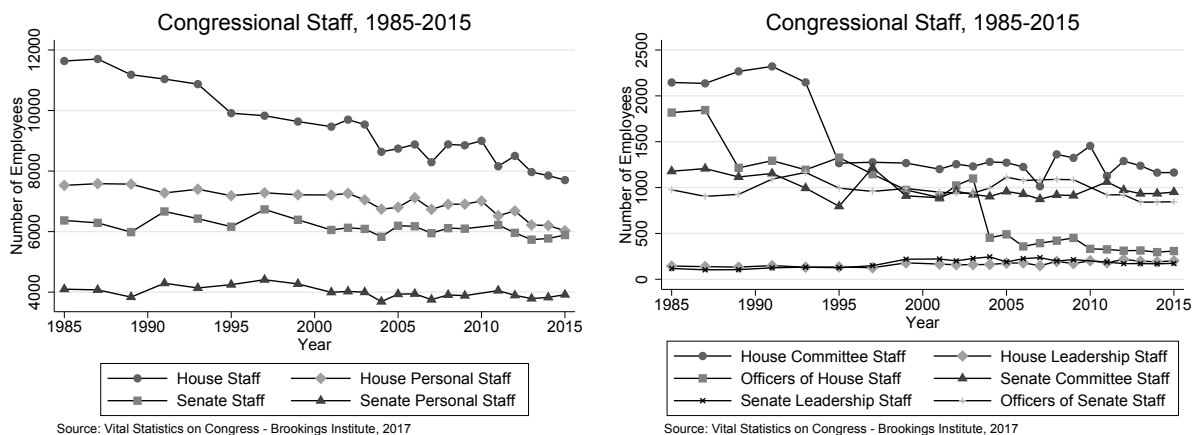
The comparative statics for the net payoff are $\gamma_{s''} = \gamma \left(\underbrace{\epsilon^L}_{(0)}, \underbrace{\epsilon^P}_{(-)}, \underbrace{e^L}_{(-)}, \underbrace{\eta^L}_{(0)}, \underbrace{\eta^P}_{(+)}, \underbrace{\lambda}_{(-)}, \underbrace{y^P}_{(-)}, \underbrace{e^P}_{(+)}, \underbrace{c}_{(+)} \right)$.

For the case C2 the lobby's instruments are independent as the lobby would only engage in informational lobbying but in neither alternative provide a policy implementation subsidy. For the case C4 and its special case the policymaker either gathers information and the lobby finances the reform or the lobby gathers information and the policymaker finances the reform. Hence, the lobbying instruments are substitutes in this scenario.

We summarize the comparative statics in Table 5 of the Appendix.

B Supplemental Appendix – Online Only

B.1 Empirical Trends



(a) Total and Personal Congressional Staff.

(b) Committee Staff, Leadership Staff, and Officers.

Figure 11: Congressional Staff.

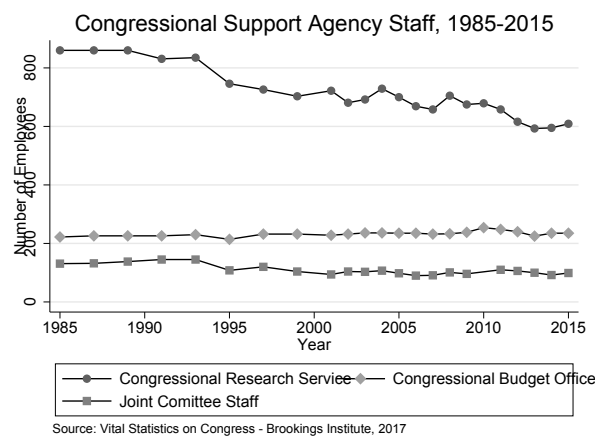
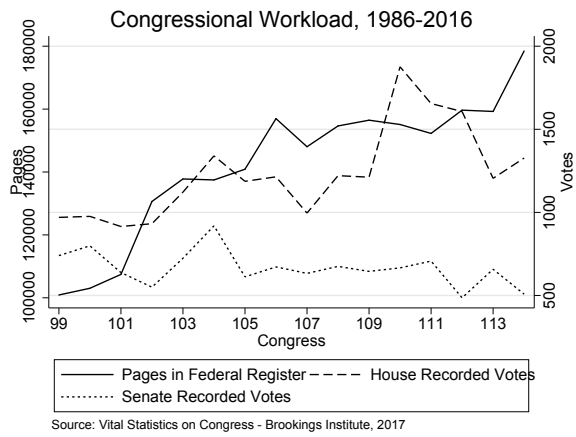
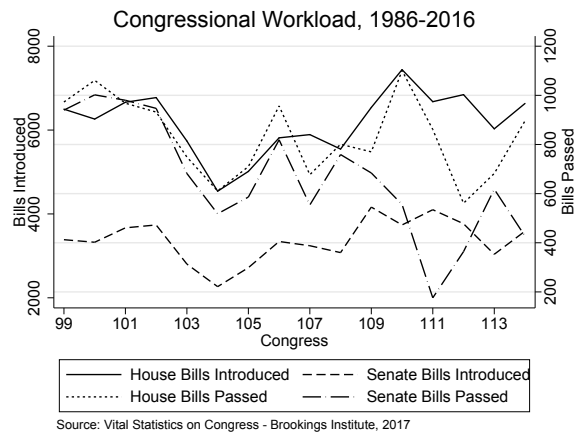


Figure 12: Congressional Support Agencies Staff.



(a) Federal Pages and Recorded Votes.



(b) Bills Introduced and Bills Passed.

Figure 13: Congressional Workload.

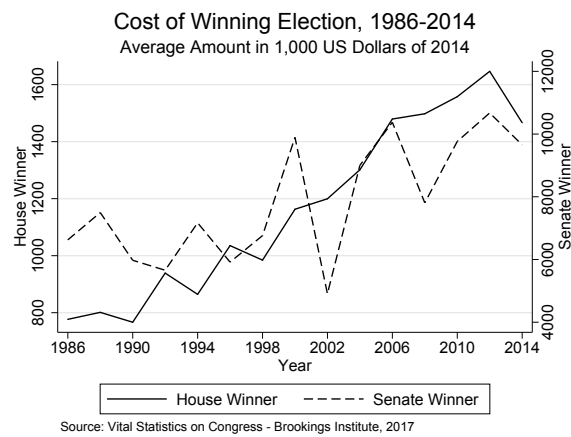


Figure 14: Electoral Costs for Congress.

B.2 Information Signals and Beliefs

B.2.1 Expected Information Signals

Given the sequence of play described in Figure 2 the players' information gathering choices depend on their expected signals conditional on their prior beliefs which may be written as

$$x^r(\lambda) \equiv Pr[x = x^r|\lambda] = \epsilon^L\lambda + (1 - \eta^L)(1 - \lambda) \quad (\text{B.1})$$

$$\text{and } x^s(\lambda) \equiv Pr[x = x^s|\lambda] = \eta^L(1 - \lambda) + (1 - \epsilon^L)\lambda \quad (\text{B.2})$$

and similarly for the policymaker as

$$z^r(\lambda^L) \equiv Pr[z = z^r|\lambda^L] = \epsilon^P\lambda^L + (1 - \eta^P)(1 - \lambda^L) \quad (\text{B.3})$$

$$\text{and } z^s(\lambda^L) \equiv Pr[z = z^s|\lambda^L] = \eta^P(1 - \lambda^L) + (1 - \epsilon^P)\lambda^L, \quad (\text{B.4})$$

where λ^L reflects the policymaker's and lobby's posterior belief and reflects the sequence of play in which policymakers gathers information after observing a lobby's signal. The corresponding policymaker's expected signals conditional on the lobby's observed information signal are

$$z^r(\lambda(x^j)) \equiv \epsilon^P\lambda^L(x^j) + (1 - \eta^P)(1 - \lambda^L(x^j)) \quad (\text{B.5})$$

$$\text{and } z^s(\lambda(x^j)) \equiv \eta^P(1 - \lambda^L(x^j)) + (1 - \epsilon^P)\lambda^L(x^j) \text{ for } j = r, s. \quad (\text{B.6})$$

