Three Essays on Political Economy

by

Patrick L. Warren

Submitted to the Department of Economics
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy in Economics

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

June 2008

© Patrick L. Warren, MMVIII. All rights reserved.

The author hereby grants to MIT permission to reproduce and distribute publicly
paper and electronic copies of this thesis document in whole or in part.

Signature of Author

Department of Economics

Department of Economics

May 15, 2008

Certified by

Daron Acemoglu
Charles P. Kindleberger Professor of Applied Economics
Thesis Supervisor

Certified by

Robert Gibbons
Sloan Distinguished Professor of Organizational Economics and Strategy
Thesis Supervisor

Accepted by

Peter Temin
Elisha Gray II Professor of Economics
Chairman, Departmental Committee on Graduate Studies
Three Essays on Political Economy

by

Patrick L. Warren

Submitted to the Department of Economics on May 15, 2008, in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Economics

Abstract

Essay 1: Allies and Adversaries: The Roles of Appointees in Administrative Policymaking under Separation of Powers

In a system of divided power, public sector agencies are an important front in the day-to-day battle for political supremacy between the executive and the legislature. The executive's key agents in this conflict are his appointees, who are observed playing two broad roles: allies, where they work to help Congress implement policy and adversaries, where they fight with Congress to shift policy strongly in the executive's direction. This paper studies how these two roles arise and what implications they have for the interaction of Congress and the executive in administrative policymaking. Thereby, it highlights how intrinsically motivated bureaucrats combined with hierarchical control affect the ability of the political principals to control the execution of policy. Furthermore, I explore how this interaction shifts under alternative institutional forms, and how it leads appointees to "marry the natives." The model makes several predictions concerning Congressional oversight of bureaucratic agencies. These predictions are broadly supported by an empirical analysis of audit reports released by the Government Accountability Office.

Essay 2: State Parties and State Policies: A Double Regression Discontinuity Approach

This paper identifies the causal effect of partisan power on tax and labor policies in the context of U.S. state legislatures from 1970 to 2000. Using a two dimensional regression discontinuity design, I identify the effect of Democratic control of the state legislature, as compared to divided control or Republican control, on tax burden and the state minimum wage. Using a novel instrumental variables approach, where the instrument is derived from the outcome of close legislative election, I also identify the effect of a marginal shift in the share of Democrats in the legislature on these same policies. To my knowledge this is the first paper to cleanly identify these pure partisan effects. In contrast to its prominence in popular discussions, the resulting estimates for control are quite small, suggesting that the pure partisan effect of control is relatively unimportant in understanding changes in these fiscal and labor policies. The estimates for party mix, however, are larger, suggesting this may be the more important channel by which party affects policy in this setting.

Essay 3: Third-Party Auditors and Political Accountability
The most important tool that citizens have to police the decisions of their elected representatives is the ballot box. But the effectiveness of this tool depends crucially on the citizens' ability to correctly judge whether the politicians they select are doing their best to act in the interests of their constituents. This paper asks when and how specialist third-party auditors, people whose incentives come from outside the particular citizen-politician relationship under consideration, can nonetheless improve the ballot box as a tool of political accountability. I will look at three sorts of auditors: journalist, bureaucrat, and the opposition party, and show that because of the way that they respond to career-concern incentives, by auditing asymmetrically, auditors with incentives similar to journalists are particularly well suited to this role.
Acknowledgments

This project would not have been possible without the support of my wife Pam Warren and the helpful advice and encouragement of the faculty and my colleagues in the department.
Contents

1 Allies and Adversaries: The Roles of Appointees in Administrative Policymaking under Separation of Powers
   1 Introduction ............................................. 9
   2 The Roles in Context .................................... 11
   3 The Baseline Model ..................................... 16
   4 Empirical Determinants of Oversight .................. 31
   5 Alternative Institutional Forms ....................... 42
   6 Conclusions ............................................. 46
   7 Data Appendix ........................................... 47
   8 Theoretical Appendix ................................... 48
   References ................................................ 54

2 State Parties and State Policies: A Double Regression Discontinuity Approach
   1 Theoretical Framework ................................. 72
   2 Data ..................................................... 75
   3 Identification of the Political Effects of Parties .... 76
   4 Baseline Specifications ................................ 81
   5 Alternative Specifications and Robustness .......... 86
   6 Conclusions ............................................. 90
   7 Appendix: Derivation of Mix Instrument from RD-Identification .......... 91
   8 Appendix 2: Theoretical ................................ 92
   References ................................................ 99
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Third-Party Auditors and Political Accountability</td>
<td>113</td>
</tr>
<tr>
<td>1</td>
<td>Third-Party Auditors and Accountability</td>
<td>116</td>
</tr>
<tr>
<td>2</td>
<td>Basic Model, Equilibria, and The Simplified Game</td>
<td>119</td>
</tr>
<tr>
<td>3</td>
<td>Endogenous Reporting in the No-Pandering Equilibrium</td>
<td>133</td>
</tr>
<tr>
<td>4</td>
<td>Endogenous Auditor Incentives</td>
<td>140</td>
</tr>
<tr>
<td>5</td>
<td>Multiple Auditors and Independently Informed Citizens</td>
<td>144</td>
</tr>
<tr>
<td>6</td>
<td>Conclusions</td>
<td>146</td>
</tr>
<tr>
<td>7</td>
<td>Appendix</td>
<td>147</td>
</tr>
<tr>
<td>References</td>
<td></td>
<td>150</td>
</tr>
</tbody>
</table>
I want to thank my advisers Daron Acemoglu, Bob Gibbons, and Jim Snyder for their encouragement and advice. The participants of the Political Economy breakfast, the organizational economics and development lunches, and the 2007 NBER student PE Conference gave excellent suggestions, many of which have improved the paper greatly. I want specifically to thank Ryan Bubb, Dan Carpenter, Alex Debs, Tal Gross, Jeanne Lafortune, Eric Van den Steen, Eric Weese, and Tom Wilkening. This research was undertaken while studying under a National Science Foundation Graduate Research Fellowship.
Allies and Adversaries: The Roles of Appointees in Administrative Policymaking under Separation of Powers

Abstract

In a system of divided power, public sector agencies are an important front in the day-to-day battle for political supremacy between the executive and the legislature. The executive's key agents in this conflict are his appointees, who are observed playing two broad roles: allies, where they work to help Congress implement policy and adversaries, where they fight with Congress to shift policy strongly in the executive's direction. This paper studies how these two roles arise and what implications they have for the interaction of Congress and the executive in administrative policymaking. Thereby, it highlights how intrinsically motivated bureaucrats combined with hierarchical control affect the ability of the political principals to control the execution of policy. Furthermore, I explore how this interaction shifts under alternative institutional forms, and how it leads appointees to "marry the natives." The model makes several predictions concerning Congressional oversight of bureaucratic agencies. These predictions are broadly supported by an empirical analysis of audit reports released by the Government Accountability Office.
1 Introduction

Administrative policymaking in the United States is important, both politically and economically. Take the first session of the 107th Congress. There were 136 public laws passed, of which 27 were “major”. In the same period, administrative agencies made 70 “major” rules changes and 3,369 other rule changes, where “major” changes are those expected to have an impact of at least $100 million on the US economy (Barshay 2001). This is to say nothing of the countless specific adjudications, dispute rulings, and citations. For example, in FY2006 the FDA received 171 new drug submissions. Approval or delay is a purely administrative decision, and it can mean millions of dollars gained or lost. A number of studies have demonstrated that changes in Federal Drug Administration (FDA) policy can have significant economic effects on pharmaceutical research and drug submission (Peltzman 1973, Wiggins 1981). The FDA is not alone in its impact. There are dozens of administrative agencies that are as powerful. If we care about the reality of policy, as experienced on the ground, rather than the generalities of legislation, then the manner and degree in which policy choice and implementation respond to the preferences of various actors involved is a question of first-order importance.

This question is particularly complex in the U.S. system of separate powers, in which one party (the President) appoints the agency managers while another (Congress) dictates policy and oversees its implementation, together with the direct influence of the bureaucratic administrators themselves. Since the appointee is the only actor who interacts with every other actor, one particularly enlightening window into how the interests of these various parties resolve into policy comes by investigating the various roles played by Presidential appointees. Of course, each appointee reacts to her circumstances in her own idiosyncratic way, but most fall into one of two broad roles: Congressional “ally,” in which the appointee helps Congress in overseeing a potentially recalcitrant agency; or “adversary,” in which the appointee fights with her Congressional overseers in an attempt to push policy as far toward the executive as is feasible.

The model, which is formalized in the next section, describes policymaking in a hierarchical bureaucracy with appointment and suggests a reason for the two roles. Policy is enacted by a street-level bureaucrat, whose decision is overseen either directly by Congress or indirectly, through a supervisor. This supervisor is appointed by an independent executive and is also overseen by
Congress. Every agent has policy preferences but is constitutionally and/or organizationally limited in his ability to affect policy. The main strategic interaction is how the Executive carefully chooses a supervisor to affect Congress's oversight costs. Specifically, he makes it relatively inexpensive for Congress to successfully implement a policy close to the executive's preferred policy.

The key theoretical contribution of this paper, and the central rationale for the two roles, comes from an explicit recognition of the hierarchical nature of public bureaucracies. Hierarchy drives the central result: The executive accepts appointees who will not deliver his ideal point, because the alternative is exclusion. A model where the agency is a unitary actor would not deliver these results. All the action is in the interplay between the levels. The model also provides a new explanation for the phenomenon of appointees "marrying the natives," in which an appointee seems to shift her preferences toward those of the agency she has been appointed to lead. Finally, the executive benefits from an independent and ideologically extreme agent, since it makes Congress's outside option worse and so enables the executive to manipulate policy more readily though appointment.

The paper's key empirical contribution is a demonstration that the distribution of Congressional oversight fits the pattern predicted by my organizational model. Specifically, I test a number of the model's implications with regards to Congressional oversight by looking at a new data set on reports by the Government Accountability Office (GAO). Oversight of agencies increases in the degree of executive-Congressional conflict, increases in the degree of agency-Congressional conflict, and these two types of conflict combine to induce and an even higher level of oversight than either would on its own.

Wilson is presumably referring to such a preference shift when he tells of the "remarkable transfiguration" that occurs when some appointees take their oath of office. "Suddenly they see the world through the eyes of their agencies—their unmet needs, their unfulfilled agendas, their loyal and hard-working employees"(Wilson 1989). This effect is jokingly referred to in Washington as "marrying the natives," and even the most initially hostile appointees are not immune. Malcolm Baldrige was Secretary of Commerce under Reagan. During his first weeks, when asked if he could cut $300 million from Commerce's budget, Baldrige responded "I'll see your $300 and raise you $100." Within two years, he was "fighting for every 35 cents and trying to get more." He wanted to guarantee that "my guys back at Commerce don't get their ox gored"(Longman 1988, p.42). According to my model, Baldrige did not change his preferences, but rather he recognized the importance of getting his underlings on board if he wanted to get anything accomplished at all. After all, they are the final implementors of policy.
In the next section, I briefly review what is known about political control of public bureaucracies and place the appointees' two roles in context. In section 3, I lay out the basic model with fixed and exogenously given bureaucrats and wages. The model features supervisor appointment and oversight in a three-level bureaucracy. In this setting, I characterize the parameter space in which the executive appoints administrators of the two types outlined above, the effects this choice has on policy, and the implications for the relative power of the executive versus Congress. I also derive empirical predictions concerning the degree of Congressional oversight. In section 4, I test three predictions of the model in the context of GAO reports and find broad support for the model. In section 5, I extend the model to several alternative institutional forms, in order to highlight what is unique about the basic model and the American system, and section 6 summarizes the contributions and suggests future work.

2 The Roles in Context

The appointee as Congressional ally has played the dominant role in the literature on bureaucracy. Herbert Kaufman, a longtime student of administrative agency politics, talks about Congress's "awesome arsenal" to keep agency heads in line. According to Kaufman, "No external group or institution enjoyed quite so commanding a position as Congress"(Kaufman 1982, p.184). Wilson (1989) notes that not many Presidents have made a determined effort to undermine this close relationship, despite the seemingly serious loss of control that it entails. My model suggests a reason for the executive's equanimity. By choosing an appointee who reduces Congress's cost of oversight for a certain range of policies, the executive makes it easy for Congress to enact the executive's preferred policy. To the outsider, it looks like the appointee is very responsive to Congress, doing the dirty work in supervising the agency, and she is. But the executive has carefully chosen the supervisor to induce Congress to implement his policy. I predict the Congressional "ally" to be more likely when the President and Congress are ideologically close, when Congress cares less about the
policy, when the bureaucratic agent is difficult to oversee, when the agency is very ideologically committed, and when the agency is very ideologically extreme.

Although Congressional allies have received a lot of attention in the literature, US political history is rife with examples of adversarial appointees heading important agencies. Philip Heymann tells the story of a successful reform of the Federal Trade Commission (Heymann 1987). Caspar Weinberger took over a slumbering FTC in 1970. By all measures the FTC did very little enforcement on either of its mandates, anti-trust or consumer protection, prior to his arrival, and what little they did was focused on ancillary issues, such as fur and textile labeling. Weinberger, and later his successor Miles Kirkpatrick, formulated a broad strategy focused on stamping out deceptive advertising and succeeded in revitalizing the agency in the face of serious opposition from the chair of the appropriations subcommittee which oversaw it. In my model, adversaries such as Kirkpatrick and Weinberger are selected by the executive when no appointee can reduce Congress’s costs enough to push policy all the way to the executive’s ideal point, and so the President selects the most extreme candidate who will not be excluded by Congress.² I find that adversaries are more likely when Congress and the President are ideologically divided, policy is important to Congress, the agent is easy to oversee, and the agency is not very ideologically extreme or committed.