Homogeneous Information Accuracies For the case of $\epsilon^L = \eta^L = \epsilon^P = \eta^P \equiv \mu$ we have

$$x^r(\lambda) \equiv Pr[x = x^r|\lambda] = z^r(\lambda^L) \equiv Pr[z = z^r|\lambda] = \mu\lambda + (1 - \mu)(1 - \lambda) \quad (\text{B.7})$$

$$\text{and } x^s(\lambda) \equiv Pr[x = x^s|\lambda] = z^s(\lambda^L) \equiv Pr[z = z^s|\lambda] = \mu(1 - \lambda) + (1 - \mu)\lambda \quad (\text{B.8})$$

as well as

$$z^r(\lambda(x^j)) \equiv \mu\lambda^L(x^j) + (1 - \mu)(1 - \lambda^L(x^j)) \quad (\text{B.9})$$

$$\text{and } z^s(\lambda(x^j)) \equiv \mu(1 - \lambda^L(x^j)) + (1 - \mu)\lambda^L(x^j) \text{ for } j = r, s. \quad (\text{B.10})$$

B.2.2 Posterior Beliefs

We denote the lobby's posterior belief and policymaker's belief given any information signals as $\lambda(x^r) \equiv Pr[\theta = \theta^r|\lambda, x^r]$ and $\lambda(x^s) \equiv Pr[\theta = \theta^r|\lambda, x^s]$ – i.e., also $\lambda^L \in \{\lambda, \lambda(x)\}$. Similarly, the policymaker's posterior is $\lambda^P \equiv Pr[\theta = \theta^r|\lambda^L, z]$ and depends on the history of information signals – i.e., also $\lambda^P \in \{\lambda, \lambda(x), \lambda(z), \lambda(x, z)\}$.

If the lobby gathers information, then the probabilities of signals x^r and x^s are as defined in (B.1) and (B.2) and the corresponding updated beliefs given the signals are

$$\lambda^L(x^r) \equiv \Pr(\theta = \theta^r | \lambda, x^r) = \frac{\epsilon^L \lambda}{\epsilon^L \lambda + (1 - \eta^L)(1 - \lambda)} \quad (\text{B.11})$$

$$\lambda^L(x^s) \equiv \Pr(\theta = \theta^r | \lambda, x^s) = \frac{(1 - \epsilon^L) \lambda}{\eta^L(1 - \lambda) + (1 - \epsilon^L) \lambda}. \quad (\text{B.12})$$

If the policymaker also gathers information and receives either z^r and z^s , then using Bayes' rule again, these posteriors are either $\lambda^P(z^r)$ or $\lambda^P(z^s)$ depending on their received signal, and where

$$\lambda^P(z^r) \equiv \Pr(\theta = \theta^r | \lambda^L, z^r) = \frac{\epsilon^P \lambda^L}{\epsilon^P \lambda^L + (1 - \eta^P)(1 - \lambda^L)} \quad (\text{B.13})$$

$$\lambda^P(z^s) \equiv \Pr(\theta = \theta^r | \lambda^L, z^s) = \frac{(1 - \epsilon^P) \lambda^L}{\eta^P(1 - \lambda^L) + (1 - \epsilon^P) \lambda^L}. \quad (\text{B.14})$$

Note that $\lambda^L = \lambda$ if the lobby did not gather information; otherwise we substitute (B.11) or (B.12).

Homogeneous Information Accuracies For the case of $\epsilon^L = \eta^L = \epsilon^P = \eta^P \equiv \mu$ we have

$$\lambda^L(x^r) \equiv \Pr(\theta = \theta^r | \lambda, x^r) = \lambda^P(z^r) \equiv \Pr(\theta = \theta^r | \lambda^L, z^r) = \frac{\mu \lambda}{\mu \lambda + (1 - \mu)(1 - \lambda)} \quad (\text{B.15})$$

$$\lambda^L(x^s) \equiv \Pr(\theta = \theta^r | \lambda, x^s) = \lambda^P(z^s) \equiv \Pr(\theta = \theta^r | \lambda^L, z^s) = \frac{(1 - \mu) \lambda}{\mu(1 - \lambda) + (1 - \mu) \lambda}. \quad (\text{B.16})$$

B.3 Comparative Statics: Homogeneous and heterogeneous Signals and Costs

B.3.1 Comparative Statics: $\underline{\lambda}$, $\bar{\lambda}$, and Λ

Homogeneous Information Signals and Costs The quantitative comparative statics follow from the first-order derivatives of $\underline{\lambda}$ and $\bar{\lambda}$ with $\epsilon^P = \epsilon^L = \eta^P = \eta^L \equiv \mu$ and $e^P \equiv e$ and the quotient rule with $0 \leq \lambda \leq 1$.

$$\frac{\partial \underline{\lambda}}{\partial \alpha} = \frac{2c(\mu - 1)\mu - e}{(\alpha - 2c\mu + c)^2} < 0 \text{ and } \frac{\partial \bar{\lambda}}{\partial \alpha} = \frac{2c(\mu - 1)\mu + e}{(\alpha + c(2\mu - 1))^2} \gtrless 0; \quad (\text{B.17})$$

$$\frac{\partial \underline{\lambda}}{\partial c} = \frac{e(2\mu - 1) - 2\alpha(\mu - 1)\mu}{(\alpha - 2c\mu + c)^2} > 0 \text{ and } \frac{\partial \bar{\lambda}}{\partial c} = \frac{e(2\mu - 1) - 2\alpha(\mu - 1)\mu}{(\alpha + c(2\mu - 1))^2} > 0; \quad (\text{B.18})$$

$$\frac{\partial \underline{\lambda}}{\partial e} = \frac{1}{\alpha - 2c\mu + c} > 0 \text{ and } \frac{\partial \bar{\lambda}}{\partial e} = \frac{1}{-\alpha - 2c\mu + c} < 0; \quad (\text{B.19})$$

$$\frac{\partial \underline{\lambda}}{\partial \mu} = \frac{-\alpha^2 + c^2 + 2ce}{(\alpha - 2c\mu + c)^2} < 0 \text{ and } \frac{\partial \bar{\lambda}}{\partial \mu} = \frac{\alpha^2 - c^2 + 2ce}{(\alpha + c(2\mu - 1))^2} > 0. \quad (\text{B.20})$$

The quantitative comparative statics follow from the first-order derivatives of the updating range Λ with $\epsilon^P = \epsilon^L = \eta^P = \eta^L \equiv \mu$ and $e^P \equiv e$ and the quotient rule with $0 \leq \lambda \leq 1$.

$$\frac{\partial \Lambda}{\partial \alpha} = \frac{2(\alpha^2 e - c^2(2\mu - 1)(4\alpha(\mu - 1)\mu - 2e\mu + e))}{(\alpha - 2c\mu + c)^2(\alpha + c(2\mu - 1))^2} > 0; \quad (\text{B.21})$$

$$\frac{\partial \Lambda}{\partial c} = \frac{4\alpha c(2\mu - 1)(2\alpha(\mu - 1)\mu - 2e\mu + e)}{(\alpha - 2c\mu + c)^2(\alpha + c(2\mu - 1))^2} < 0; \quad (\text{B.22})$$

$$\frac{\partial \Lambda}{\partial e} = -\frac{2\alpha}{(\alpha - 2c\mu + c)(\alpha + c(2\mu - 1))} < 0; \quad (\text{B.23})$$

$$\frac{\partial \Lambda}{\partial \mu} = -\frac{2(-\alpha^4 + c^4(1 - 2\mu)^2 - 4\alpha c^2(\alpha(\mu - 1)\mu - 2e\mu + e))}{(\alpha - 2c\mu + c)^2(\alpha + c(2\mu - 1))^2} > 0. \quad (\text{B.24})$$

Heterogeneous Information Signals and Costs The quantitative comparative statics follow from the first-order derivatives of $\underline{\lambda}$ and $\bar{\lambda}$ and the quotient rule with $0 \leq \lambda \leq 1$.

$$\frac{\partial \underline{\lambda}}{\partial \alpha} = \frac{2c\epsilon^P(\eta^P - 1) - e^P(1 + \epsilon^P - \eta^P)}{(c(\epsilon^P + \eta^P - 1) - \alpha(1 + \epsilon^P - \eta^P))^2} < 0 \text{ and } \frac{\partial \bar{\lambda}}{\partial \alpha} = \frac{2c(\epsilon^P - 1)\eta^P + e^P(1 - \epsilon^P + \eta^P)}{(\alpha(1 - \epsilon^P + \eta^P) + c(\epsilon^P + \eta^P - 1))^2} \gtrless 0; \quad (\text{B.25})$$

$$\frac{\partial \underline{\lambda}}{\partial c} = \frac{2\alpha\epsilon^P(1 - \eta^P) + e^P(\epsilon^P + \eta^P - 1)}{(c(\epsilon^P + \eta^P - 1) - \alpha(1 + \epsilon^P - \eta^P))^2} > 0 \text{ and } \frac{\partial \bar{\lambda}}{\partial c} = \frac{2\alpha(1 - \epsilon^P) + e^P(\epsilon^P + \eta^P - 1)}{(\alpha(1 - \epsilon^P + \eta^P) + c(\epsilon^P + \eta^P - 1))^2} > 0; \quad (\text{B.26})$$

$$\frac{\partial \underline{\lambda}}{\partial e^P} = \frac{2\alpha\epsilon^P(1 - \eta^P) + e^P(\epsilon^P + \eta^P - 1)}{\alpha(1 + \epsilon^P - \eta^P) - c(\epsilon^P + \eta^P - 1)} > 0 \text{ and } \frac{\partial \bar{\lambda}}{\partial e^P} = \frac{1}{\alpha(1 - \epsilon^P + \eta^P) + c(\epsilon^P + \eta^P - 1)} < 0; \quad (\text{B.27})$$

$$\frac{\partial \underline{\lambda}}{\partial \epsilon^P} = \frac{(c - \alpha)(e^P + (\alpha + c)(1 - \eta^P))}{(c(\epsilon^P + \eta^P - 1) - \alpha(1 + \epsilon^P - \eta^P))^2} < 0 \text{ and } \frac{\partial \bar{\lambda}}{\partial \epsilon^P} = \frac{(\alpha - c)((\alpha + c)\eta^P - e^P)}{(\alpha(1 - \epsilon^P + \eta^P) + c(\epsilon^P + \eta^P - 1))^2} > 0; \quad (\text{B.28})$$

$$\frac{\partial \underline{\lambda}}{\partial \eta^P} = \frac{(\alpha + c)(e^P + (c - \alpha)\epsilon^P)}{(c(\epsilon^P + \eta^P - 1) - \alpha(1 + \epsilon^P - \eta^P))^2} < 0 \text{ and } \frac{\partial \bar{\lambda}}{\partial \eta^P} = \frac{(\alpha + c)(e^P + (\alpha - c)(1 - \epsilon^P))}{(\alpha(1 - \epsilon^P + \eta^P) + c(\epsilon^P + \eta^P - 1))^2} > 0. \quad (\text{B.29})$$

B.3.2 Comparative Statics: $\underline{\lambda}'$ and $\bar{\lambda}'$

Homogeneous Information Signals and Costs The quantitative comparative statics follow from the first-order derivatives of $\underline{\lambda}'$ with $\epsilon^P = \epsilon^L = \eta^P = \eta^L \equiv \mu$ and $e^P \equiv e$ and the quotient rule with $0 \leq \lambda \leq 1$.

$$\frac{\partial \underline{\lambda}'}{\partial \alpha} = \frac{e(-2\mu^2 + 2\mu - 1) + 2(\mu - 1)\mu y^P}{(\alpha + (e + y^P)(2\mu - 1))^2} < 0; \quad (\text{B.30})$$

$$\frac{\partial \underline{\lambda}'}{\partial c} = 0; \quad (\text{B.31})$$

$$\frac{\partial \underline{\lambda}'}{\partial e} = \frac{\alpha(2\mu^2 - 2\mu + 1) - y^P(1 - 2\mu)}{\alpha + (e + y^P)(2\mu - 1))^2} \geq 0; \quad (\text{B.32})$$

$$\frac{\partial \underline{\lambda}'}{\partial \mu} = -\frac{\alpha^2 + e^2 - y^{P2}}{\alpha + (e + y^P)(2\mu - 1))^2} < 0; \quad (\text{B.33})$$

$$\frac{\partial \underline{\lambda}'}{\partial y^P} = \frac{e(2\mu - 1) - 2\alpha(\mu - 1)\mu}{\alpha + (e + y^P)(2\mu - 1))^2} > 0. \quad (\text{B.34})$$

The quantitative comparative statics follow from the first-order derivatives of $\bar{\lambda}'$ with $\epsilon^P = \epsilon^L = \eta^P = \eta^L \equiv \mu$ and $e^P \equiv e$ and the quotient rule with $0 \leq \lambda \leq 1$.

$$\frac{\partial \bar{\lambda}'}{\partial \alpha} = \frac{-c - 2e(\mu - 1)\mu + (2\mu^2 - 2\mu + 1)y^P}{(\alpha + (2\mu - 1)(y^P - e))^2} \geq 0; \quad (\text{B.35})$$

$$\frac{\partial \bar{\lambda}'}{\partial c} = \frac{1}{\alpha + (2\mu - 1)(y^P - e^P)} > 0; \quad (\text{B.36})$$

$$\frac{\partial \bar{\lambda}'}{\partial e} = \frac{2\alpha(\mu - 1)\mu + c(2\mu - 1) - 2\mu y^P + y^P}{(\alpha + (2\mu - 1)(y^P - e))^2} < 0; \quad (\text{B.37})$$

$$\frac{\partial \bar{\lambda}'}{\partial \mu} = \frac{\alpha^2 + 2c(e - y^P) - e^2 + y^{P2}}{(\alpha + (2\mu - 1)(y^P - e))^2} > 0; \quad (\text{B.38})$$

$$\frac{\partial \bar{\lambda}'}{\partial y^P} = \frac{\alpha(-2\mu^2 + 2\mu - 1) - 2c\mu + c + e(2\mu - 1)}{(\alpha + (2\mu - 1)(y^P - e))^2} < 0. \quad (\text{B.39})$$

Heterogeneous Information Signals and Costs The quantitative comparative statics follow from the first-order derivatives of $\underline{\lambda}'$ and the quotient rule with $0 \leq \lambda \leq 1$.

$$\frac{\partial \underline{\lambda}'}{\partial \alpha} = \frac{2y^P \epsilon^P (\eta^P - 1) + e^P (\epsilon^P + \eta^P - 1 - 2\epsilon^P \eta^P)}{(\alpha(1 + \epsilon^P - \eta^P) - (y^P - e^P)(\epsilon^P + \eta^P - 1))^2} < 0; \quad (\text{B.40})$$

$$\frac{\partial \underline{\lambda}'}{\partial c} = 0; \quad (\text{B.41})$$

$$\frac{\partial \underline{\lambda}'}{\partial e^P} = \frac{\alpha(1 - \eta^P - \epsilon^P + 2\eta^P \epsilon^P) - y^P(\epsilon^P + \eta^P - 1)}{(\alpha(1 + \epsilon^P - \eta^P) - (y^P - e^P)(\epsilon^P + \eta^P - 1))^2} \geq 0; \quad (\text{B.42})$$

$$\frac{\partial \underline{\lambda}'}{\partial \epsilon^P} = \frac{(\alpha - y^P + e^P)((\eta^P - 1)(y^P + \alpha) - \eta^P e^P)}{(\alpha(1 + \epsilon^P - \eta^P) - (y^P - e^P)(\epsilon^P + \eta^P - 1))^2} < 0; \quad (\text{B.43})$$

$$\frac{\partial \underline{\lambda}'}{\partial \eta^P} = \frac{(\alpha + y^P - e^P)(e^P(1 - \epsilon^P) - (\alpha - y^P)\epsilon^P)}{(\alpha(1 + \epsilon^P - \eta^P) - (y^P - e^P)(\epsilon^P + \eta^P - 1))^2} < 0; \quad (\text{B.44})$$

$$\frac{\partial \underline{\lambda}'}{\partial y^P} = \frac{2\alpha\epsilon^P(\eta^P - 1) + e^P(\epsilon^P + \eta^P - 1)}{(\alpha(1 + \epsilon^P - \eta^P) - (y^P - e^P)(\epsilon^P + \eta^P - 1))^2} > 0. \quad (\text{B.45})$$