Recognizing that agency policymaking and implementation are at least as important as legislation, political scientists have studied it for decades (Cushman 1941, Downs 1964)(for a summary, see Spence (1997) or Moe (1997)). More recently, several camps have formed, each with a preferred story of the dominant party in the policy struggle. The earliest of these modern theories represent a radically independent bureaucrat, able to impose his preferences due to a strong informational

²In addition to successful adversaries, there is infrequently an appointee who is too ideologically extreme to effectively influence policy at the agency: a failed adversary. Here, the paradigmatic example is Reagan EPA appointee Anne M. Gorsuch (later Burford). Ms. Gorsuch was continuously denounced in Congress and the press for being anti-environmental, for undermining the efforts of the regulators below her, and finally for cutting “sweetheart deals” with business. Finally, she was charged with contempt of Congress and resigned. As these allegations surfaced, Congress, led by Rep. John Dingell, held closed-door hearings with EPA staff and subpoenaed thousands of documents. Congress took over the oversight of the EPA, cutting Gorsuch out of the loop (Bonner 1983). Exactly this threat of cutting the appointee out of the loop limits the executive’s attempts to shape policy through appointment.
advantage (Niskanen 1971, Stigler 1971, Peltzman 1976). Carpenter (2001) traces the historical evidence for and genesis of bureaucratic autonomy, while Carpenter (2004) suggests another reason the agent may influence policy, even if the agent is perfectly responsive to political pressure, since he may have an incentive to delay a decision if the decision is costly to reverse and information can be improved by waiting. Although my model gives the agent an advantage, since he alone can implement policy, the other actors have leverage, oversight for the Congress and appointment for the executive, and they are also able to guide policy.

The members of the Congressional Dominance camp (Weingast and Moran 1983, McCubbins and Schwartz 1984), by contrast, maintain that Congress has a variety of ex-ante and ex-post controls that allow them to keep the agency in line. Therefore, Congress is the dominant actor in administrative policymaking. My model is in this broad spirit, since Congress is the final authority, uses oversight and delegation to influence the agency, and has a large advantage as a take-it or leave-it policy proposer. But Congress must work with the agency at hand and with the appointee the executive chooses, and these limitations curb its influence.

At a third extreme is what Spence calls the “Presidential Dominance” school (Moe 1987, Moe and Wilson 1994), which maintains that the President is truly in control of policy, as the constitutional head of the administration. In my model, the President is able to influence policy through appointment, but he is limited by Congress’s outside option to circumvent the appointment. As close to Presidential Dominance as occurs in my model is when the President’s ideal point is not too far from Congress’s, and he can appoint a “ally” who makes the President’s ideal policy the most attractive to Congress.

In contrast to the models which look for a single dominant actor, some recent work finds that the terms of control vary, with different agents taking the lead in different situations. Most of the empirical evidence seems to support this view (Whitford 2005, Epstein and O’Halloran 1996, Snyder and Weingast 2000, Shipan 2004). The starkest of these models is Dixit, Grossman and Helpman’s (1997) multiple-principal model. In their model, unless the principals’ incentives are well-aligned,
they cannot provide effective incentives to the agent. The introduction of a hierarchical system of control can improve these incentives, both in my model and in reality. Several other models also add some structure (Huber and Shapin 2002, Shapin 2004). These works focus on conflicts within the legislature and legislative policymaking. Shapin (2004) and Bawn (1997), for example, concentrate on the interaction between the floor and the committees in Congress. I focus, instead, on what I perceive as the key feature of a separation of power system: the conflict between the executive and the Congress, especially the role of appointees as the fulcrum on which these various principals attempt to tip agency policy in their direction. Nevertheless, my paper is in a similar vein to these. I identify conditions under which the Congress, executive, and even the agency itself plays a strong role in shaping policy.

This paper is certainly not the first to consider the role of appointees in policymaking. Early models assumed or asserted that appointees have the same (or nearly the same) ideal point as the executive (Ferejohn and Shapin 1990, Horn 1995, Epstein and O’Halloran 1999, Shapin 2004). I show that this conclusion holds in a knife-edged case only, and more generally the appointee is chosen optimally to balance a number of forces. Another series of models focuses on the appointment and confirmation process (Snyder and Weingast 2000, Hammond and Hill 1993, Nixon 2004), while I focus on the interaction of appointment and ex-post oversight. These appointment/confirmation models apply to the small fraction of appointments that require Senate approval (800 versus 5000 non-confirmed appointments, in 2001). Furthermore, some view the Senate approval process as little more than a rubber stamp, a chance to air grievances and nothing more, especially given the President’s ability to circumvent the process through temporary and recess appointments (Baker and Raines 2001). Even the models which focus on the confirmation process, of course, respect the proposer advantage of the President, so my model represents the case where that advantage is particularly strong. Furthermore, in an extension, I show that the approval process and oversight can act as substitutes, and confirmation may be soft in anticipation of successful oversight of the appointee. Finally, a handful of models allow for a distinct appointee ideal point and post-
appointment oversight by Congress or the Executive (Bertelli and Feldmann 2007, Hammond and Knott 1996, McCarty 2004, Wiseman 2007). The primary distinctions of my model are the more explicit role played by hierarchy and the recognition of one important risk of appointing an ideologically extreme supervisor: they could be cut out of the policymaking loop by a coalition of Congress together with agency personnel. In my model, this hierarchical risk provides the primary check on the executive’s authority.

Despite the role hierarchy plays in public administrations, few formal models of policymaking and implementation have taken it seriously. The exceptions, such as Ting (2006) and Rose-Ackermann (1986), focus on implementation instead of the effects on policy choice. Notably, Carpenter (1996) focuses on hierarchy as an information-processing system and finds it to affect the alacrity with which agencies respond to changing demands from their political principals. Moving beyond explicitly public bureaucracies, economists have explored the role of hierarchies from a number of angles. Williamson (1967), Calvo and Wellisz (1978), and Qian (1994) are interested in hierarchies as monitoring devices, but focus more on the design question, while I take the structure of the hierarchy as fixed and ask what happens as the preferences of those included in the hierarchy change. Tirole (1986) is similar to this paper, in that respect, but he is looking at a strict hierarchy where the principal always works through the supervisor. Also, the supervisor in that model is fixed ex-ante, while in my model appointment of the supervisor is one of the key strategic choices.

\[3\text{Hierarchy's minor role in most models of administrative policymaking seems strange. Public administrations are nothing if not hierarchical. The FDA has hundreds of investigators whose central task is to monitor the production of seafood for human consumption. These inspectors are overseen by over 50 specialists, all housed in the Program and Enforcement Branch, in the Division of Programs and Enforcement Policy, which is housed in the Office of Seafood, in the Office of Programs, in the Center for Food Safety and Applied Nutrition, and on up to the Department of Health and Human Services. All told, there are at least 10 formal layers of hierarchy between the investigators and the head of the public administration, the President. Most other federal and state agencies are just as deeply hierarchical. Sociologists, especially, have been documenting and characterizing the degree of hierarchy in public agencies for years, including important work by Blau, Crozier (1964), and of course Max Weber (1978).} \]
3 The Baseline Model

Imagine a public sector bureaucracy that must implement a single policy. The bureaucracy consists of three actors: a Congressional principal (C, referred to as “it”), perhaps the median member or chair of the committee overseeing the bureaucracy; a supervisor (S, referred to as “she”), a Presidential appointee in a managerial role; and an agent (A, referred to as “he”), who is directly responsible for the implementation of the policy (in the parlance of Lipsky (1980), the agent is a “street-level” bureaucrat). Finally, there is an independent and distinct executive (E, also referred to as “he”) who affects policy by appointing the supervisor. The ideal points of the Executive, Congress, and the Agent are fixed and exogenous. Although the question of how agents select to serve in the agency is an interesting one, this is a medium-run model in which the composition of the civil service bureaucracy is fixed.

The policy is chosen from a single-dimensional policy space, along which each actor has an ideal point $\theta_i$, where I assume without loss of generality that $\theta_C = 0 < \theta_A$. The ideal points of the other two actors $\theta_E$ and $\theta_S$ can take any real value. If policy $x$ is implemented, actor $i$ receives a policy/ideological payoff $-\alpha_i(x - \theta_i)^2$. Here, $\alpha_i$ represents how important this policy is, relative to effort and the wage, which are introduced below.

In addition to intrinsic returns from policy, the agent and supervisor are paid an efficiency wage to encourage them to implement the specified policy, $w_A$ and $w_S$, respectively. These wages are fixed and exogenous, and they are measured with respect to zero-normalized outside options. Pol-

---

4 Alternately, we could think of the agent as a career manager, one who is simply closer to the site of policy implementation, such as an office head. In this second interpretation, I leave the details of implementation below the agent unmodeled. I prefer this second interpretation, since Congressional oversight makes more sense in this setting, but the first may be easier to digest quickly. This three-tiered setup mirrors Tirole (1986) and Laffont and Tirole (1991), although they are concerned exclusively in policy implementation in a strict hierarchy.

5 Bureaucrats having ideological or policy preferences that affect their decisions should be uncontroversial: It has been demonstrated in widely varying situations, including Federal Judges (Sunstein, Schkade and Ellman 2004), case workers in job training centers (Heckman, Smith and Taber 1996), and NLRB staff (Moe 1985). Besley and Ghatak (2005) and Prendergast (2003a), (2003b) look theoretically at the effects of intrinsically motivated agents on policy implementation.
icy choice is not directly contractible, but an overseer verifiably reveals failure to implement the specified policy with some probability. The wage is paid unless there is evidence of failure.\(^6\)

Congress can either oversee the agent directly, or it can delegate that responsibility to the supervisor and, instead, oversee the supervisor \((d \in \{0, 1\})\).\(^7\) If Congress chooses to oversee directly, it names its prescribed policy, \(x^C\), and sets a level of oversight \(o_A\). The agent then sets policy, and if \(x \neq x^C\), his deviance is revealed with probability \(p_{DA}\).\(^8\) If deviance is revealed, the agent loses his wage, but policy remains as he set it. If Congress chooses the delegate, it still names its prescribed policy and sets a level of oversight \(o_S\). The supervisor then prescribes a policy to the agent \(x^S\) and chooses a level of supervision \(s\). If \(x^S \neq x^C\), the supervisor loses her wage with probability \(p_{DS}\). Regardless, the agent sets the policy, and, if \(x \neq x^S\), he loses his wage with probability \(p_{IS}\).

Oversight is costly, since there is an outside option for Congress's time or that of its staff. Think of oversight here broadly, including both the committee's time, in terms of hearings, and also the allocation of members' staff resources, committee staff resources, and investigative resources of Congressional organs such as the GAO. We can think of \(o_S\) as measuring the amount of oversight resources dedicated to reviewing the management practices in the division, while \(o_A\) represents the resources allocated to accounting for actual policy implementation. Similarly, supervision is costly in terms of the supervisor's time.

\(^6\)For the agent, the wage can be thought of as a promotion or next year's salary, which is automatic in the absence of verifiable evidence of failure. Civil service advancement, at least within grade, has this general structure. For the supervisor, the wage is best thought of as a combination of a money wage and some unmodeled benefits of holding office.

\(^7\)Congress's ability to cut out the supervisor and deal directly with the agent may seem odd, but such action is observed from time to time. First, the logical possibility is clear from the day-to-day affairs of Congressional committees: oversight hearings involve testimony from myriad witnesses from various levels of the bureaucracy, from department secretaries all the way down to the heads of small offices buried deep within the bureaucracy. Second, there are rare examples of low-level agency employees subpoenaed by Congress to talk about the policy they were forced to enact by the political machinations of their supervisors. Footnote 2 discussed such a situation at the EPA. Moreover, direct oversight never occurs in equilibrium, in the model, so its rarity, in practice, is unsurprising.

\(^8\)The assumption that any deviation, no matter how small, has the same probability of being detected is a simplification. A generalization in which the agent's probability of being caught is increasing in his deviation from his overseer's ideal point gives substantially similar results. In fact, any model of the inner-working of the agency which yields "cost functions" for Congress similar to those in Figure 1 suffices. I have settled on this simple setup for tractability.
The payoffs and actions of the executive, Congress, supervisor, and agent are summarized in the table below, where $q^*$ is the appropriate chance of the agent being caught shirking by whomever is overseeing him and $x^*$ is their prescribed policy.

**Payoff Function and Actions for Each Actor**

<table>
<thead>
<tr>
<th>Actor</th>
<th>Payoff</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive</td>
<td>$-\alpha_E (x - \theta_E)^2$</td>
<td>$\theta_S \in \mathbb{R}$</td>
</tr>
<tr>
<td>Congress</td>
<td>$-\alpha_C (x - \theta_C)^2 - o_A - o_S$</td>
<td>$(x^C, o_A, o_S, d) \in \mathbb{R} \times \mathbb{R}^+ \times {0, 1}$</td>
</tr>
<tr>
<td>Supervisor</td>
<td>$-\alpha_S (x - \theta_S)^2 + w_S [1 - o_S \bar{p}] + \quad \quad \quad \quad \quad \quad \quad w_S o_S \bar{p} 1(x^S = x^C) - s$</td>
<td>$(x^S, s) \in \mathbb{R} \times \mathbb{R}^+$</td>
</tr>
<tr>
<td>Agent</td>
<td>$-\alpha_A (x - \theta_A)^2 + w_A [1 - q^<em>] + w_A q^</em> 1(x = x^*)$</td>
<td>$x \in \mathbb{R}$</td>
</tr>
</tbody>
</table>

The timing of the game is as follows. First, the executive chooses a supervisor. I ignore informational problems and assume the executive can simply choose any ideal point he wishes. All potential appointees will accept the position and have identical $\alpha_S$. Once the supervisor is selected, Congress chooses a policy prescription $x^C$, whether to delegate to the supervisor, and its degree of oversight ($o_A$ and $o_S$). The supervisor then chooses her level of supervision ($s$) and prescribed policy $x^S$, although these decisions affect the policy outcomes only if authority has been delegated. The agent, observing oversight and supervision choices, delegation, and prescriptions, chooses the policy. Finally, the audits are realized, wages are paid, and policy payoffs are received. Figure 1 illustrates the timing.
3.1 Equilibrium

I solve for a pure strategy subgame-perfect Nash equilibrium of the extensive form game described above.

Definition 1. Let $s_{-i}$ represent the strategies adopted by actors moving before actor $i$ and $s_{-i}$ represent the strategies adopted by those moving after actor $i$. A pure-strategy subgame-perfect equilibrium for the game outlined above consists of a pure strategy profile $(s_i^*(s_{-i}))_{i \in \{E,C,S,A\}}$, such that, for every actor $i$ and pure strategies $s_i, s_{-i}$,

$$V^i(s_i^*(s_{-i}), s_{-i}, s_{-i}^*(s_i^*(s_{-i}), s_{-i})) \geq V^i(s_i, s_{-i}, s_{-i}^*(s_i, s_{-i})).$$

This is equivalent to the standard definition of a subgame-perfect Nash equilibrium, but with four
different actors the notation gets messy. Informally, each actor's choice needs to be optimal, given what has come before and expecting those moving later to also maximize. In the rest of this section, I identify a pure strategy subgame-perfect equilibrium through backward induction. This equilibrium is unique, on the equilibrium path. To guarantee interior solutions, I assume that the agent's ideal point is close enough to Congress's, relative to his efficiency wage. The formal condition is specified in (9) and derived in the theoretical appendix. I also derive the equilibrium with corner solutions, which is similar to the unconstrained case presented here in the body.

I analyze the game by characterizing the agent's choice, proceed to the supervisor, and then move to optimization by Congress. Only then do I consider the executive's appointment decision.

Taking the oversight level, policy prescription, and supervisor's effort as given, the agent chooses the prescribed policy $x^*$ if it is better than his best alternative. This alternative is choosing $x = \theta_A$, netting himself $w_A(1 - q^*)$. So he chooses the prescribed policy if

$$q^* w_A \geq \alpha_A (x^* - \theta_A)^2.$$  

Consider, next, the game played just between the agent and supervisor, ignoring the Congress for the moment. The supervisor solves the problem

$$\max_x -\alpha_S (x - \theta_S)^2 - \frac{\alpha_A (x - \theta_A)^2}{p_I w_A},$$

where the second term is the cost of inducing the agent to choose $x$, from (1). Solving for the maximizing $x$ yields

$$\bar{x} = \frac{\theta_A \alpha_A / (p_I w_A) + \theta_S \alpha_S}{\alpha_A / (p_I w_A) + \alpha_S},$$

a weighted average of the supervisor's and agent's ideal points. Replacing for this policy in the
supervisor’s utility yields the following “outside option” for the supervisor:

\[ O(\theta_A, \theta_S) = \frac{-(\theta_S - \theta_A)^2 \alpha_S \alpha_A/(p I w_A)}{\alpha_S + \alpha_A/(p I w_A)}. \]  

(4)

This expression is important because, in the case of delegation, the supervisor sets \( x^S = x^C \) if and only if it nets her more than this outside option. Formally, this requires

\[ w_S \theta_A \geq \alpha_S (x^C - \theta_S)^2 + \alpha_A/(p I w_A) (x^C - \theta_A)^2 - O(\theta_A, \theta_S). \]  

(5)

The Congress, then, has two methods for inducing the agent to implement the policy prescription. First, it can ignore the supervisor completely and directly induce \( x^C \) by setting \( \theta_A \) sufficiently high. Second, it can work through the supervisor, by setting \( \theta_S \) high enough to induce the supervisor to do the supervision herself.

I refer to these two methods as the direct and indirect oversight regimes, respectively, and let \( c^D(x) \) and \( c^I(x) \) represent the cost to Congress of implementing prescription \( x \) in the appropriate regime. From (1) and (5), the cost functions are given by

\[ c^D(x) = \frac{\alpha_A}{p_D w_A} (x - \theta_A)^2 \]

\[ c^I(x) = \frac{1}{\bar{p} w_S} [\alpha_S (x - \theta_S)^2 + \alpha_A/(p I w_A) (x - \theta_A)^2 - O(\theta_A, \theta_S)]. \]  

(6)

The first cost function is minimized at \( x = \theta_A \), while the second is minimized at \( x = \bar{x} \), the policy that would result from the supervisor and agent setting policy among themselves in the absence of any oversight. Both costs are zero at their minimum, and both are strictly increasing as you move away from those points for \( \alpha > 0 \). See Figure 1 for a graphical depiction of the cost curves.
Congress optimizes over policies, taking these costs into account. A revealing approach is simply to calculate its best policy under each oversight regime and compare them. Let

$$V^C_j = \max_x \{-\alpha C x^2 - c^j(x)\},$$  \hspace{1cm} (7)

and label the policy choice which attains this maximum $x_j^*$. Directly from the first order conditions, we have

$$x^*_A = \frac{\theta_A \alpha_A / p_{AWA}}{\alpha_C + \alpha_A / p_{AWA}}$$  \hspace{1cm} (8)

$$x^*_j = \frac{\theta_A \alpha_A / (p_{AWA} \bar{p}_{WS}) + \theta_S \alpha_S / (\bar{p}_{WS})}{\alpha_C + \alpha_A / (p_{AWA} \bar{p}_{WS}) + \alpha_S / (\bar{p}_{WS})}$$  \hspace{1cm} (9)

Once again, the optimal policy under each regime is a weighted average of the ideal points of all the actors involved in the implementations, with the weights depending in obvious ways on the model’s parameters. Since the weights placed on the ideal points in the indirect oversight regime
play such an important role in the analysis to come, define

\[ \beta_A = \frac{\alpha_A/(pIWA\tilde{p}ws)}{\alpha_C + \alpha_A/(pIWA\tilde{p}ws) + \alpha_A/(\tilde{p}ws)} \]

\[ \beta_S = \frac{\alpha_S/(\tilde{p}ws)}{\alpha_C + \alpha_A/(pIWA\tilde{p}ws) + \alpha_S/(\tilde{p}ws)}. \]

By substitution, and some algebra, we have

\[ V_D^{C^*} = -\frac{\alpha_C\alpha_A/p_{DAW}}{\alpha_C + \alpha_A/p_{DAW}} \theta_A^2 \]

(10)

\[ V_F^{C^*} = -\frac{\alpha_C\beta_S^2}{(\beta_A + \beta_S)} (\theta_S + (\beta_A/\beta_S)\theta_A)^2. \]

(11)

Comparing these two functions yields the following Lemma, which characterizes Congress's equilibrium behavior.

**Lemma 1.** Take any \( \theta_A > 0 \). Congress delegates to the appointee for

\[ \theta_S = \frac{\theta_A(-\beta_A - K)}{\beta_S} < \theta_S < \frac{\theta_A(-\beta_A + K)}{\beta_S} \equiv \theta_S, \]

where

\[ K = \sqrt{\frac{(\beta_A + \beta_S)\alpha_A/p_{DAW}}{(\alpha_C + \alpha_A/p_{DAW})}}. \]

He sets \( x^C = x^*_C \), \( o_S = c^I(x^*_C) \), and \( o_A = 0 \). This induces the supervisor to choose \( x^S = x^C \) and set

\[ s = \frac{\alpha_A}{p_{DAW}} (x^*_C - \theta_A)^2, \]

which in turn induces compliance by the agent. If \( \theta_S \) is outside the given range, Congress does not delegate, choose \( x^C = x^*_D \), set \( o_S = 0 \), and set \( o_A = c_D(x^*_D) \). This choice induces the agent to set \( x = x^*_D \).

**Proof.** An application of the quadratic formula, together with the foregoing argument for the supervisor and agent.

\[ \square \]
Figure 3. Determination of Oversight Regime

Figure 2 shows how Congress's regime choice varies for different values of $\theta_A$ and $\theta_S$. The center line represents the supervisor who makes the implementation of $x=0$ costless ($\theta_S = -\frac{\beta_A}{\beta_S} \theta_A$), while the two surrounding lines represent the supervisor who makes Congress indifferent between indirect and direct oversight.

With this characterization of Congress's regime choice, the following Lemma outlines the policy resulting from a given supervisor/agent combination.

**Lemma 2.** For $\theta_A > 0$, Congress's policy prescription strategy, as a function of $\theta_S$, is given by

$$x^*(\theta_S) = \begin{cases} 
\beta_A \theta_A + \beta_S \theta_S, & \text{if } \theta_S < \theta_S < \bar{\theta}_S \\
\frac{\theta_A \alpha_A/p_{DWA}}{\alpha_c + \alpha_A/p_{DWA}}, & \text{otherwise.}
\end{cases}$$

*Proof.* Everything follows Lemma 1 and the definitions of $x_D^*$ and $x_I^*$. \hfill \square

According to Lemmas 1 and 2, for a fixed agent and Congress we should expect policy to be a non-monotonic function of the supervisor's ideal point. There is a middle range, when the supervisor is helpful to Congress in implementing policy, Congress uses indirect oversight, and policy is
responsive to the supervisor's preferences. But if the supervisor becomes too extreme, Congress will shift to a direct oversight regime, and work directly with the agent. Figure 4 presents policy as a function of the supervisor's ideal point.

![Figure 4. Prescribed Policy as a Function of the Supervisor's Ideal Point, for a Fixed Agent](image)

### 3.2 Appointment

Returning to appointment by a distinct executive, we know equilibrium policy responds to the executive's choice of $\theta_S$ only as long as $\theta_S$ is in the range given by Lemma 1. Outside this range, equilibrium policy reverts to $x^*_D$. So the executive needs to take into account not only the way the interaction with Congress and the agent transforms policy, but also Congress's direct oversight outside option. If too extreme a supervisor is selected, Congress will circumvent her.

Assume that the direct oversight policy is within the span of policies which can be implemented in the indirect oversight regime, i.e., $x^*_I(\theta_S) < x^*_D < x^*_C(\theta_S)$. Specifically, this condition requires

$$\beta_A + \beta_S \geq \frac{\alpha_A/p_{DWA}}{\alpha_C + \alpha_A/p_{DW_S}}$$

(12)
so the weight on the Congress in the direct oversight regime is less than that placed on it in the indirect oversight regime. Relaxing this condition would lead some executives to appoint any extreme supervisor, because he prefers the outcome when Congress oversees directly to any outcome a supervisor could induce.

Throughout, I have assumed that the agent and the supervisor could be induced to implement any policy, if Congress is willing to put sufficient effort into oversight. In fact, only so much oversight is feasible. Once deviation is uncovered for certain, no more pressure can be exerted. For extreme policies, no amount of oversight would be sufficient to induce their implementation. In equilibrium, those policies would never be requested. Instead, the most extreme feasible policies would be chosen. If the agent’s wage is high enough, relative to his ideological distance from Congress, this restrictions will never bind. The Theoretical Appendix outlines the general case. The results are qualitatively similar, but the following restriction allows us to ignore this complication here in the body.

\[
\theta_s^2 \leq \min\left\{ \frac{w_A}{\alpha_K (\beta_A + \beta_A)^2}, \frac{w_A}{\alpha_A (1 - \beta_A - \beta_A)^2} \right\}, \quad (13)
\]

Under this restriction the following proposition completes the characterization of the equilibrium.

**Proposition 1.** Assuming (12) and (9) hold, the executive always induces high oversight by setting \( \theta_S \) according to

\[
\theta_S = \begin{cases} 
\theta_S, & \text{if } \theta_E < -K \theta_A \\
\frac{\theta_E - \beta_A \theta_A}{\beta_S}, & \text{otherwise} \\
\overline{\theta_S}, & \text{if } \theta_E > K \theta_A.
\end{cases}
\]

**Proof.** When feasible, the supervisor is selected such that \( x_f^*(\theta_S) = \theta_E \), but when this choice would require a supervisor who is beyond the indirect oversight bounds [\( \overline{\theta_S}, \theta_S \)] the feasibility constraint binds and the executive chooses the supervisor to make the Congress indifferent between indirect and direct oversight.

Figure 5 illustrates equilibrium policy for a fixed Congress and agent, for various executive ideal
points. For the middle range, the executive is able to induce the implementation of his ideal policy, but as his preferences diverge from those of Congress he can no longer obtain it. The supervisor who would induce such an extreme policy is too extreme for Congress to work with.

Figure 6. Equilibrium Policy as a Function of the Executive’s Ideal Point

3.3 Discussion

Before looking at the roles played by the appointee, note one fact about the administrative subgame played between Congress, the supervisor, and the agent. The supervisor’s threat point under indirect oversight is not implementing her individually ideal policy. Even when ignoring the dictates of Congress, she still has to work with the agent to implement something. In fact, the best she can do is the policy given by \( \bar{x} \) in (3). To Congress, and to an executive predicting Congress’s oversight choices, the supervisor comes to look like an actor with quadratic policy preferences around an ideal point at \( \bar{x} \)–like her preferences have shifted toward the agent’s, like she has “married the natives.” Note that this is a new explanation based on incentives and constraints, quite different from a more standard socialization story (see, e.g., (Peters 1981)). The appointee’s underlying preferences do not actually change, they only seem to change as she takes into account the supervision
costs of driving the agent to implement policy.

Turning to the appointment stage, the appointee in this model plays the two distinct roles observed in reality: ally and adversary. Which role is active depends on the ideological position of the executive, with respect to Congress and the agent. As pointed out in passing, Congress’s dream is to have a supervisor with ideal point at $-(\beta_A/\beta_S)\theta_A$, in which case the supervisor drives implementation of Congress’s ideal policy at no cost to the Congress. Moving away from this point, her role changes to adversary, as the executive hits his feasibility constraint.

**Ally** When $x^*_T(\theta_S) < \theta_E < x^*_T(\overline{\theta}_S)$, the executive chooses a supervisor with ideal point strictly between $\theta_S$ and $\overline{\theta}_S$ and induces indirect oversight. The role of the supervisor is to shift policy, by reducing the costs to Congress. To the outside observer it looks as if the supervisor is simply doing Congress’s dirty work. But in fact, by appointing a carefully chosen supervisor, the executive is able to obtain his ideal policy.

The “width” of the ally range is given by $2K\theta_A$. It is increasing in $\theta_A$, $\alpha_A$, and $\alpha_S$, and it is decreasing in $\alpha_C$, $p_D$, $p_I$, and $\bar{p}$. Allies occur more frequently when the agent is ideologically extreme and committed and when the supervisor is ideologically committed, but Congress does not care too much about policy. Furthermore, they are chosen when the agent is hard for either the Congress or the supervisor to control, and the supervisor is difficult to oversee.

I refer to appointees playing this role as allies because they make life easier for Congress. Congress chooses to use these appointees to help with oversight because it is less costly, in policy and oversight terms, than directly overseeing the agency. If this role is played by most appointees, either there is broad consonance in ideal points between Congress and the executive, Congress does not care too much about policy, relative to oversight costs, and/or agents and supervisors are relatively difficult to control (low $p$) and ideologically motivated. Although the executive does very well in this range (achieving his ideal point), so does Congress, justifying the “ally” label.
**Adversary** When $\theta_E > x^*_E(\theta_S)$ or when $\theta_E < x^*_E(\theta_S)$, the executive chooses a supervisor with ideal point $\overline{\theta_S}$ or $\underline{\theta_S}$, respectively, and induce indirect oversight. I refer to these intervals as the *adversary* range, and it consists of the two corner solutions from the ally range. The supervisor is perched at the very edge of the indirect oversight regime. The executive would love to push policy even further in the appropriate direction, but any further move would lead Congress to circumvent the supervisor and deal with the agent directly.

The “width” of the adversary range is the inverse of the native range. And so adversaries are more likely when the agent is ideologically near Congress, and not too ideologically motivated, Congress cares strongly about policy, and the supervisor and agent are easy to control. When the executive appoints an adversary, Congress’s scrutiny of the appointee reaches its maximal level, because that sort of appointee has the strongest incentive to deviate from the prescribed policy. All this oversight suggests a quite rocky relationship, justifying the “adversary” label.