The quantitative comparative statics follow from the first-order derivatives of $\bar{\lambda}'$ and the quotient rule with $0 \leq \lambda \leq 1$.

$$\frac{\partial \bar{\lambda}'}{\partial \alpha} = \frac{y^P(1 - \epsilon^P - \eta^P + 2\epsilon^P \eta^P) - c(1 - \epsilon^P + \eta^P) - 2e^P(\epsilon^P - 1)}{(\alpha(1 + \epsilon^P - \eta^P) - (y^P - e^P)(\epsilon^P + \eta^P - 1))^2} \geq 0; \quad (\text{B.46})$$

$$\frac{\partial \bar{\lambda}'}{\partial c} = \frac{1}{\alpha(1 + \epsilon^P - \eta^P) - (y^P - e^P)(\epsilon^P + \eta^P - 1)} > 0; \quad (\text{B.47})$$

$$\frac{\partial \bar{\lambda}'}{\partial e^P} = \frac{2\alpha(\epsilon^P - 1)\eta^P - (y^P - c)(\epsilon^P + \eta^P - 1)}{(\alpha(1 + \epsilon^P - \eta^P) - (y^P - e^P)(\epsilon^P + \eta^P - 1))^2} < 0; \quad (\text{B.48})$$

$$\frac{\partial \bar{\lambda}'}{\partial \epsilon^P} = \frac{(y^P - e^P - \alpha)(y^P(1 - \eta^P) - c + (e^P - \alpha)\eta^P)}{(\alpha(1 + \epsilon^P - \eta^P) - (y^P - e^P)(\epsilon^P + \eta^P - 1))^2} < 0; \quad (\text{B.49})$$

$$\frac{\partial \bar{\lambda}'}{\partial \eta^P} = \frac{(e^P - y^P - \alpha)(c - \alpha + \epsilon^P(\epsilon^P - 1) + (\alpha - y^P)\epsilon^P)}{(\alpha(1 + \epsilon^P - \eta^P) - (y^P - e^P)(\epsilon^P + \eta^P - 1))^2} < 0; \quad (\text{B.50})$$

$$\frac{\partial \bar{\lambda}'}{\partial y^P} = \frac{(e^P - c)(\epsilon^P + \eta^P - 1) + \alpha(\epsilon^P + \eta^P - 1 - 2\epsilon^P \eta^P)}{(\alpha(1 + \epsilon^P - \eta^P) - (y^P - e^P)(\epsilon^P + \eta^P - 1))^2} < 0. \quad (\text{B.51})$$

B.4 Comparative Statics – Summary for Heterogeneous Signals and Costs

B.4.1 Purely Informational Lobbying

| Case | $d\epsilon^L$ | $d\epsilon^P$ | de^L | $d\eta^L$ | $d\eta^P$ | $d\lambda$ |
|--|---------------|---------------|--------|-----------|-----------|------------|
| $C1$ $\lambda < \underline{\lambda} \leq \lambda(x^r) < \bar{\lambda}$ | (+) | (+) | (-) | (-) | (-) | (+) |
| $C2$ $\lambda < \underline{\lambda} < \bar{\lambda} \leq \lambda(x^r)$ | (+) | (0) | (-) | (-) | (0) | (+) |
| $C3$ $\underline{\lambda} \leq \lambda(x^s) \leq \lambda \leq \bar{\lambda} \leq \lambda(x^r)$ | (+) | (-) | (-) | (-) | (+) | (+/-) |
| $C4$ $\lambda(x^s) \leq \underline{\lambda} \leq \lambda \leq \bar{\lambda} \leq \lambda(x^r)$ | (+) | (-) | (-) | (-) | (+) | (+/-) |

Table 3: Comparative Statics for the Lobby's Updating Net Payoff – Both Unconstrained.

B.4.2 Informational Lobbying and Policy Implementation Subsidies

| Case | $d\epsilon^L$ | $d\epsilon^P$ | de^L | $d\eta^L$ | $d\eta^P$ | $d\lambda$ | dy^P | de^P | dc |
|---|---------------|---------------|--------|-----------|-----------|------------|--------|--------|-------|
| $C1'$ $\lambda < \underline{\lambda}' \leq \lambda(x^r) < \bar{\lambda}'$ | (+) | (+) | (-) | (-) | (-) | (+) | (+) | (-) | (-) |
| $C2'$ $\lambda < \underline{\lambda}' < \bar{\lambda}' \leq \lambda(x^r)$ | (+) | (0) | (-) | (-) | (0) | (+) | (0) | (0) | (0) |
| $C3'$ $\underline{\lambda}' \leq \lambda(x^s) \leq \lambda \leq \bar{\lambda}' \leq \lambda(x^r)$ | (+) | (-) | (-) | (-) | (+) | (+/-) | (+/-) | (-/+) | (-/+) |
| $C4'$ $\lambda(x^s) \leq \underline{\lambda}' \leq \lambda \leq \bar{\lambda}' \leq \lambda(x^r)$ | (+) | (-) | (-) | (-) | (+) | (+/-) | (-) | (+) | (+) |

Complements
Independent
Substitutes/Damage Ctrl.
Substitutes

Table 4: Comparative Statics for Lobby's Updating Net Payoff – Constrained Policymaker.

B.4.3 Informational Lobbying or Policy Implementation Subsidies

| Case | $d\epsilon^L$ | $d\epsilon^P$ | de^L | $d\eta^L$ | $d\eta^P$ | $d\lambda$ | dy^P | de^P | dc |
|--|---------------|---------------|--------|-----------|-----------|------------|--------|--------|------|
| $C2''$ $\lambda < \underline{\lambda}' \leq \lambda^* < \lambda(x^r)$ | (+) | (0) | (-) | (-) | (0) | (+) | (0) | (0) | (0) |
| $C4''$ $\underline{\lambda}' \leq \{\lambda, \lambda^*\} < \{\lambda(x^r), \bar{\lambda}'\}$ | (+) | (-) | (-) | (-) | (+) | (+/-) | (-) | (+) | (+) |
| CS $\underline{\lambda} < \lambda(z^s) < \lambda^* < \lambda(x^s) < \lambda < \{\bar{\lambda}, \lambda(x^r)\}$ | (0) | (-) | (-) | (0) | (+) | (-) | (-) | (+) | (+) |

Independent
Substitutes
Substitutes

Table 5: Comparative Statics for Lobby's Updating Net Payoff – Both Constrained.

B.5 Extensions

B.5.1 Extension 1: No Informational Lobbying

Here we are solving the general lobbying game with $e^P \neq e^L$, $\epsilon^P \geq \epsilon^L$, and $\eta^P \geq \eta^L$ but $e^L > 1$. Varying the resource constraints for the policymaker and lobby, we are solving each game backward and derive only 1) the policymaker's policy choice, 2) the lobby's policy implementation subsidy, and 3) the policymaker's information choice as informational lobbying would not be beneficial for the lobby. In other words, we are considering the standard sequence of play presented in Figure 2 except for the first stage.