Finally, the agent has a profound effect on which of these roles arises and how much the executive is able to swing policy his direction. As the agent becomes more extreme, he reduces Congress’s outside option. This reduction allows the executive more flexibility in choosing his supervisor. So while Presidents may bemoan ideologically motivated civil servants, they may actually benefit from more extreme agents. A similar phenomenon occurs as the agent becomes more difficult to control. Lewis (2003), in his discussion of the politics of agency design, notes that Presidents often push for greater administrative independence, and the interaction outlined here suggests a reason for their exhortations.

### 3.4 Empirical Predictions

With respect to the types of appointees that will arise, the model makes predictions both among agencies, for fixed principals, and within agencies, over time. In the cross-section of agencies, for a fixed executive and Congressional committee, the model predicts adversarial appointees to
occur when the agency is not very ideological and is easy to control, and ally appointees to occur when the opposite holds. For a fixed agency, over time, we expect adversarial appointees when the executive and committee have strongly divergent ideological preferences.

Empirically identifying which appointees are adversaries and which are allies may be difficult. Fortunately, the predictions on appointee roles map almost directly into predictions about the degree of Congressional oversight, which may be easier to measure. Since, in equilibrium, we only observe indirect oversight, oversight should be minimized when Congress gets its perfect supervisor and policy is at Congress's ideal point. As the executive moves away from Congress, he will appoint a more extreme supervisor, which will lead to more oversight. The level of oversight will be maximized when the supervisor reaches the edge of the feasible space and begins playing the role of adversary.

Formally, in equilibrium, the model predicts oversight given by

\[
Oversight = \begin{cases} 
\alpha_C \left( \frac{1}{\beta_A + \beta_S} - 1 \right) \theta_E^2 , \text{ if } -K \theta_A \leq \theta_E \leq K \theta_A \\
\alpha_C (1 - \beta_S - \beta_A) \left( \frac{\alpha_A/\eta_{pda}}{\alpha_C + \alpha_A/\eta_{pda}} \right) \theta_A^2 , \text{ otherwise}
\end{cases}
\]

(14)

For a fixed agency, oversight should increase as the preferences of Congress and the executive diverge but should level out after a point (since the most extreme policy the executive can induce is limited by Congress's outside option). In the cross section of agencies, for a fixed Congress and executive, a similar pattern should hold, with oversight increasing as the agency's preferences diverge from Congress's, to the point where the supervisor becomes an ally.

Furthermore, in a panel, the two sorts of conflict should be complementary in the "production" of oversight, because the executive has more flexibility to shift policy when the agency is more extreme, and an increase in agency extremism only increases oversight when the executive and Congress are already sufficiently divided. Finally, as long as (12) holds, oversight is increasing in measures of how easy the agency and supervisor are to control (p) and decreasing in the degree
of ideological commitment of the supervisor and agent ($\alpha_A$ and $\alpha_S$). It is always higher when Congress cares more about the policy ($\alpha_C$).

Any reasonable model of the determination of oversight would predict more oversight in the presence of Congressional-executive conflict, at least for a fixed statutory regime (see, e.g., (Aberbach 1991, Ogul and Rockman 1990)). The novel predictions concern the effects of conflict between Congress and the bureaucratic agent in the presence of hierarchical control and, particularly, the interaction of the two forms of conflict. The next section presents some suggestive evidence for the oversight predictions of the model.

4 Empirical Determinants of Oversight

The basic model makes three central predictions about the determinants of Congressional oversight. First, for a given agency, oversight should be higher as the President and Congress (or the Congressional committee) are more ideologically divided. Second, for a given committee/President pair, oversight should be higher as the agency is more ideologically extreme. Finally, these two measures of conflict should interact positively. Increasing conflict on one dimension increases oversight even more if there is greater conflict on the other dimension. This section provides some simple tests of those three propositions, in the context of oversight by the GAO, the primary organ of Congressional oversight.

The modern study of Congressional oversight is generally traced to Ogul (1976) and Aberbach (1991), who concerned themselves primarily with the use of hearings and committee staffs as instruments of Congressional oversight. Many scholars came away from these, and other similar works from the period, wondering why we observe so little explicit oversight. This observation led to a whole stream of literature contrasting police patrol and fire alarm oversight, kicked off by McCubbins and Schwartz (1984), suggesting why low levels of equilibrium oversight may still be effective in maintaining control of bureaucracy. More recent work has begun to trace the political,
economic, and institutional determinants of oversight (Gailmard 2006, Smith 2003). Smith (2003) measures oversight by both number of committee days spent on oversight hearings and percent of hearing days spent on oversight. He finds that the first is higher under under divided government, while the second is not affected. Gailmard (2006) concentrates on oversight share of House hearing days and finds an increase when the President and House are divided.

Unappreciated in most of this work is the important role of an institution created by Congress for the primary purpose of managing oversight, the Government Accountability Office (formerly General Accounting Office). Founded in 1921, the GAO’s stated purpose is to “gather information to help Congress determine how well executive branch agencies are doing their jobs” (Government Accountability Office 2007). Currently, the GAO employs over 3200 employees, most of whom are involved in the compilation of audits of executive-branch agency activity. The GAO issues a steady stream of products, including more than 1,000 reports and hundreds of testimonies by GAO officials each year (Government Accountability Office 2006). The majority of these reports are in response to requests from members of Congress, with precedence given to (in order): 1) statutory or Congressional mandates, 2) Congressional officers and committee chairs and/or ranking members, 3) individual members (Government Accountability Office 2004). Despite the central role the GAO plays in the Congressional oversight process, to my knowledge, the only work which has explored GAO reports as a measure of Congressional oversight is an unpublished dissertation by Joseph (2002).

GAO reports have a big advantage over hearing-based measures of oversight because they represent actual audits of agency performance. The GAO sends investigators to the agency and the field, interviews both staff and outsiders affected by the agency, reviews documents, and independently verifies the accuracy of the agency’s reports. In a sense, they provide and/or verify the facts around which oversight hearings turn. With Congressional hearings, by contrast, it can be difficult to untangle pure oversight from political grandstanding or point-scoring. If a minority member spends an additional hour on the soapbox during an oversight hearing, does that really represents more
oversight? An additional investigation by the GAO almost certainly is.

In this section, I use the number of reports produced by the GAO concerning an agency as a measure of the degree of Congressional oversight of that agency.

4.1 Data and Descriptive Statistics

The dependent variable for these analyses is the number of GAO reports written about each agency, \(i\), for each year, \(t\), from 1980 to 2006 (\(count_{it}\)). A complete history from 1980 to 2006 was available for 33 large agencies. Table 1 lists these agencies, together with the total number of reports by agency for the period. The key independent variables for the first test are several measures of ideological division between Congress and the President. The simplest approach is to look for an effect of divided government. I include an indicator variable \((conflict_{t})\) set to be equal to 1 if the President is one party and both chambers of Congress are another, and 0 otherwise.

Table 2 presents descriptive statistics for the entire sample broken down by the presence or absence of this conflict. Details concerning the sources and construction for all the variables in this analysis are included in the Data Appendix. The descriptive statistics offer suggestive evidence for increased oversight in times of strong political conflict. The mean number of reports is about 35 percent higher in times of high political conflict.

For multiple regression in the next section, I also break this measure of conflict into its constituent parts. I define a dummy for a Democratic President \((dempres_{t})\), a Democratic house \((demhouse_{t})\), and a Democratic Senate \((demsen_{t})\). Furthermore, for each agency, I use the number of reports requested by each committee to identify which committee of each chamber has primary oversight responsibility for that agency. For each agency, I then code the first dimension Poole and Rosenthal (2006) DW-nominate score for the committee chair of the appropriate House and Senate oversight committees as a measure of Congressional preferences \((housechair_{it}, senchair_{it})\). More positive DW-nominate scores indicate more conservative ideology. The effect of these variables on over-
sight depends on the ideology of the President, so I will interact them with the indicator for a Democratic President.

For the second hypothesis, the impact of Congressional-agency conflict, we need a measure of agency ideology. Clinton and Lewis (2007) outline the state of the art and highlight the problems with each approach. They then implement an alternative measure, the measure used here, based on a survey of experts in bureaucratic politics (academics, journalists, and think tanks). The details for the estimates are outlined in their paper, but in brief, they adjust for individual-rater heterogeneity and the agencies’ political origins in a multi-rater item response model. I use their measures of agency ideology \((ideo_i)\), which cover 24 of the agencies in the sample and are reported in Table 1. As with DW-Nominate, higher ideological scores represent more conservative agencies. Table 2 splits the sample into the more and less ideologically extreme agencies, in terms of absolute ideology. On average, more extreme agencies receive more oversight, a difference of about 30 percent.

Finally, since variation in ideology is available only cross-sectionally, I sometimes collapse the oversight measure for all 26 years into a single measure \((\text{totreports}_i)\) and control for civilian agency employment in 2006 \((\text{emp2006}_i)\)(Office of Personnel Management 2006). Alternatively, I control for the size of the agencies’ outlays \((\text{budget}_i)\) or, in the cross-section, the average outlays over the sample period \((\text{avgbudget}_i)\), as a measure of the level of activity. These variables are both measured in millions of 1983 dollars from the OMB budget (Office of Management and Budget 2007). Sample means by agency for these variables are also included in Table 1.

### 4.2 Congress-Executive Conflict

From (14), \((\partial \text{Oversight}/\partial |\theta_E| \geq 0)\), which leads to the first hypothesis to test empirically.

**Hypothesis 1.** *For a fixed agency, the level of Congressional oversight, as measured by number of GAO reports, is increasing in the degree of Congress-executive conflict.*
I test this hypothesis in three ways. First, I look at a macro-level measure of Congress-executive conflict. Second, I untangle how the correlation found in the broad measure varies under different combinations of political control. And finally, I use a more focused measure of conflict, looking at individual oversight committees. In all these tests, the general hypothesis bears out: more Congress-executive conflict is correlated with more GAO oversight.

The simplest measure of Congress-executive conflict is presence of strong conflict as defined above. If this conflict has any effect on oversight, the effect likely takes the form of proportional changes, with different agencies starting from different baselines, and so a log-linear specification with agency fixed effects seems most appropriate. Since these large agencies have no zero-report years, a log-linear specification is feasible. Conflict may be related to the amount of agency activity, which in turn spurs oversight. Since we are concerned primarily with the direct effect of conflict on oversight, I control for agency outlays, although the estimated coefficient on conflict does not change much with the inclusion of this control. Finally, since there may be a time trend in oversight and in conflict, I include a cubic trend in years. Year fixed-effects are not feasible, since political conflict varies, at most, yearly. I will estimate the following regression equation:

\[
\ln \text{count}_{it} = \beta \text{conflict}_{it} + \phi \text{outlays}_{it} + \gamma_1 \text{year}_t + \gamma_2 \text{year}_t^2 + \gamma_3 \text{year}_t^3 + \delta_i + \epsilon_{it}
\]  

(15)

The model predicts \( \beta > 0 \), and column 1 of Table 3 presents the OLS estimates for this equation. The results comport well with the difference in means from Table 2. In fully divided government, all else equal, the number of GAO reports increases by about 40 percent as compared to either weakly divided or unitary governments.\(^9\)

Although there is no direct prediction from the model, we may wonder if the correlation between

\(^9\)The best treatment of standard errors in this setting is not completely clear. In all the results, I have followed Bertrand, Duflo and Mullainathan (2004) and opted to cluster on agencies, since within-agency autocorrelation and between-agency heteroskedasticity seem the biggest concerns. However, independence across agencies is unlikely to be strictly satisfied, since there is likely some covariance between agencies. An alternative approach is to cluster on years. This assumption would allow any complex covariance matrix among the agencies but assumes the years are independent. This covariance structure seems less likely and, in the end, gives stronger results.
conflict and oversight is the same for a Republican or Democratic President. Table 3 includes OLS estimates of the following equation.

\[ Incount_{it} = \beta_1 \text{conflict}_t + \beta_2 \text{dempres}_t \times \text{conflict}_t + \beta_3 \text{demsen}_t + \phi \text{outlays}_{it} \]

\[ + \gamma_1 \text{year}_t + \gamma_2 \text{year}^2 + \gamma_3 \text{year}^3 + \delta_i + \epsilon_{it}. \]  

(16)

According to the results presented in columns 2 and 3 of Table 3, oversight is about 20 percent higher under a Democratic President, even in the absence of strong political conflict. Furthermore, the added increase in oversight associated with conflict is smaller under a Democratic President than a Republican, but in both cases strong political conflict is still associated with higher levels of oversight: a nearly 50 percent increase with a Republican president and nearly 30 percent increase with a Democratic president.

Neither does the theoretical model directly touch on the bicameral nature of the U.S. Congress, but the data can suggest whether conflict in one chamber or the other is more important. The final macro-level regression tries to disentangle the change in oversight of “weak conflict,” in which only one chamber is controlled by a party different from the President, and whether the oversight associated with conflict is symmetric across chambers. The final regression in Table 3 is

\[ Incount_{it} = \beta_1 \text{dempres}_t + \beta_2 \text{demhouse}_t + \beta_3 \text{demsen}_t + \beta_4 \text{demhouse}_t \times \text{demsen}_t \]

\[ + \beta_5 \text{dempres}_t \times \text{demhouse}_t \times \text{demsen}_t + \phi \text{outlays}_{it} \]

\[ + \gamma_1 \text{year}_t + \gamma_2 \text{year}^2 + \gamma_3 \text{year}^3 + \delta_i + \epsilon_{it}. \]  

(17)

This equation does not include all logically possible interactions of the control indicators, because, in this period, there was never time with a Democratic President and Democrats controlling only a single chamber of Congress. The excluded category is complete Republican control. Except for an odd negative coefficient on Democratic control of the House, all the coefficients are large, significant, and in the expected direction. House control has a larger impact on oversight than
Senate control. Returning briefly to the theoretical determinants of oversight, if agency policy is more important to the Congressional principal (α_C larger) compared to his outside option, then a given shift in θ_E will have a bigger impact on oversight. Perhaps overseeing one particular agency is less important to Senators than to House members, since they are less specialized and have more responsibilities elsewhere.