Policy Choice and Implementation Subsidy At the last stage of the lobbying game the policymaker has posterior belief λ^P and chooses whether to reform or to keep the status quo. Comparing the payoffs for each and deriving the policy threshold λ^* , we get as before

$$\begin{aligned}\lambda^P \alpha - c &= (1 - \lambda^P) \alpha \\ \lambda^P &\geq \frac{1}{2} + \frac{c}{2\alpha} \equiv \lambda^*.\end{aligned}\tag{B.52}$$

The implementation subsidies for the various constraints follow from

- i) $\tau^* = 0$ if the policymaker is unconstrained;
- ii) $\tau^* = e^P + c - y^P$ if the policymaker is constrained, received signal z^r , and $e^P + c - y^P \leq 1$.
- iii) $\tau^* = 0$ if the policymaker is constrained and did not receive signal z^r or $e^P + c - y^P > 1$.

This is similar to the characterization of τ^* in (4.1).

Unconstrained Policymaker's Information Choice The lower threshold $\underline{\lambda}$ follows from the policymaker's trade-off between the expected payoff from costly information with uncertain information signal and policy outcome and the expected payoff from the costless status quo without information choice. Note that the policymaker considers the posterior belief about the state of the world, $\lambda^P(z)$, for the expected payoff associated with the expected information signal, $z(\lambda)$. The policymaker gathers information if

$$z^r(\lambda) [y^P - c + \lambda^P(z^r)\alpha] + z^s(\lambda) [y^P + (1 - \lambda^P(z^s))\alpha] - e^P \geq y^P + (1 - \lambda)\alpha.\tag{B.53}$$

Applying each information signal's probability, the updating choice reduces to

$$\lambda \geq \frac{(1 - \eta^P)(\alpha + c) + e^P}{\alpha(1 + \epsilon^P - \eta^P) + c(1 - \epsilon^P - \eta^P)} \equiv \underline{\lambda},\tag{B.54}$$

which defines the lower updating threshold.

The upper threshold $\bar{\lambda}$ follows from the policymaker's trade-off between the expected payoff from costly information with uncertain information signal and policy outcome and the expected payoff from a costly reform without gathering information. The policymaker gathers information if

$$z^r(\lambda) [y^P - e^P - c + \lambda^P(z^r)\alpha] + z^s(\lambda) [y^P - e^P + (1 - \lambda^P(z^s))\alpha] \geq y^P - c + \lambda\alpha. \quad (\text{B.55})$$

Solving for λ , we can write

$$\lambda \leq \frac{\eta^P(\alpha + c) - e^P}{\alpha(1 - \epsilon^P + \eta^P) + c(\epsilon^P + \eta^P - 1)} \equiv \bar{\lambda}, \quad (\text{B.56})$$

which defines the upper updating threshold.

Note that these thresholds are similar to the homogenous case's thresholds presented in (3.2) and similar to the ones of the general model presented in (A.25) and (A.27), with the only difference being $\lambda^L = \lambda$.

Constrained Policymaker's Information Choice The lower threshold $\underline{\lambda}'$ follows again from the policymaker's trade-off between the expected payoff from costly information with uncertain information signal and policy outcome and the expected payoff from the costless status quo without gathering information. Note that the policymaker anticipates a policy implementation subsidy of $\tau = e^P + c - y^P$ in the case of a reform signal and zero otherwise. The policymaker gathers information if

$$\begin{aligned} z^r(\lambda) [y^P - e^P - c + \tau(z^r) + \lambda^P(z^r)\alpha] + z^s(\lambda) [y^P - e^P + \tau(z^s) + (1 - \lambda^P(z^s))\alpha] &\geq y^P + (1 - \lambda)\alpha \\ \Rightarrow z^r(\lambda)\lambda^P(z^r)\alpha + z^s(\lambda) [y^P - e^P + (1 - \lambda^P(z^s))\alpha] &\geq y^P + (1 - \lambda^L)\alpha. \end{aligned} \quad (\text{B.57})$$

Applying each information signal's probability, the updating choice reduces to

$$\lambda \geq \frac{(1 - \eta^P)(\alpha + y^P) + \eta^P e^P}{(1 - \eta^P)(\alpha + y^P - e^P) + \epsilon^P(\alpha + e^P - y^P)} \equiv \underline{\lambda}', \quad (\text{B.58})$$

which defines the new lower updating threshold.

The upper threshold $\bar{\lambda}'$ follows again from the policymaker's trade-off between costly information and costly reform without gathering information. The policymaker gathers information if

$$z^r(\lambda) [y^P - e^P - c + \tau(z^r) + \lambda^P(z^r)\alpha] + z^s(\lambda) [y^P - e^P + \tau(z^s) + (1 - \lambda^P(z^s))\alpha] \geq y^P - c + \lambda\alpha$$

$$\Rightarrow z^r(\lambda)\lambda^P(z^r)\alpha + z^s(\lambda) [y^P - e^P + (1 - \lambda^P(z^s))\alpha] \geq y^P - c + \lambda\alpha. \quad (\text{B.59})$$

Solving for λ , we can write

$$\lambda \leq \frac{(\alpha + y^P - e^P)\eta^P + c - y^P}{(\alpha + y^P - e^P)\eta^P + (\alpha - y^P + e^P)(1 - \epsilon^P)} \equiv \bar{\lambda}', \quad (\text{B.60})$$

which defines the new upper updating threshold.

Note that these thresholds are similar to the homogenous case's thresholds underlying Proposition 2 and similar to the ones of the general model presented in (A.34) and (A.36), with the only difference being $\lambda^L = \lambda$.

B.5.2 Extension 2: Contributions in Stages

Suppose now that the policymaker's resource constraint binds even more tightly such that they can afford neither information nor to implement a reform. There are two possible cases here. One case involves policy subsidies as before; the other case independent subsidies for information gathering and implementing reforms.⁴⁷ We focus our analysis here on the general case with $e^P \geq e^L$, $\epsilon^P \geq \epsilon^L$, and $\eta^P \geq \eta^L$.

In the first case, which is illustrated in Figure 15, the lobby must first decide whether to gather information, then whether to offer a policy implementation subsidy. Hence, if a reform signal is generated, they then offer a policy implementation subsidy and the lobbying instruments are complements, if a status quo signal is generated they are independent.

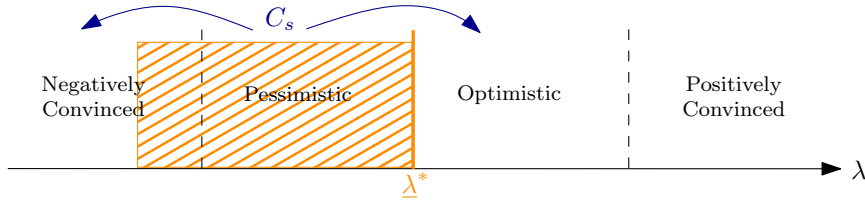


Figure 15: Cases for Lobby's Information Choices – Very Constrained Policymaker.

In the second case, a lobby may benefit from the additional flexibility of providing subsidies in stages. Suppose that $y^P < \min\{c, e^P\}$ and $y^L \geq e^L + e^P + c - y^P$ and that the lobby can contribute before and after a policymaker's information stage. The policymaker's lack of resources implies that a lobby has to provide a policy implementation subsidy whenever the policymaker wants to implement a reform. Whether the lobby engages in information gathering, or subsidizes information gathering by the policymaker, or both, determines the various possible cases.

Proposition 5. *If the policymaker's constraint is very binding and the lobby contributes in stages, then the lobby's choices of gathering and subsidizing information follow the same patterns of complements, substitutes, and independence as when the policymaker can afford information.*

The lobby's trade-offs between informational lobbying, subsidizing information, and policy implementation subsidies follow from the same strategic considerations as before. The differences are that; i) a lobby's policy subsidy is always complementary to its other two instruments, and, ii) a lobby can induce a reform the lower standard, $\lambda^L \geq \lambda^*$ instead of $\lambda^L \geq \bar{\lambda}'$. The lobby

⁴⁷Mathematically, the policymaker's resource constraint is $y^P < \min\{c, e^P\}$. Information subsidies from the lobby to the policymaker may arise when the policymaker cannot afford neither to investigate or implement a policy (presented as an illustration), or when the policymaker has sufficient resources for a policy change but not for gathering information, $e^P > y^P \geq c$. The implications of the latter are very similar and we discuss here the more extensive case.

can achieve the latter by strategically withholding an information subsidy from the policymaker, leaving them with the decision to implement reform or not given their belief.