The foregoing estimates looked at broad ideological conflict between Congress and the President, but since GAO oversight is primarily triggered by members of the committees which oversee the agency, a potentially more productive approach is to look at ideological conflict at the committee level. Since committee chairs have priority in the GAO oversight process, I here consider conflict between the President and committee chairs. Dropping down to committee level, the model indicates the estimation of an equation of the form

\[
\text{Inc_{count}_{it}} = \beta_1 \text{housechair}_{it} + \beta_2 \text{dempres}_{it} \times \text{housechair}_{it} + \beta_3 \text{senchair}_{it} \\
+ \beta_4 \text{dempres}_{it} \times \text{senchair}_{it} + \phi_{dempres}_{it} + \phi_{outlays}_{it} \\
+ \gamma_1 \text{year}_{i} + \gamma_2 \text{year}_{i}^2 + \gamma_3 \text{year}_{i}^3 + \delta_{i} + \epsilon_{it}. \tag{18}
\]

If the model is correct, β_1 and β_3 should be negative, while β_1 + β_2 and β_3 + β_4 should be positive. Table 4 presents results which are broadly consistent with this expectation. All the signs are in the predicted direction and the joint null is rejected in all three specifications. In terms of magnitudes, a one standard deviation rightward shift in both oversight committees under a Republican president would be correlated with a 35 percent drop in the number of GAO reports. A similar shift under a Democratic President predicts an 5 percent increase. Democratic Presidents again have a direct influence on oversight, as their presence is associated with a large and significant increase. Perhaps Democratic Presidents were more ideologically divided from their average committee chair than Republican Presidents were, in this period. Furthermore, the marginal impact of conflict is
relatively small under Democratic Presidents ($\beta_1 + \beta_2$ and $\beta_3 + \beta_4$ both are relatively small). A configuration with Democratic Presidents perched near the edge of the "ally" zone is consistent with these results.

The results on divided government contrast markedly with some early work on the determinants of oversight. In particular, Mayhew (1991) finds little evidence that divided government leads to increases in major investigations. However, they do fit well with more recent work on Congressional oversight hearings (Gailmard 2006, Smith 2003). Contrary to common wisdom, ideological conflict has little effect on major investigations but instead affects day-to-day oversight.

4.3 Congress-Agency Conflict

The second hypothesis also comes directly from (14), since $(\partial\text{Oversight}/\partial|\theta_A| \geq 0)$.

**Hypothesis 2.** For a fixed executive, the level of oversight is increasing in the degree of Congressional-agency conflict.

At the level of our data, more ideologically extreme agencies (relative to Congress) lead to more oversight. Using Clinton and Lewis’s measure of agency ideology and the collapsed measure of oversight, a simple approach is to estimate either of

\[
\ln(totreports_i) = \beta |ideo_i| + \gamma_1 \ln(2006_i) + \gamma_2 \ln(avgbudget_i) + \epsilon_i \quad (19)
\]

\[
\ln(totreports_i) = \beta |ideo_i|^2 + \delta \ln(2006_i) + \gamma_1 \ln(avgbudget_i) + \epsilon_i. \quad (20)
\]

In both cases, the model predicts $\beta > 0$, i.e., more extreme agencies induce more oversight. Of course, using the absolute value implicitly assumes that the average Congressional ideology is near zero, and we have no particular reason to believe that to be true. The quadratic specification allows the minimal point to be anywhere on the real line. It can also estimate both the contribution of the extreme agencies ($\beta$) and oversight-minimizing agency ideology ($-\frac{\delta}{2\beta}$). The first two
columns of Table 5 present the OLS estimates of these regressions. In either specification, there is a positive relationship between ideologically extreme agencies and high levels of oversight. In the first specification, a one standard-deviation increase in the absolute ideology predicts a nearly 40 percent increase in oversight. From the second specification, the oversight-minimizing ideology is approximately 0.15, which is more liberal than the average agency in the sample, but more conservative than the average agency overall, fitting with the conventional wisdom that federal bureaucratic agencies slant slightly liberal. This oversight-minimizing value is approximately the ideological score of the Department of Agriculture. As a caveat, the defense agencies explain much of this relationship; limiting to civilian agencies weakens the results considerably, although the sign remains positive ($\beta = .33$, $s.e. = .23$ for the absolute-value case).

By taking a firmer stand on measuring agency-Congress ideological distance, we can consider a more focused test of the second hypothesis. Since the model measures ideological extremism relative to Congress’s ideal point, it make more sense to assume that the agency’s ideal point is fixed but becomes more “extreme” as its committee moves away from it. As a rough estimate, define

$$ideodist_{it} = housechair_{it}[1(\text{ideo}_t < 0) - 1(\text{ideo}_t > 0)].$$

For a conservative agency, for example, this measure is increasing as the oversight committee becomes more liberal and decreasing as it becomes more conservative. This measure would be exactly correct if every agency were more extreme than every house committee chair, but with the inclusion of agency-level fixed effects it should not be too far off. Importantly, I am not taking differences in two ideology scores, since with the scale differences this would not be sensible. This panel specification has the advantage of allowing the inclusion of agency fixed effects, as well as fixed effects for each Congress. Now consider the regression

$$\ln(\text{count}_{it}) = \beta \text{ideodist}_{it} + \delta_i + \pi_t + \gamma_1 year_t + \gamma_2 year_t^2 + \gamma_3 year_t^3 + \epsilon_{it},$$

(21)
where $\pi_t$ are Presidential fixed-effects. The model predicts oversight to be increasing in ideological distance $\beta > 0$, and the estimates in columns 3 and 4 of Table 5 bear that out. A standard deviation increase in ideological distance would predict an increase in GAO reports of about six percent.

One additional caveat must be kept in mind for all the regressions that include agency ideology. Although I believe we are using the best measure of agency ideology available, it is still likely to be contaminated with quite a bit of measurement error. This error has certainly attenuated the results, and so the true effect of agency ideology on oversight is likely to be much larger than that estimated here.

### 4.4 Complementary Conflict

Finally, in addition to direct predictions on Congress-executive and Congress-agency conflict, these conflicts should be complements in the "production" of oversight, i.e.

$$\frac{\partial \text{Oversight}(\theta_A)}{\partial |\theta_E|} \geq \frac{\partial \text{Oversight}(\theta'_A)}{\partial |\theta_E|}, \text{ if } \theta_A > \theta'_A.$$

**Hypothesis 3.** An increase in the degree of Congressional-executive conflict should induce a larger increase in oversight for agencies which are further from Congress, ideologically.

The complementarity occurs because, beyond a point, increasing the degree of executive-Congressional conflict has no effect on equilibrium oversight, but that point is further from Congress’s ideal point if the agency is further as well. To empirically identify the cross effects, I combine the direct terms
with a cross term for the degree of complementarity. Specifically

\[
\ln(\text{count}_{it}) = \beta_1 \text{absideo}_{it} + \beta_2 \text{conflict}_t + \beta_3 \text{absideo}_{it} \times \text{conflict}_t + \phi \text{budget}_{it} \\
+ \gamma_1 \text{year}_t + \gamma_2 \text{year}_t^2 + \gamma_3 \text{year}_t^3 + \varepsilon_{it}
\]

(22)

\[
\ln(\text{count}_{it}) = \beta_2 \text{conflict}_t + \beta_3 \text{absideo}_{it} \times \text{conflict}_t + \phi \text{budget}_{it} \\
+ \delta_{it} + \gamma_1 \text{year}_t + \gamma_2 \text{year}_t^2 + \gamma_3 \text{year}_t^3 + \varepsilon_{it}
\]

(23)

and the squared-ideology variants. The second, fixed effects, specification has the advantage of controlling for all agency-specific factors which may be correlated with agency ideology, but the first has the advantage of presenting all three hypotheses in one regression. The central prediction of the model that these regressions test is \(\beta_3 > 0\)—more ideological agencies induce more oversight when there is political conflict between the executive and Congress. Table 6 presents the results of OLS estimates of these regressions. The signs are as predicted by the model, but the statistical evidence for this hypotheses is weak. A one standard deviation increase in absolute ideology increases predicted oversight by 10 percent more under political conflict than it does otherwise. And, when there is political conflict the net increase in oversight of such a “shift” is about 40 percent. We can certainly reject the alternative hypothesis that these two types of conflict are strong substitutes in the “production” of GAO oversight.

Taken together, the data on GAO oversight broadly support the three hypotheses provided by the model. The evidence for the first two hypotheses is stronger than that for the last, but even in that case the data do not conflict with the story suggested by the model. With the basic plausibility of the baseline model established, the next section how the results would change under several alternative institutions.
5 Alternative Institutional Forms

The context for the basic model and the empirics is a Presidential system with completely separate appointment and oversight authority, a hierarchical bureaucracy that is subject to appointment at the top only, and administrative policymaking that is always subject to Congressional oversight. The roles I find appointees playing are a product of this institutional environment. To highlight the importance of each feature of the Presidential system for our results, and to shed some light on how differences in institutional details could affect policymaking, this section compares the outcomes that would occur under alternative institutional systems. I first discuss two variants which are both common and simple to analyze, a stylized parliamentary system and a strict hierarchy. Next I consider one institutional alternative which takes us a little further afield, Congressional confirmation.

Consider, first, a stylized parliamentary system, in which the legislature both appoints the supervisor and oversees her. Otherwise, the game is identical to the baseline model. From the envelope theorem on Congress's utility function we have $\theta_A^* = -\frac{\partial u}{\partial \theta_A}$, and Congress uses indirect oversight and receives their ideal policy for "free." Furthermore, the supervisor always play the ally role. Wilson touches on this point when he notes that "[the U.S. separation of powers system] contributes to the adversarial nature of bureaucratic politics in this country" (Wilson 1989, p.299). Only in rare circumstances of strong ideological coherence between the Congress and the executive would separation of powers produce as helpful an appointee as the parliamentary system always produces.

There is some evidence for this prediction cross-nationally, at least at the level of case study. Parliamentary democracies such as Great Britain (Vogel 1986), Sweden (Kelman 1981), West Germany (Brickman, Jasanoff and Ilgen 1985), and Japan (Wilson 1989) seem to define the roles and tasks of bureaucrats much more broadly than in Presidential systems, such as the United States. If we think of oversight as time spent setting rules of conduct and enforcing those rules, the basic model
unambiguously predicts tighter rules on bureaucrats in a Presidential system. In a parliamentary system, little oversight is required by the legislature, since the supervisor is carefully selected to implement the Legislature’s preferred policy without any oversight at all.

Perhaps the opposite extreme is a strict hierarchy. In a strict hierarchy, where the executive appoints a supervisor whom Congress is required to utilize, the executive can always obtain his ideal point. Since Congress no longer has the outside option of dealing directly with the agent, the executive is no longer bound by the feasibility constraint. He chooses \( \theta^*_s = \frac{1}{\beta_s} (\theta_E - \beta_A \theta_A) \), which induces the implementation of the executive’s ideal policy. The appointee is neither an ally nor an adversary, but rather an outright enemy of Congress. She actually undermines Congress’s position, since it could do better by dealing directly with the agent.

This institutional setup is isomorphic to one in which there is no supervisor and the executive simply appoints the agent (or there is no agent, and the supervisor directly implements policy herself). This simple unitary agency, which has been the subject of most of the research on political control of agency policymaking, can never produce any checks on the executive or, therefore, the two roles we observe appointees playing. We do not believe that the executive always gets his preferred policy, and studies by Weingast and Moran (1983) and Moe (1985), among others, demonstrate an effect of Congress’s preferences on agency policymaking. So models of a unitary agency must include an additional check on the executive, the most common of which is Senate confirmation, which we now consider.

5.1 Congressional Confirmation

One aspect of the US system of divided government which is absent from the basic model presented above is the Constitutional provision for the confirmation by Congress of key Presidential appointments. Since this provision is an ex-ante check on the executive’s appointment authority, its inclusion may interact with the ex-post check outlined above in interesting ways. In fact, if
ex-post oversight is sufficiently effective, Congress may never use its confirmation powers.

Rather than model all the institutional complexities of the appointment process, consider a reduced-form simplification in which Congress can limit the executive's range of appointees at a cost. Specifically, before the baseline game begins, Congress can pay a cost \( d \geq 0 \) in order to restrict the range of available appointees to the set

\[
-\frac{\theta_A}{\theta_S} - D \leq \theta_S \leq -\frac{\theta_A}{\theta_S} + D.
\]

In other words, Congress can guarantee that the supervisor appointed will not diverge too far from its ideal appointee, but that guarantee comes at a cost. This condition could easily arise as an equilibrium of an appointment/monitoring game between the Congress and the executive.

The costs of confirmation are fixed and exogenous for every constellation of agent and executive preferences (\( \theta 's \) and \( \alpha 's \)) and supervision probabilities (\( p 's \)), but the benefits of confirmation depend on all these parameters. So the attractiveness of the confirmation process depends crucially on both the degree of preference divergence and the effectiveness of ex-post oversight. Specifically, Congress is less likely to subject an appointee to confirmation if that agency is easy to control, ex-post, or if the executive is closely aligned with Congress.

Formally, consider an agency with \( K \theta_A < D \beta_S \), where \( K \) is defined as in Lemma 1. In this case, the Congress gains nothing from subjecting the appointee to confirmation, since the executive is already constrained to select a supervisor within the confirmation range due to Congress's ex-post outside option. Similarly, if \( -D \beta_S < \theta_E < D \beta_S \), Congress gains nothing from subjecting the appointee to confirmation, since the executive always chooses an appointee within the confirmation range without any intervention by Congress because he never wants a policy which is more extreme than his ideal point. Confirmation involves a trade off for Congress only if \( D \beta_S < \min\{|\theta_E|, K \theta_A\} \). In this case its behavior is characterized by the following proposition.

**Proposition 2.** If \( D \beta_S > \min\{|\theta_E|, K \theta_A\} \) Congress never chooses confirmation. If \( D \beta_S < \min\{|\theta_E|, K \theta_A\} \)
Congress subjects the appointment to confirmation if and only if

\[ d \leq \frac{\alpha_c}{\beta_A + \beta_S} \left[ \min \left\{ (K\theta_A)^2, \frac{\theta_E^2}{2} \right\} - (D\beta_S)^2 \right]. \]

If Congress chooses confirmation, the executive will choose a supervisor at the appropriate extreme of the confirmable range, Congress will use the indirect oversight regime, and the equilibrium policy will be \( \pm D\beta_S \). Without confirmation, Proposition 1 governs equilibrium action.

Proof. Compare Congress's payoffs under the confirmation regime to those under the no-confirmation regime, recognizing that the confirmation process is used only if it binds.