The lobbying instruments of information subsidies and informational lobbying follow the same pattern and illustrate when the lobby chooses to use its own information technology, prefers to subsidize the use of the policymaker's, or does both.⁴⁸ For example, when the policymaker is negatively convinced, reform may require two reform signals, and the lobby may engage in informational lobbying and subsidizing the policymaker's information gathering as complimentary instruments. Similarly, when a policymaker would like to gather information, then the lobby may either gather information on its own and de facto prevent a policymaker gathering information by denying an information subsidy or subsidize the policymaker to gather information and implement a reform – which would imply that both lobbying instruments are substitutes.

The lack of resources implies that a lobby can achieve a reform with greater probability than when the policymaker's constraint is less binding. The possibility of contributions in stages allows the lobby more flexibility such that it has the option of subsidizing the policymaker to gather information and then choosing whether or not to subsidize a reform. However, this comes at two costs: i) the lobby has to provide greater resources to achieve its policy goals, and, ii) the lobby's choices may not involve the socially optimal level of information gathering.⁴⁹

Proof of Proposition 5 Solving the game backward, we consider 1) the policymaker's policy choice, 2) the lobby's policy implementation subsidy, 3) the policymaker's information choice, 4) the lobby's information subsidy, and 5) the lobby's information choice.

1. The policymaker's policy choice follows from the expected payoffs from keeping the status quo or implementing a reform. We have

$$\begin{aligned}\lambda^P \alpha - c &\geq (1 - \lambda^P) \alpha \\ \lambda^P &\geq \frac{1}{2} + \frac{c}{2\alpha},\end{aligned}\tag{B.61}$$

which is identical to the other cases.

2. The lobby's policy implementation subsidy can be described by

$$\tau(\lambda^P) = \begin{cases} c - \bar{y}^P & \text{if } \lambda^P \geq \lambda^* \text{ and } 1 > c - \bar{y}^P \\ 0 & \text{otherwise,} \end{cases}\tag{B.62}$$

⁴⁸Table 6 in Supplemental Appendix B.5.2 illustrates details on the lobbying patterns.

⁴⁹The welfare implications follow from our analysis that can be found in Supplemental Appendix B.5.3.

where $\bar{y}^P = 0$ if the policymaker gathered information and $\bar{y}^P = y^P$ if she did not.

3. The policymaker cannot gather information if the lobby did not provide an information subsidy – i.e., when $\tau(\lambda^L) = 0$. However, if the lobby provided an information subsidy, $\tau(\lambda^L) = e^P - y^P$, then the policymaker can either choose no information gathering and status quo, no information gathering and reform, or information gathering and π based on z^j with $j = r, s$. The information choice thresholds, for which a policymaker would anticipate a policy implementation subsidy later, follow the same logic as before: the policymaker chooses between information and status quo or information and reform. The lower threshold with applied subsidies follows from

$$z^r(\lambda^L)\alpha\lambda^L(z^r) + z^s(\lambda^L)\alpha(1 - \lambda^L(z^s)) \geq \alpha(1 - \lambda^L) + y^P \quad (\text{B.63})$$

$$\Rightarrow \lambda^L \geq \frac{y^P + \alpha(1 - \eta^P)}{\alpha(1 + \epsilon^P - \eta^P)} \equiv \underline{\lambda}'' \quad (\text{B.64})$$

The upper threshold with applied subsidies follows from

$$\begin{aligned} z^r(\lambda^L)\alpha\lambda^L(z^r) + z^s(\lambda^L)\alpha(1 - \lambda^L(z^s)) &\geq \alpha\lambda^L + \overbrace{y^P - c + \tau(\lambda^P)}^{=0} \\ \Rightarrow \lambda^L &\leq \frac{\eta^P}{1 - \epsilon^P + \eta^P} \equiv \bar{\lambda}'' \end{aligned} \quad (\text{B.65})$$

4. The lobby's information subsidy follows the rationale that a policymaker's information gathering would benefit the lobby in expected terms. If $\lambda^* < \lambda^L$, then a policymaker, who could not gather information, would implement a reform with probability one and the lobby would not gain from a policymaker updating. If $\lambda^L < \underline{\lambda}'$, then the policymaker would not use an information subsidy for gathering information and the lobby has no rationale to make a contribution. Hence, the lobby would only consider an information subsidy if $\underline{\lambda}' < \lambda^L < \lambda^* \leq \lambda^L(z^r)$. The lobby's information subsidy can be described by

$$\tau(\lambda^L) = \begin{cases} e^P - y^P & \text{if } \underline{\lambda}' < \lambda^L < \lambda^* \leq \lambda^L(z^r) \text{ and } z^r(\lambda^L)(1 - c) \geq 0 \\ 0 & \text{otherwise.} \end{cases} \quad (\text{B.66})$$

5. The lobby's updating choice follows from the rationale that an information signal could induce the policymaker to gather subsidized information or could induce the policymaker to reform. Because of the lobby's ability to constrain the policymaker's information gathering, the lobby will not gather information if $\lambda^* < \lambda$. The four cases of interest are then i)

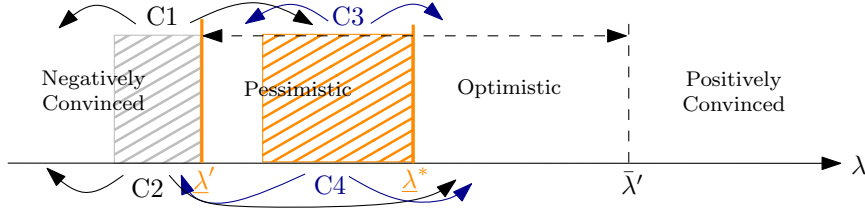


Figure 16: Lobby's Updating Cases – Entirely Constrained Policymaker and Contributions in Stages.

$\lambda < \underline{\lambda}' \leq \lambda(x^r) < \lambda^*$, ii) $\lambda < \underline{\lambda}' < \lambda^* \leq \lambda(x^r)$, iii) $\underline{\lambda}' \leq \lambda(x^s) \leq \lambda \leq \lambda^* \leq \lambda(x^r)$, and iv) $\lambda(x^s) \leq \underline{\lambda}' \leq \lambda \leq \lambda^* \leq \lambda(x^r)$, all of which are illustrated in Figure 16.

For i) $\lambda < \underline{\lambda}' \leq \lambda(x^r) < \lambda^*$ the lobby compares the expected payoff from gathering information and a potential, subsidized policymaker information gathering with the certain payoff from the status quo. The lobby gathers information if

$$\begin{aligned} x^r(\lambda) (z^r(\lambda(x^r))(1-c) - e^P + y^P) &\geq e^L \\ (\epsilon^P \epsilon^L \lambda + (1 - \eta^P)(1 - \eta^L)(1 - \lambda)) (1 - c) - (1 - \eta^L - \lambda(1 - \epsilon^L - \eta^L)) (e^P - y^P) &\geq e^L \end{aligned} \quad (\text{B.67})$$