If we let \( d^* \) be the cost of confirmation which makes Congress indifferent, it becomes a measure of how attractive confirmation hearings are to Congress. Within the range for which there is a trade off for Congress, the comparative statics on \( d^* \) are instructive. With an adversarial appointee (the only time the agency ideology matters, when \( |\theta_E| > K\theta_A \)), the more ideologically extreme (higher \( \theta_A \)) or ideologically committed is the agency (\( \alpha_A \)), the more attractive are confirmation hearings. The most ideologically extreme agency given by Clinton and Lewis (2007) is the Department of the Navy, which has 7 appointees requiring approval out of 48 total (16 percent), while the least ideological, NASA, has 4 out of 138 (2 percent). Similarly, the harder agencies are to control (low \( p_D \) and \( p_I \)), the more attractive are confirmation hearings. Although outside the model, Federal Judges might very well be the extreme of this case: Congress cannot control them at all, ex-post, and so they always require confirmation. A little less extreme example is U.S. District Attorneys. They are very difficult to oversee because so much of their job is discretion and judgment. Instead, Congress requires consent in their appointment. In the Department of Justice, 222 of the 569 appointees required confirmation in 2004 (39 percent). At the opposite extreme is the Department of Health and Human Services, in which only 19 of 418 appointments require Senate approval (4 percent). Here agency policymaking is much easier to observe—if Medicare is not being implemented as specified, Congress will hear from its constituents immediately. Of course, a real test of the
confirmation hypotheses produced by the model would look only at de jure authority, but de facto exercise. Binder and Maltzman (2002) and Chang (2001) suggest a potentially fruitful approach, looking at the length of confirmation process.

6 Conclusions

By taking hierarchy seriously in administrative agencies, we can shed light on the way appointment and administrative policymaking work in a separation of powers system. Specifically, I explain why some appointees end up playing the role of Congressional allies, while others maintain an adversarial position vis-a-vis Congress and push the policy at the agency they lead away from Congress’s preferences. This dichotomy is closely related to an under-appreciated check on the executive’s appointment power brought about by Congress’s oversight authority. Neither result holds when dropping either the separation of powers assumption (as in a parliamentary democracy) or the hierarchical agency assumption (as when the executive selects the agent). In this simple model, ex-post oversight and ex-ante appointee confirmation are substitutes and outline the conditions under which each is attractive. Furthermore, the phenomenon of “going native” arises endogenously in the model, when the supervisor internalizes the costs of inducing implementation by the agent. Although the modeling framework is the primary contribution of this paper, the empirical evidence on the determinants of Congressional oversight, as measured by GAO reports, follows the general pattern predicted by the model. Specifically, oversight is increasing in Congress-executive conflict, increasing in Congress-agency conflict, and these two forms of conflict are complementary in the “production” of oversight.

Future work should continue to put the organizational nature of bureaucratic agencies at the fore. One especially attractive future step is to endogenize the ideology of the agent. The Department of Defense is more conservative than the EPA for a reason. Certainly, tasks play an important role. To build a theory of endogenous agency preferences requires a model of organizational
design, and I hope the model outlined here might serve as a fruitful jumping off point for such an endeavor. Finally, the empirics presented here are bare-bones. A fuller investigation must consider the appointees directly. Nixon (2004) made a few steps, but more needs to be done. The section on alternative institutions offered some stylized facts suggesting the plausibility of its conclusions, but a more robust empirical approach should help bound the model's applicability.

7 Data Appendix

GAO Reports: This count includes both written testimony submitted to Congress and larger formal reports distributed more widely. It was compiled by a script-based search of the GAO website’s reports database in the spring of 2007. The sample includes only agencies with complete histories, which presumably are those for which the GAO does a lot of oversight, so selection may be an issue. A single report often discusses two or more agencies, in which case it is counted as a report for all of them. This duplication is especially worrying in the case of sub-agencies, such as the Army and Air Force, since many reports written about the Army also refer to the Department of Defense, and so the measures for the DoD and Army are strongly correlated. It is not, however, the case that all sub-agency reports are included in the count of their parent agency; they are included only if both are explicitly referred to in the report. Note, for example, that the IRS has 1186 reports, while the Treasury has only 1012.

House/Senate Chair Ideology: I used the most recent DW-Nominate scores from www.voteview.com. The DW-Nominate procedure uses roll call votes to place legislators on an s-dimensional policy space, where the first dimension fits fairly well with the traditional left-right continuum. Committee assignments are from Nelson (2005) and Stewart and Woon (2005). For

\[\text{Perl script available from author by request. The search form can be found at http://www.gao.gov/docsearch/agency.php}\]
certain agencies, their primary oversight committee came into existence after the beginning of the sample period or went out of existence before the end. For these agencies, there is no committee chair ideology for those years, and so the observations are dropped.

Agency Ideology: Clinton and Lewis ask,

Please see below a list of United States government agencies that were in existence between 1988–2005. I am interested to know which of these agencies have policy views due to law, practice, culture, or tradition that can be characterized as liberal or conservative. Please place a check mark in one of the boxes next to each agency—“slant Liberal, Neither Consistently, slant Conservative, Don’t Know.”

Where their predictions overlap with those of prior methods, the results are broadly similar. The strongest feature of this method is its broad applicability—they come up with ideological estimates for 82 executive agencies. The biggest weakness, shared by every method, is that it cannot identify variation over time in agency ideology.

8 Theoretical Appendix

Since the probability of being caught in deviation can never exceed 1, there is a limit on how extreme a policy the agent can be induced to produce. When the supervisor is working with the agent, then, she actually solves the constrained problem

$$\max_x -\alpha_5(x - \theta_5)^2 - \frac{\alpha_A(x - \theta_A)^2}{pw_A}, \text{ such that } \frac{\alpha_A}{w_A}(x - \theta_A)^2 \leq 1.$$  \hspace{1cm} (24)
This yields the solution

\[ x = \begin{cases} \frac{\theta_A \alpha_A/(\alpha_A/\pi) + \theta_S \alpha_S}{\alpha_A/(\alpha_A/\pi) + \alpha_S}, & \text{if } (\theta_A - \theta_S)^2 < \frac{w_A (\alpha_S + \alpha_A/\pi)}{\alpha_S}^2 \\ \theta_A \pm \sqrt{w_A/\alpha_A}, & \text{if } \theta_S \geq \theta_A \pm \sqrt{w_A (\alpha_S + \alpha_A/\pi)}/\alpha_S \end{cases} \]

Replacing for this policy in the supervisor's utility function yields the supervisor's outside option.

\[ O(\theta_A, \theta_S) = \begin{cases} \frac{-(\theta_S - \theta_A)^2 \alpha_S \alpha_A/(\alpha_A/\pi)}{\alpha_S + \alpha_A/\pi} & \text{if } (\theta_A - \theta_S)^2 < \frac{w_A (\alpha_S + \alpha_A/\pi)}{\alpha_S}^2 \\ -\alpha_S (|\theta_S - \theta_A| - \sqrt{w_A/\alpha_A})^2 - \frac{1}{p_I}, & \text{otherwise.} \end{cases} \]

Let \( O^*(\theta_A, \theta_S) \) represent the unconstrained outside option, since it appears later.

The Congress, then, finds its optimal policy under each oversight regime by performing its own constrained optimization. For direct oversight, the problem is very similar to that faced by the supervisor. Congress solves

\[ \max_x \quad -\alpha_C x^2 - \frac{\alpha_A (x - \theta_A)^2}{p_D w_A}, \text{ such that } \frac{\alpha_A}{w_A} (x - \theta_A)^2 \leq 1. \]  

(25)

This problem yields the maximizing policy

\[ x_D^* = \begin{cases} \frac{\theta_A \alpha_A / p_D w_A}{\alpha_C + \alpha_A / p_D w_A}, & \text{if } \theta_A < \sqrt{w_A (\alpha_C + \alpha_A / p_D w_A)}/\alpha_C \\ \theta_A - \sqrt{w_A/\alpha_A}, & \text{otherwise.} \end{cases} \]

Indirect oversight is more complicated, since there are two restrictions to consider. First, the policy must be feasibly enforced on the agent by the supervisor. Second, the policy my be feasibly
enforced on the supervisor by the Congress. So Congress solves

\[
\max_x \quad -\alpha c x^2 - \frac{1}{\hat{\rho} w_S} \left[ \alpha_s (x - \theta_s)^2 + \frac{\alpha_A}{p l w_A} (x - \theta_A)^2 + O(\theta_A, \theta_S) \right]
\]

such that

1) \( \frac{\alpha_A}{w_A} (x - \theta_A)^2 \leq 1 \)

2) \( \frac{1}{w_S} [\alpha_s (x - \theta_s)^2 + \frac{\alpha_A}{p l w_A} (x - \theta_A)^2 + O(\theta_A, \theta_S)] \leq 1 \)

Two constraints on parameters emerge from Congress's maximization problem.

\[
(\beta_A \theta_A + \beta_S \theta_S - \theta_A)^2 \leq \frac{w_A}{\alpha_A} \quad (27)
\]

\[
(\beta_A \theta_A + \beta_S \theta_S)^2 \leq \left( \frac{\beta_A + \beta_S}{1 - \beta_A - \beta_S} \right)^2 \left( \frac{w_A + O^*(\theta_A, \theta_S) - O(\theta_A, \theta_S)}{\alpha_S + \alpha_A / p l w_A} \right) \quad (28)
\]

Taking both constraints into account, Congress's best policy under indirect oversight is given by

\[
x^*_I = \begin{cases} \beta_A \theta_A + \beta_S \theta_S & , \text{if (27) and (28) hold} \\ \theta_A \pm \sqrt{w_A / \alpha_A} & , \text{if (27) fails and (28) holds} \\ \frac{\beta_A \theta_A + \beta_S \theta_S}{\beta_A + \beta_S} \pm \sqrt{\frac{w_A + O^*(\theta_A, \theta_S) - O(\theta_A, \theta_S)}{\alpha_S + \alpha_A / p l w_A}} & , \text{if (27) holds and (28) fails} \\ \text{the most restrictive} & , \text{if both constraints fail.} \end{cases}
\]

The first constraint limits the distance between equilibrium policy and the agent's ideal point, while the second limits the distance between the equilibrium policy and the supervisor's induced ideal point from the supervisor-agent subgame. When a constraint binds, the sign of the deviation in the resulting policy is inferred from the location of the unconstrained policy vis-a-vis the limiting ideal point. For example, when \( \beta_A \theta_A + \beta_S \theta_S > \theta_A \) and the first constraint binds, the resulting policy is \( \theta_A + \sqrt{w_A / \alpha_S} \), while if \( \beta_A \theta_A + \beta_S \theta_S < \theta_A \) it is \( \theta_A - \sqrt{w_A / \alpha_S} \).

Inserting these optimal policies into Congress's utility and cost functions yields the indirect utility functions in each regime.
\[ V_D^*(\theta_A) = \begin{cases} 
\frac{-\alpha_C \theta_A}{\alpha_C + \alpha_A/\rho_D w_A} - \theta_A^2 \frac{\rho_D w_A}{\alpha_C}, & \text{if } \theta_A < \sqrt{\frac{\alpha_C + \alpha_A/\rho_D w_A}{\alpha_C}} \\
-\alpha_C (\theta_A - \sqrt{\frac{\alpha_C + \alpha_A/\rho_D w_A}{\alpha_C}})^2 - \frac{1}{\rho_D}, & \text{otherwise.} 
\end{cases} \]

\[ V_I^*(\theta_A, \theta_S) = \begin{cases} 
\frac{-\alpha_C \theta_A^2}{(\beta_A + \beta_S)} + (\beta_A/\beta_S) \theta_A^2 \frac{\rho_D w_A}{\alpha_C}, & \text{if (27) and (28) hold} \\
-\alpha_C (\theta_A + \sqrt{\frac{\alpha_C + \alpha_A/\rho_D w_A}{\alpha_C}})^2 - \frac{1}{\rho_D}, & \text{if (27) and (28) fail} \\
\frac{1}{\rho_D w_S} \left[ \alpha_S (\theta_S - \theta_A + \sqrt{\frac{\alpha_C + \alpha_A/\rho_D w_A}{\alpha_C}})^2 + \frac{1}{\rho_D} + O(\theta_A, \theta_S) \right], & \text{if (27) fails and (28) holds} \\
-\alpha_C (\beta_A \theta_A + \beta_S\theta_S) \frac{\rho_D w_A}{\alpha_C + \alpha_A/\rho_D w_A} \left[ \theta_A + \sqrt{\frac{\alpha_C + \alpha_A/\rho_D w_A}{\alpha_C}} \right]^2 - \frac{1}{\rho_D}, & \text{if (27) holds and (28) fails} \\
\text{the most restrictive,} & \text{if both constraints fail.} 
\end{cases} \]

Just as in the unconstrained case considered in the body, Congress's indirect utility under the direct oversight regime is independent of the supervisor's ideal point. By revealed preference, the constraints on the indirect oversight policy can never make Congress better off, and so just like in the unconstrained case, Congress circumvents the supervisor and uses direct oversight if the supervisor is too extreme. Furthermore, just like the unconstrained case, there is a type of supervisor which guarantees that Congress prefers the indirect oversight regime. In fact, it is the same supervisor as in the unconstrained case \((\theta_S = -\beta_A \theta_A)\), which suggests the following lemma.

**Lemma 3.** For each \(\theta_A > 0\), there exist \((M, N) > 0\), such that Congress delegates to the appointee for

\[ \theta_S = -\frac{\beta_A}{\beta_S} \theta_A - M < \theta_S < -\frac{\beta_A}{\beta_S} \theta_A + N \equiv \bar{\theta}_S. \]

He sets \(x^C = x^*_i\), \(o_S = c^i(x^*_i)\), and \(o_A = 0\). These choices induce the supervisor to choose \(x^S = x^C\) and set supervision appropriately to induce compliance by the agent. If \(\theta_S\) is outside these bounds, Congress does not delegate, chooses \(x^C = x^*_D\), sets \(o_S = 0\), and sets \(o_A = c_D(x^*_D)\). This choice induces the agent to set \(x = x^*_D\).
Proof. I first show that $V_j^*(\theta_A, -\frac{\theta_A}{\theta_S} \alpha_A)) > V^*_D(\theta_A)$ and then that $V_j^*(\theta_A, \theta_S)$ is decreasing in $\theta_S$. Since it is clearly unbounded below, this condition is sufficient to establish the result. First, assume that $\theta_A^2 \leq w_A/\alpha_A$, then neither constraint in (26) binds, we are in the case considered in the body, and Congress gets its ideal point for free. Congress can certainly do no better in direct oversight. Now, assume that $\theta_A^2 > w_A/\alpha_A$, so the first constraint binds in (26), but that means it also binds in the supervisor-agent subgame (24), and so the supervisor implements that policy with no oversight from the Congress. As a result, Congress receives utility

$$-\alpha_C(\theta_S + \sqrt{w_A/\alpha_A})^2.$$ 

If, instead, Congress oversaw the agent directly, the same policy would be implemented, but Congress would have to pay the implementation cost $(1/P_D)$, from (25).