For ii) $\lambda < \underline{\lambda}' < \lambda^* \leq \lambda(x^r)$ the lobby compares the expected payoff from gathering information and no policymaker information gathering with the certain payoff from the status quo. The lobby gathers information if

$$\begin{aligned} x^r(\lambda)(1 - c + y^P) &\geq e^L \\ (1 - \eta^L - \lambda(1 - \epsilon^L - \eta^L)) (1 - c + y^P) &\geq e^L. \end{aligned} \quad (\text{B.68})$$

iii) For $\underline{\lambda}' \leq \lambda(x^s) \leq \lambda \leq \lambda^* \leq \lambda(x^r)$ the lobby has to choose whether it would subsidize a policymaker's information gathering and whether it would subsidize a second information signal. Suppose $z^r(\lambda(x^s))(1-c) \geq e^P - y^P$, which implies $z^r(\lambda)(1-c) \geq e^P - y^P$, then the lobby would subsidize both information signals. The lobby compares the expected payoff from gathering information and either a reform or a subsidized policymaker information gathering with the expected payoff from a subsidized policymaker information gathering. The lobby gathers information if

$$\begin{aligned} x^r(\lambda)(1 - c + y^P) - x^s(\lambda)(e^P - y^P) + x^s(\lambda)z^r(\lambda)(1 - c) - e^L &\geq z^r(\lambda)(1 - c) - e^P + y^P \\ (1 - c)((\eta^L - 1)\eta^P(\lambda - 1) - \lambda\epsilon^L(\epsilon^P - 1)) - e^L + e^P(\eta^L(\lambda - 1) + \lambda(\epsilon^L - 1) + 1) &\geq 0 \end{aligned} \quad (\text{B.69})$$

Now suppose $z^r(\lambda(x^s))(1-c) < e^P - y^P$ but $z^r(\lambda)(1-c) \geq e^P - y^P$, then the lobby

| Lobby gathers information for... | $d\epsilon^L$ | $d\epsilon^P$ | de^L | $d\eta^L$ | $d\eta^P$ | $d\lambda$ | dy^P | de^P | dc |
|--|---------------|---------------|--------|-----------|-----------|------------|--------|--------------------------------|-------|
| <i>Case S1</i> $\lambda < \lambda' \leq \lambda(x^r) < \lambda^*$ | (+/-) | (+) | (-) | (+/-) | (-) | (+/-) | (+) | (-) <i>Compl./Compl.</i> | (-) |
| <i>Case S2</i> $\lambda < \lambda' < \lambda^* \leq \lambda(x^r)$ | (+) | (0) | (-) | (-) | (0) | (+) | (+) | (0) <i>Ind./Compl.</i> | (-) |
| <i>Case S3</i> $\lambda' \leq \lambda(x^s) \leq \lambda \leq \lambda^* \leq \lambda(x^r)$ $\tau(\lambda(x^s)) > 0, \tau(\lambda) > 0$ | (+) | (-) | (-) | (-) | (+) | (+/-) | (0) | (+) <i>Subs./Dam. Ctrl.</i> | (+/-) |
| $\tau(\lambda(x^s)) = 0, \tau(\lambda) > 0$ | (+) | (-) | (-) | (-) | (+) | (+/-) | (-) | (+) <i>Subs./Dam. Ctrl.</i> | (+/-) |
| $\tau(\lambda(x^s)) = 0, \tau(\lambda) = 0$ | (+) | (0) | (-) | (-) | (0) | (+) | (+) | (0) <i>Ind./Compl.</i> | (-) |
| <i>Case S4</i> $\lambda(x^s) \leq \lambda' \leq \lambda \leq \lambda^* \leq \lambda(x^r)$ $\tau(\lambda) > 0$ | (+) | (-) | (-) | (-) | (+) | (i) | (-) | (+) <i>Substitutes</i> | (+/-) |
| $\tau(\lambda) = 0$ | (+) | (0) | (-) | (-) | (0) | (+) | (+) | (0) <i>Ind./Compl.</i> | (-) |

Table 6: Comparative Statics for Lobby's Updating Net Payoff – Contributions in Stages.

would subsidize a policymaker information gathering but not a second information signal. The lobby compares the expected payoff from information gathering and either a reform or status quo with the expected payoff from a subsidized policymaker information gathering. The lobby gathers information if

$$x^r(\lambda)(1 - c + y^P) - e^L \geq z^r(\lambda)(1 - c) - e^P + y^P$$

$$(\epsilon^L \lambda + (1 - \eta^L)(1 - \lambda))(1 - c + y^P) - e^L \geq (\epsilon^L \lambda + (1 - \eta^L)(1 - \lambda))(1 - c) - e^P \quad (\text{B.70})$$

Finally, suppose $z^r(\lambda)(1 - c) < e^P - y^P$ and the lobby would not subsidize any policymaker information gathering, then the comparison would be the one of (B.68).

For iv) $\lambda(x^s) \leq \lambda' \leq \lambda \leq \lambda^* \leq \lambda(x^r)$ the lobby has to choose whether it would subsidize a policymaker's information signal. Suppose $z^r(\lambda)(1 - c) \geq e^P - y^P$. The lobby then compares the expected payoff from information and either reform or status quo with the expected payoff from a policymaker information gathering. Then the comparison would be the one of (B.70). Finally, suppose the lobby would not subsidize a policymaker's information gathering, $z^r(\lambda)(1 - c) < e^P - y^P$, then the comparison would be the one of (B.68).

Table 6 illustrates the qualitative comparative statics and relationships between costly informational lobbying and information subsidy as well as informational lobbying and policy implementation subsidy.

We summarize the results in Table 6.

B.5.3 Extension 3: Detailed Social Welfare Implications

To consider the welfare implications of our analysis, we restrict the social planner's choices to those made by the lobbyist and the policymaker. Then a deviation of the described market solution from the welfare optimum can occur for only three reasons; firstly, they arise because the lobbyist's and planner's objectives differ; secondly, the constraints faced by the planner are less binding than either those faced by the policymaker or lobbyist; or finally, a cost may not be internalized by the lobbyist or policymaker but will be by the planner. Employing (2.1) and (2.1), we write the social welfare function as

$$E[U^P(\pi, \theta)] + \sum_{k=L,P} y^k - fe^P - he^L - gc, \quad (\text{B.71})$$

where we have assumed that the lobbyist's benefit from reform is a pure transfer. Hence, $E[U^L(\pi, \theta)]$ does not appear in the social welfare function. Notice immediately that the incentives of the policymaker and social planner are perfectly aligned and therefore only the three distortions mentioned above may occur. We begin by assuming that neither budget constraint would independently bind on either a lobby or policymaker; then we will consider the scenario in which the policymaker's budget constraint is binding.

Neither Budget Constraint is Binding In the case where neither of the budget constraints binds, and given that the incentives of the policymaker and planner are aligned, it follows that the deviation of the market outcome from the welfare optimum arises from differences in the lobbyist's and planner's objectives, and the lobbyist's failure to internalize the policymaker's information and policy implementation cost. Given that for any common prior the policymaker and planner would both make the same information choices and subsequent choice between reform and status quo, it follows that any deviation of the market outcome from the welfare optimum follows from differences between the lobbyist's and planner's choices over purchasing the signal x .

We explore this question by asking what initial priors are required for the lobbyist and planner to gather x . We employ the case where two reform signals x^r and z^r are required for the policymaker or planner to choose reform. That is

$$\lambda(x^r, z^r) > \frac{1}{2} + \frac{c}{2\alpha} > \text{Max}\{\lambda(x^r), \lambda(z^r)\}. \quad (\text{B.72})$$

In this case (A.29) tells us that a lobbyist will choose to gather the signal x iff

$$\epsilon^P \epsilon^L \lambda + (1 - \eta^P)(1 - \eta^L)(1 - \lambda) \geq e^L. \quad (\text{B.73})$$

Which is satisfied if

$$\lambda \geq \frac{e^L - (1 - \eta^P)(1 - \eta^L)}{\epsilon^P \epsilon^L - (1 - \eta^P)(1 - \eta^L)} \equiv \lambda_x^L. \quad (\text{B.74})$$