Now consider how $V_j^*$ changes as $\theta_S$ moves away from the optimal point. If none of the constraints bind, the indirect utility function clearly declines, as outlined in the body. Changing $\theta_S$ has no direct impact on the first constraint of (26), and therefore no impact on the indirect utility at any point where that constraint binds. Finally, moving $\theta_S$ away from the optimal point can only tighten the second constraint, since it moves supervisor-agent cost-minimizing policy away from $0$. The result is that the indirect utility can only decrease faster than it does in the unconstrained case. 

With the limits of the high-oversight range in mind, the Executive must select a supervisor. If we again assume that the span of policies implementable under indirect-oversight includes the one implemented under direct-oversight, his choice is much like that outlined in the body. Since $x_j^*$ remains weakly monotonic in $\theta_S$, a maximizing supervisor choice is given by

$$\theta^*_S(\theta_E) = \begin{cases} \theta_S & \text{, if } \theta_E < x_j^*(\theta_S) \\ \theta_S \in (x_j^*)^{-1}(\theta_E) & \text{, otherwise} \\ \overline{\theta_S} & \text{, if } \theta_E > x_j^*(\overline{\theta_S}), \end{cases}$$
and we arrive at the same pattern as in the unconstrained case in the body. All that remains is to derive conditions under which we can ignore the constraints. It turns out that we need only limit the extremism of the agent.

**Proposition 3.** Assume $\theta_A$ satisfies the following condition,

$$\theta_A^2 \leq \min\left\{ \frac{w_A}{\alpha_A} \left( \frac{\beta_S + \beta_A}{K + \beta_S + \beta_A} \right)^2, \frac{w_A}{\alpha_S + \alpha_A/\rho} \left( \frac{1}{1 - \beta_A - \beta_S} \right)^2 \right\}, \tag{29}$$

where $K$ is defined in Lemma 1, and (12) holds. Then none of the constraints bind, and the equilibrium policy, supervisor, oversight, and supervision values are the solutions to the unconstrained problems, as presented in Proposition 1.

**Proof.** This restriction keeps $x_D^*$ in the unconstrained range, as is obvious from the solution to (25). Since Congress’s constrained payoff under indirect oversight is always less than its unconstrained payoff, while the constrained direct oversight utility is equal to the unconstrained, $K \geq \max\{M, N\}$. Turn now to the supervisor-agent subgame. The ideological distance between the agent and the supervisor must be less than $|\theta_A|(1 + \frac{\beta_A}{\beta_S}[1 + K])$, since that is the distance of the most extreme type the executive would choose. Replacing for this distance in the solution to (24), results in the constraint

$$\theta_A^2 \leq \frac{w_A}{\alpha_A} \left( \frac{\beta_S + \beta_A}{K + \beta_S + \beta_A} \right)^2,$$

the first term in (29). Likewise, the most extreme policy which could be implemented in indirect oversight is $x = -K\theta_A$, and so the first restriction in (25) become

$$\theta_A^2 \leq \frac{w_A}{\alpha_A} \left( \frac{1}{1 + K} \right)^2,$$

which is less restrictive than the first term in (29). The second restriction is equal to the second term in (29). So the given condition is sufficient to guarantee an interior solution to each individual’s problem and, therefore, an interior equilibrium. \qed
References


Kelman, Steven, Regulating America, Regulating Sweden, MIT Press, 1981.


Table 1: Agencies in Sample

<table>
<thead>
<tr>
<th>Agency</th>
<th># of reports</th>
<th>avg. outlays (M1983$)</th>
<th>Clinton-Lewis Ideology</th>
<th>2006 Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Labor</td>
<td>776</td>
<td>29023</td>
<td>-1.43</td>
<td>15320</td>
</tr>
<tr>
<td>Department of Housing and Urban Development</td>
<td>833</td>
<td>19715</td>
<td>-1.33</td>
<td>9665</td>
</tr>
<tr>
<td>Department of Health and Human Services</td>
<td>1583</td>
<td>216540</td>
<td>-1.32</td>
<td>60478</td>
</tr>
<tr>
<td>Department of Education</td>
<td>733</td>
<td>21155</td>
<td>-1.22</td>
<td>4212</td>
</tr>
<tr>
<td>Environmental Protection Agency</td>
<td>1509</td>
<td>4725</td>
<td>-1.21</td>
<td>18234</td>
</tr>
<tr>
<td>Social Security Administration</td>
<td>722</td>
<td>227778</td>
<td>-0.45</td>
<td>64023</td>
</tr>
<tr>
<td>Department of State</td>
<td>1042</td>
<td>4182</td>
<td>-0.27</td>
<td>33844</td>
</tr>
<tr>
<td>National Aeronautics and Space Administration</td>
<td>538</td>
<td>7950</td>
<td>-0.07</td>
<td>18369</td>
</tr>
<tr>
<td>Department of Transportation</td>
<td>1062</td>
<td>24255</td>
<td>0.07</td>
<td>53375</td>
</tr>
<tr>
<td>Department of Agriculture</td>
<td>1478</td>
<td>43870</td>
<td>0.16</td>
<td>104385</td>
</tr>
<tr>
<td>Office of Personnel Management</td>
<td>611</td>
<td>39946</td>
<td>0.24</td>
<td>4900</td>
</tr>
<tr>
<td>General Services Administration</td>
<td>842</td>
<td>496</td>
<td>0.26</td>
<td>12429</td>
</tr>
<tr>
<td>Department of Energy</td>
<td>1790</td>
<td>12500</td>
<td>0.35</td>
<td>14762</td>
</tr>
<tr>
<td>Department of Justice</td>
<td>931</td>
<td>6818</td>
<td>0.37</td>
<td>106035</td>
</tr>
<tr>
<td>Department of the Interior</td>
<td>783</td>
<td>6556</td>
<td>0.47</td>
<td>74399</td>
</tr>
<tr>
<td>Nuclear Regulatory Commission</td>
<td>310</td>
<td>358</td>
<td>0.53</td>
<td>3307</td>
</tr>
<tr>
<td>Office of Management and Budget</td>
<td>1565</td>
<td>37</td>
<td>0.85</td>
<td>466</td>
</tr>
<tr>
<td>Department of the Treasury</td>
<td>1012</td>
<td>200814</td>
<td>1.07</td>
<td>117553</td>
</tr>
<tr>
<td>Small Business Administration</td>
<td>395</td>
<td>967</td>
<td>1.17</td>
<td>6086</td>
</tr>
<tr>
<td>Department of Commerce</td>
<td>749</td>
<td>2710</td>
<td>1.25</td>
<td>41567</td>
</tr>
<tr>
<td>Department of the Air Force</td>
<td>1493</td>
<td>61927</td>
<td>1.95</td>
<td>159411</td>
</tr>
<tr>
<td>Department of the Army</td>
<td>1611</td>
<td>55110</td>
<td>2.04</td>
<td>246054</td>
</tr>
<tr>
<td>Department of Defense</td>
<td>4847</td>
<td>200110</td>
<td>2.21</td>
<td>678327</td>
</tr>
<tr>
<td>Department of the Navy</td>
<td>1440</td>
<td>63940</td>
<td>2.4</td>
<td>176344</td>
</tr>
<tr>
<td>Army Corps of Engineers</td>
<td>282</td>
<td>2894</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bureau of Indian Affairs</td>
<td>156</td>
<td>1116</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bureau of Land Management</td>
<td>299</td>
<td>763</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal Aviation Administration</td>
<td>734</td>
<td>5228</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food and Drug Administration</td>
<td>412</td>
<td>506</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forest Service</td>
<td>423</td>
<td>2334</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal Revenue Service</td>
<td>1186</td>
<td>14963</td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Park Service</td>
<td>229</td>
<td>1096</td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States Fish and Wildlife Service</td>
<td>255</td>
<td>732</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

60
<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>988.82</td>
<td>38592</td>
<td>0.31</td>
</tr>
<tr>
<td>s.d.</td>
<td>840.53</td>
<td>69987</td>
<td>1.17</td>
</tr>
<tr>
<td></td>
<td>Overall</td>
<td>Strong Conflict (12 years)</td>
<td>No Strong Conflict (15 years)</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------</td>
<td>---------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>ln(#GAO Reports)</td>
<td>3.23</td>
<td>3.41</td>
<td>3.09</td>
</tr>
<tr>
<td></td>
<td>(0.89)</td>
<td>(0.43)</td>
<td>(0.32)</td>
</tr>
<tr>
<td>House Committee Chair DW-Nominate</td>
<td>-0.02</td>
<td>0.01</td>
<td>-0.05</td>
</tr>
<tr>
<td></td>
<td>(0.43)</td>
<td>(0.32)</td>
<td>(0.44)</td>
</tr>
<tr>
<td>Senate Committee Chair DW-Nominate</td>
<td>0.04</td>
<td>0.03</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>(0.32)</td>
<td>(0.34)</td>
<td>(0.44)</td>
</tr>
<tr>
<td>Agency-Committee Ideological Distance</td>
<td>0.000</td>
<td>-0.006</td>
<td>0.005</td>
</tr>
<tr>
<td></td>
<td>(0.44)</td>
<td>(0.44)</td>
<td>(0.44)</td>
</tr>
<tr>
<td>ln(Annual Agency Outlays M1983$)</td>
<td>8.85</td>
<td>8.84</td>
<td>8.86</td>
</tr>
<tr>
<td></td>
<td>(2.15)</td>
<td>(2.15)</td>
<td>(2.15)</td>
</tr>
<tr>
<td>Dem. Pres Dummy</td>
<td>0.33</td>
<td>0.5</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>(0.48)</td>
<td>(0.48)</td>
<td>(0.48)</td>
</tr>
<tr>
<td>Strong Political Conflict</td>
<td>0.44</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>(0.50)</td>
<td>(0.50)</td>
<td>(0.50)</td>
</tr>
<tr>
<td>Agency Ideology Score</td>
<td>0.33</td>
<td>0.33</td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td>(1.13)</td>
<td>(1.13)</td>
<td>(1.13)</td>
</tr>
<tr>
<td></td>
<td>Agency Ideology Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.95</td>
<td>0.95</td>
<td>0.95</td>
</tr>
<tr>
<td></td>
<td>(0.73)</td>
<td>(0.73)</td>
<td>(0.73)</td>
</tr>
<tr>
<td>Committee-Agency Ideological Distance</td>
<td>0.00</td>
<td>-0.01</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>(0.44)</td>
<td>(0.44)</td>
<td>(0.44)</td>
</tr>
<tr>
<td>ln(Total GAO Reports 1980-2006)</td>
<td>5.93</td>
<td>5.93</td>
<td>5.93</td>
</tr>
<tr>
<td></td>
<td>(0.91)</td>
<td>(0.91)</td>
<td>(0.91)</td>
</tr>
<tr>
<td></td>
<td>(1.43)</td>
<td>(1.43)</td>
<td>(1.43)</td>
</tr>
</tbody>
</table>

Overall sample includes 33 executive branch agencies from 1980-2006. Ideological measure are available for 24 agencies. Agency Ideologies are derived from Clinton and Lewis (2007), Congressional Chair DW-Nominate scores from www.voteview.com (Poole and Rosenthal). GAO Reports were collected from the GAO website, agency employment from the Office of Personnel Management, and Agency Outlays from the OMB historical budget series, which did not offer disaggregated budgets for the defense agencies for 1980-1983.
Table 3: Effects of Broad Executive-Congressional Conflict on Oversight

<table>
<thead>
<tr>
<th>Dependent: ln(#GAO Reports)</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong Political Conflict</td>
<td>0.35</td>
<td>0.34</td>
<td>0.40</td>
<td></td>
</tr>
<tr>
<td>(0.03)**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dem. President</td>
<td>0.17</td>
<td>0.24</td>
<td>0.69</td>
<td></td>
</tr>
<tr>
<td>(0.03)**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dem. President x Strong Political Conflict</td>
<td>-0.15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0.07)*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dem. House</td>
<td></td>
<td></td>
<td>0.76</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.11)**</td>
<td></td>
</tr>
<tr>
<td>Dem. Senate</td>
<td>0.26</td>
<td>0.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.06)**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dem. House x Dem. Senate</td>
<td></td>
<td></td>
<td>0.54</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.09)**</td>
<td></td>
</tr>
<tr>
<td>Dem. House x Dem. Senate x Dem. President</td>
<td>-1.03</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.07)**</td>
<td></td>
</tr>
<tr>
<td>ln(Annual Agency Outlays M1983$)</td>
<td>0.35</td>
<td>0.34</td>
<td>0.34</td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td>(0.10)**</td>
<td>(0.10)**</td>
<td>(0.10)**</td>
<td>(0.10)**</td>
</tr>
<tr>
<td>cubic year</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>agency effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.79</td>
<td>0.79</td>
<td>0.80</td>
<td>0.81</td>
</tr>
<tr>
<td>n</td>
<td>879</td>
<td>879</td>
<td>879</td>
<td>879</td>
</tr>
</tbody>
</table>

All equations have the natural log of annual number of GAO reports, by agency, as the dependent variable. All regressors are dummy variables for Democratic control, except conflict which is equal to 1 when one party controls both chambers of Congress and the other party controls the Presidency. Robust standard errors in parentheses, clustered at the agency level. A single asterisk indicates .05 significance, while two indicates .01.
### Table 4: Effects of Presidential-Committee Conflict on Oversight

Dependent: \( \ln(\# \text{GAO Reports}) \)

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>House Chair DW-Nom</td>
<td>-0.77</td>
<td>-0.76</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.14)**</td>
<td>(0.14)**</td>
<td></td>
</tr>
<tr>
<td>Dem. Pres x House Chair DW-Nom</td>
<td>0.79</td>
<td>0.79</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.12)**</td>
<td>(0.16)**</td>
<td></td>
</tr>
<tr>
<td>Senate Chair DW-Nom</td>
<td>-0.10</td>
<td>-0.09</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.14)</td>
<td>(0.13)</td>
<td></td>
</tr>
<tr>
<td>Dem. Pres x Senate Chair DW-Nom</td>
<td>0.43</td>
<td>0.11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.21)*</td>
<td>(0.28)</td>
<td></td>
</tr>
<tr>
<td>Dem. Pres</td>
<td>0.23</td>
<td>0.24</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>(0.04)**</td>
<td>(0.06)**</td>
<td>(0.06)**</td>
</tr>
<tr>
<td>ln(Annual Agency Outlays M1983$)</td>
<td>0.35</td>
<td>0.34</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td>(0.10)</td>
<td>(0.10)**</td>
<td>(0.10)**</td>
</tr>
<tr>
<td>cubic year</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Congress Effects</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>agency effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**F Test p-value:**