Whereas employing (B.1)-(B.4) and (B.13)-(B.14) as well as (B.11)-(B.12), we may show that a planner will choose to gather information if

$$\begin{aligned} & \alpha [\epsilon^P \epsilon^L \lambda - (1 - \eta^P)(1 - \eta^L)(1 - \lambda)] \\ & \geq e^L + e^P [\epsilon^L \lambda + (1 - \eta^L)(1 - \lambda)] + c [\epsilon^P \epsilon^L \lambda + (1 - \eta^P)(1 - \eta^L)(1 - \lambda)], \end{aligned} \quad (\text{B.75})$$

which in turn is satisfied if

$$\lambda \geq \frac{e^L + e^P(1 - \eta^L) + c(1 - \eta^P)(1 - \eta^L)}{\alpha [\epsilon^P \epsilon^L + (1 - \eta^P)(1 - \eta^L)] + e^P [(1 - \eta^L) - \epsilon^L] + c [(1 - \eta^P)(1 - \eta^L) - \epsilon^P \epsilon^L]} \equiv \lambda_x^s. \quad (\text{B.76})$$

Notice that λ_x^L is invariant with respect to α, e^P , and c whereas λ_x^s is increasing in each of these variables (since signals are informative). It then follows that for α, e^P , or c sufficiently large the social planner will gather less information than the lobbyist. This is just the lobby failing to internalize all costs and benefits. We may isolate the different incentives of the lobbyist and planner to gather x arising purely from their valuation of information by letting $e^P = c = 0$ and $\alpha = 1$, that is effectively “turning-off” the other sources of distortions. Notice that we can interpret $\alpha = 1$ as the lobbyist capturing all the rents from a reform when it is socially desirable. The condition $\lambda_x^L \gtrless \lambda_x^s$ may then be written

$$2e^L - \epsilon^L \epsilon^P - (1 - \eta^L)(1 - \eta^P) \gtrless 0. \quad (\text{B.77})$$

From which we observe that if there are almost equal chances of reform signals and status quo when the state is reform $\epsilon^L \epsilon^P \rightarrow 1/4$ and/or there are almost always status quo signals when the state is status quo $(1 - \eta^L)(1 - \eta^P) \rightarrow 0$, then there is a tendency for the lobbyist to gather less information than the planner. Conversely, if there are almost always reform signals when the state is reform $\epsilon^L \epsilon^P \rightarrow 1$ and/or there are almost equal status quo signals and reform when the state is status quo $(1 - \eta^L)(1 - \eta^P) \rightarrow 1/2$, then there is a tendency for the lobbyist to gather more information than the planner.

The Policymaker's Budget Constraint is Binding The immediate implication of this configuration of constraints is that the lobbyist can choose to gather information by purchasing the signal x , in which case there does not exist a transfer that allows the policymaker to both gather information in the form of the signal z and finance the cost of reform c . This provides an example of how the lobbyist may strategically gather information so as to limit the transfer they can afford, and hence manipulate the policymaker's choices via their budget constraint. A planner who makes all of the choices will in certain circumstances prefer to purchase the signal z rather than the signal x .

Employing (2.1) and (2.2), we write the social welfare function as

$$E[U^P(\pi, \theta)] + y^P - e^P - c + y^L - e^L, \quad (\text{B.78})$$

where we have assumed that the lobby's benefit from reform is a pure transfer. Hence, $E[U^L(\pi, \theta)]$ does not appear in the social welfare function. We begin by assuming that neither budget constraint would independently bind on either a lobby or policymaker.

Here we consider the case

$$\text{Max}\{c + e^L, c + e^P\} < y^L + y^P < e^L + e^P + c \text{ and } y^P < e^P + c. \quad (\text{B.79})$$

The immediate implication of this configuration of constraints is that the lobby can choose to strategically gather the signal x , in which case there does not exist a transfer that allows the policymaker to both gather the signal z and finance the cost of reform c . This provides an example of how the lobbyist may gather a signal so as to limit the transfer they can afford and hence manipulate the policymaker's choices via their budget constraint. A planner who makes all of the choices will in certain circumstances prefer to gather the signal z rather than the signal x . In this case the lobbyist will choose to gather x if (A.43) is satisfied, which may be rewritten as

$$\epsilon^L \lambda + (1 - \eta^L)(1 - \lambda) - e^L \geq (\epsilon^P \lambda + (1 - \eta^P)(1 - \lambda)) (1 - c - e^P + y^P), \quad (\text{B.80})$$

which again may be rewritten as a condition on the initial common prior

$$\lambda \geq \frac{e^L + (1 - c - e^P + y^P)(1 - \eta^P) - (1 - \eta^L)}{\epsilon^L - (1 - \eta^L) - (1 - c - e^P + y^P)(\epsilon^P - (1 - \eta^P))} \equiv \lambda_x^L. \quad (\text{B.81})$$

In a similar fashion the planner will choose to gather z rather than x if

$$z^r(\lambda) [\alpha \lambda (z^r) - e^P - c] + z^s(\lambda) [\alpha (1 - \lambda (z^s)) - e^P]$$

| Case | Unconstrained Policymaker | | Constrained Policymaker | | |
|-------|---|------------------------|---|------------------------|------------------------|
| | Beliefs | Informational Lobbying | Beliefs | Informational Lobbying | Implementation Subsidy |
| C1 | $\lambda \leq \underline{\lambda} \leq \lambda(x^r) \leq \bar{\lambda}$ | yes | $\lambda \leq \underline{\lambda}' \leq \lambda(x^r) \leq \bar{\lambda}'$ | | both |
| C2 | $\lambda \leq \underline{\lambda} \leq \bar{\lambda} \leq \lambda(x^r)$ | yes | $\lambda \leq \underline{\lambda}' \leq \bar{\lambda}' \leq \lambda(x^r)$ | yes | no |
| C3(a) | $\underline{\lambda} < \lambda < \lambda^*$ | no | $\underline{\lambda}' < \lambda < \lambda^*$ | no | yes |
| C3(b) | $\underline{\lambda} < \lambda^* < \lambda \leq \bar{\lambda}$ | yes | $\underline{\lambda}' < \lambda^* < \lambda \leq \bar{\lambda}'$ | | either or both |
| C4 | $\lambda(x^s) \leq \underline{\lambda} \leq \lambda \leq \bar{\lambda} \leq \lambda(x^r)$ | no | $\lambda(x^s) \leq \underline{\lambda}' \leq \lambda \leq \bar{\lambda}' \leq \lambda(x^r)$ | no | yes |

Table 7: Comparison of Possibilities for Informational Lobbying and Implementation Subsidies.

$$\begin{aligned}
&\geq x^r(\lambda) [\alpha\lambda(x^r) - e^L - c] + x^s(\lambda) [\alpha(1 - \lambda(x^s)) - e^L] \\
&\Leftrightarrow \alpha\epsilon^P\lambda - [\epsilon^P + (1 - \eta^P)(1 - \lambda)]c + \alpha(1 - \epsilon^P)\lambda - e^P \\
&\geq \alpha\epsilon^L\lambda - [\epsilon^L + (1 - \eta^L)(1 - \lambda)]c + \alpha(1 - \epsilon^L)\lambda - e^L,
\end{aligned} \tag{B.82}$$

which reduces to the condition on the initial common belief

$$\lambda \geq \frac{e^P - e^L + c(\eta^L - \eta^P)}{\epsilon^L - \epsilon^P + c(\eta^L - \eta^P)} \equiv \lambda_z^s. \tag{B.83}$$

We can gain some insights into this distortion by choosing parameter values that “turn-off” the lobby’s informational incentives to gather a signal by assuming $\eta^L = \epsilon^L \rightarrow \frac{1}{2}$ hence any signal the lobbyist receives is uninformative. Further, we assume $\epsilon^P \rightarrow \frac{1}{2}$ and $\eta^P \rightarrow 1$ which provides some incentives for a planner to gather a signal, but is a “worst-case-information-scenario” for the lobby as this maximizes the likelihood of a status quo signal if z is gathered. With these assumptions (B.81) and (B.83) reduce to

$$\lambda \geq \frac{2e^L - 1}{c + e^P - y^P - 1} \equiv \lambda_x^L \quad \text{and} \quad \lambda \geq 1 + \frac{2(e^L - e^P)}{c} \equiv \lambda_z^s. \tag{B.84}$$

It can be shown that a simple sufficient condition for there to exist a range of values of the initial prior, λ , that satisfy both conditions in (B.84) is $e^P \leq \frac{1}{2}$.