- House Chair DW-Nom + Dem. Pres x House Chair DW-Nom = 0: 0.66
- House Chair DW-Nom + Dem. Pres x House Chair DW-Nom = 0 & House Chair DW-Nom = 0: 0.00
- Senate Chair DW-Nom + Dem. Pres x Senate Chair DW-Nom = 0: 0.00
- Senate Chair DW-Nom + Dem. Pres x Senate Chair DW-Nom = 0 & Senate Chair DW-Nom = 0: 0.00

\( R^2 \) | 0.800 | 0.796 | 0.774 |
\( n \)  | 879   | 879   | 879   |

All equations have the natural log of annual number of GAO reports, by agency, as the dependent variable. Housechair and Senchair are the first dimension DW-nominate score of chair of the primary oversight committee for the agency. Robust standard errors in parantheses, clustered at the agency level. A single asterisk indicates .05 significance, while two indicates .01.
Table 5: Effects of Agency Ideology on Oversight

<table>
<thead>
<tr>
<th></th>
<th>Dep: ln(GAO Reports 80-06)</th>
<th>Dep: ln(#GAO Reports)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td></td>
<td>Agency Ideology Score</td>
<td>0.45</td>
</tr>
<tr>
<td>Agency Ideology Score</td>
<td>-0.07</td>
<td>(0.13)</td>
</tr>
<tr>
<td>(Agency Ideology Score)$^2$</td>
<td>0.24</td>
<td>(0.08)**</td>
</tr>
<tr>
<td>Ideological Distance</td>
<td>0.14</td>
<td>0.12</td>
</tr>
<tr>
<td>ln(Average Annual Agency Outlays M1983$)</td>
<td>-0.04</td>
<td>-0.05</td>
</tr>
<tr>
<td>ln(2006 Agency Employment)</td>
<td>0.32</td>
<td>0.32</td>
</tr>
<tr>
<td>ln(Annual Agency Outlays M1983$)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cubic year</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>agency effects</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Congress effects</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.584</td>
<td>0.605</td>
</tr>
<tr>
<td>n</td>
<td>24</td>
<td>24</td>
</tr>
</tbody>
</table>

In equations 1 and 2, the dependent variable is the log of the total number of GAO reports written about the agency between 1980 and 2006. In equations 3 and 4, it is the natural log of annual number of GAO reports, by agency. The Agency Ideology score comes from Clinton and Lewis(2006). Ideological distance measures agency and the chair of the House committee overseeing it. The budget is outlays measured in M$1983$. Employment in 1000s. Robust standard errors in parentheses, clustered at the agency level in equations 3 and 4. A single asterisk indicates .05 significance.
Table 6: Cross Effects of Agency and Political Conflict

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Agency Ideology Score</td>
<td>0.20</td>
<td>(0.19)</td>
<td></td>
</tr>
<tr>
<td>Strong Political Conflict</td>
<td>0.22</td>
<td>0.26</td>
<td>0.21</td>
<td>0.24</td>
</tr>
<tr>
<td>(0.10)*</td>
<td>(0.07)**</td>
<td>(0.10)*</td>
<td>(0.07)**</td>
<td></td>
</tr>
<tr>
<td>Strong Political Conflict x</td>
<td>0.13</td>
<td>0.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agency Ideology</td>
<td>(0.09)</td>
<td>(0.09)</td>
<td></td>
</tr>
<tr>
<td>Agency Ideology Score</td>
<td>0.03</td>
<td>(0.09)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Agency Ideology Score)²</td>
<td>0.10</td>
<td>(0.09)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strong Political Conflict x</td>
<td>0.01</td>
<td>0.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agency Ideology</td>
<td>(0.05)</td>
<td>(0.05)</td>
<td></td>
</tr>
<tr>
<td>Strong Political Conflict x</td>
<td>0.05</td>
<td>0.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Agency Ideology)²</td>
<td>(0.04)</td>
<td>(0.04)</td>
<td></td>
</tr>
<tr>
<td>ln(Annual Agency Outlays M1983$)</td>
<td>0.08</td>
<td>0.07</td>
<td>0.24</td>
<td>0.24</td>
</tr>
<tr>
<td>(0.06)</td>
<td>(0.07)</td>
<td>(0.09)*</td>
<td>(0.08)**</td>
<td></td>
</tr>
<tr>
<td>cubic year</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>agency effects</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Congress effects</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

F Test: p-values:

Strong Political Conflict x |Agency Ideology| + |Agency Ideology| = 0   0.03
Strong Political Conflict x (Agency Ideology)²+ |(Agency Ideology)² = 0 0.05

R² | 0.375 | 0.317 | 0.754 | 0.756 |
| n  | 636   | 636   | 636   | 636   |

The dependent variable is the log of the number of GAO reports written about the agency. The Agency Ideology score comes from Clinton and Lewis(2006). The budget is outlays measured in M$1983. Conflict is a dummy variable for the president being one party and both houses of Congress the other. Robust standard errors in parentheses, clustered at the agency level. A single asterisk indicates significance at the .05 level.
State Parties and State Policies: A Double Regression Discontinuity Approach

Doctoral Dissertation Essay 2

Patrick L. Warren

Department of Economics

Cambridge, MA

I want to thank my advisers Daron Acemoglu, Bob Gibbons, and Jim Snyder for their encouragement and advice. The participants of the Political Economy breakfast, the organizational economics and development lunches, and the 2007 NBER student PE Conference gave excellent suggestions, many of which have improved the paper greatly. I want specifically to thank Ryan Bubb, Dan Carpenter, Alex Debs, Tal Gross, Jeanne Lafortune, Eric Van den Steen, Eric Weese, and Tom Wilkening. This research was undertaken while studying under a National Science Foundation
Graduate Research Fellowship
Abstract

In a system of divided power, public sector agencies are an important front in the day-to-day battle for political supremacy between the executive and the legislature. The executive's key agents in this conflict are his appointees, who are observed playing two broad roles: **allies**, where they work to help Congress implement policy and **adversaries**, where they fight with Congress to shift policy strongly in the executive's direction. This paper studies how these two roles arise and what implications they have for the interaction of Congress and the executive in administrative policymaking. Thereby, it highlights how intrinsically motivated bureaucrats combined with hierarchical control affect the ability of the political principals to control the execution of policy. Furthermore, I explore how this interaction shifts under alternative institutional forms, and how it leads appointees to "marry the natives." The model makes several predictions concerning Congressional oversight of bureaucratic agencies. These predictions are broadly supported by an empirical analysis of audit reports released by the Government Accountability Office.
The evidence that political parties influence policy outcomes in the United States is decidedly mixed. At the Congressional level, the answer seems to be "Yes," at least as far as voting is concerned (Lee, Moretti and Butler 2004). Beyond voting per-se, evidence from prediction markets suggests that people certainly believe that changes in party control at the national level will affect economic policy (Snowberg, Wolfers and Zitzewitz 2007). At the municipal level, by contrast, Ferreira and Gyourko (2007) demonstrate that the party of the mayor has little if any effect on the policies pursued by the local government. 1 If party control is important at the national level but seems relatively insignificant at the local level, the question remains open for the important middle ground of state government.

State policymaking is particularly interesting for a number of reasons. First of all, state and local government spending makes up a large part of the U.S. Economy. For the years 1970-2000, state and local spending from own sources (exclusive of federal transfers) averaged a bit over 10 percent of GDP. For example, in 2004, state revenue from own sources was approximately 1.2 $Trillion, or about $4,000 per capita. 2 Furthermore with our Federal system, even ostensibly federal programs are frequently implemented (within guidelines) by the states. 3 Finally, as pointed out by Volden (2006), states often act as policy "laboratories," in which different policy innovations are tested before they are adopted more generally. If parties can affect the state policies, they may also indirectly affect national policies.

Although there are generally accepted ideological differences between state political parties in the U.S., the evidence that these ideological differences transform into policy differences is less

---

1 By contrast, Pettersson-Lidbom (2006) does find a pure partisan effect in Swedish municipalities.
2 According to Historical Table 15.3 of the 2009 Budget of the United States Government and Table 422 of the 2008 Statistical Abstract of the United States.
3 For example, "Temporary Aid for Needy Families" (TANF) and, formerly, Aid to Families with Dependent Children (AFDC) were two of the most important federal programs for combating child poverty. Both were implemented by the states, with cost sharing and implementation guidelines but greatly devolved control.
clear. The most recent studies, working with longer and wider panels of states and more extensive controls, have uncovered some evidence of party effects. Reed (2006) and Besley and Case (2003) find that Democratic control is associated with higher taxes, while Caplan (2001) finds that a higher proportion Democratic in the lower chamber of the state house is associated with higher taxes. Similarly, for state minimum wages, the cross sectional evidence for an effect of Democratic strength on the minimum wage is weak (Waltman and Pittman 2002), but longer panels suggest a positive effect (Zavodny 1996).

Although more sophisticated than the first generation studies, these studies share a weakness in their identification strategies: since they all use some variant of fixed-effect OLS estimation, they are not robust to omitted variables which are correlated with party mix and control. The central problem of estimating the causal effect of parties on policies is that party control and mix are not randomly assigned. Rather, they arise endogenously as the outcome of a political process, and respond to many unmeasured differences in polities, both between states and over time. For example, an economic shock in a particular state could drive both a change in party control and a change in economic policies, and a simple OLS-style analysis would spuriously attribute the change in policy to the change in party.

This paper corrects the potential problem of omitted variable bias in the setting of U.S. state legislatures, using two variants of a regression discontinuity. The central finding is a partial return to the null result of the first generation studies. I find no statistical evidence for a change in tax burden or the minimum wage when there is an exogenous shift in party power, as measured by control of the legislature (control effect), but weak statistical evidence in favor of effect for the proportion of seats held by the Democrats (mix effect). Furthermore, in terms of economic significance, the

Looking at control of state legislatures, Dye (1966), Winters (1976), and Erikson, Wright and McIver (1993) all look cross-state and find little difference in policies. Some within-state evidence is strong in favor of an effect, (Erikson 1971, Garand 1985, Alt and Lowry 1994), while others are mixed (Jennings 1979, Dye 1984).
absolute size of the best estimate of the effect of shift in party control is dwarfed by the effect of other factors and by noise. In contrast, the estimated mix effect is large and positive, larger even than the OLS prediction. In fact, the coefficient pattern fits that predicted by Stigler (1972), with changes in party mix seeming to be more important than changes in control. These results seem to fit less with similar work done on municipal politics (Ferreira and Gyourko 2007), which find no effect of party, and more with findings on the national level (Levitt 1996, Lee et al. 2004), which find a large effect, with the caveat that the effect seems to come through mix and not control.

The next section describes a simple theoretical framework. I then turn to the data and the identification strategy. I present the basic results for both the control and mix effects, before turning to robustness checks, additional specifications, and some brief concluding remarks. Two appendices provide technical details on the theoretical model and the identification strategy.

1 Theoretical Framework

One way parties can affect policy in the legislature is through their agenda setting power (Cox and McCubbins 2005). In this section, I will present a stylized variant of the Rubinstein (1982) bargaining model as applied by Baron and Ferejohn (1989) to legislative bargaining. The main innovation is to allow the probability of being selected as proposer (agenda setter) to increase with your party’s share of the legislature and to allow this probability to jump discontinuously at the 50-50 split point. We will then see what effect a shift in the party mix has on the expected policy.

Consider a single-chamber legislature with two parties (D and R), an open agenda, and unanimity rule. This legislature is choosing some policy ($x$) from the closed interval [0, 1]. Each party consists
of homogeneous members with policy preferences of members of party $i$ represented by

$$u_i(x) = 1 - |x - i|,$$

where $0 \leq D < R \leq 1$. Each period one party will propose some policy. If the other party accepts that offer, the game ends and payoffs are realized. Otherwise, the game continues, payoffs are discounted by $\delta < 1$, a new proposer is selected, and the proposal/acceptance game repeats. This process continues until a policy has been selected. If no policy is ever selected, everyone receives 0. In every stage, the probability that the D party is selected as proposer is given by $p(s)$, where $s$ is the share of the legislative seats held by members of the D party.

**Proposition 4.** For a given orientation of ideal points, $(D, R)$, and probability of proposal by party D, $p(s)$, there is a unique subgame perfect equilibrium in the repeated game. The expected policy in this equilibrium is continuously weakly increasing in $D$, continuously weakly increasing in $R$, and continuously strictly decreasing in $p$.

**Proof.** See Appendix 2 □

An extension of the model, allowing for heterogeneity within the parties, is included in the theoretical appendix. Although it changes some of the details, the essential point remains that a discontinuous jump in proposer function should lead to a discontinuous jump in policy.\(^5\)

**Remark 1.** As long as, $1 - (R - D) \leq \min\{\delta p, \frac{\delta(1-p)}{1-\delta(1-p)}\}$, expected policy in the unique equilibrium in the above game is given by

$$E[x] = (1 - p(s))(1 + D) + p(s)(R - 1),$$

\(^5\)Additionally, one could drop the unanimity rule assumption, following Baron and Ferejohn (1989) directly, but the predictions would again be qualitatively similar to those above with respect to discontinuous jumps in policy.
so a discontinuous change in \(p(s)\) leads to a discontinuous change in expected policy, as long as \(D \neq R\).

With this simple model of legislative policymaking to set ideas, we can now turn to the data. The goal is to try to characterize the shape of the proposal function \(p(s)\), by seeing how policy changes due to exogenous shifts in \(s\). In particular, I will look for a jump in expected policy as \(s\) passes the 50 percent threshold, since proposal power may shift with formal control of the legislature. Table 1 summarizes the model’s predictions as a function of the shape of the proposer function and the preferences of the two parties.

<table>
<thead>
<tr>
<th>Jump at (s = .5)?</th>
<th>(D=R)</th>
<th>(D \neq R)</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES (p'(s) = 0)</td>
<td>No Party Effect</td>
<td>Only Control Effect</td>
</tr>
<tr>
<td>(p'(s) \neq 0)</td>
<td>No Party Effect</td>
<td>Control and Mix Effect</td>
</tr>
<tr>
<td>NO (p'(s) = 0)</td>
<td>No Party Effect</td>
<td>No Party Effect</td>
</tr>
<tr>
<td>(p'(s) \neq 0)</td>
<td>No Party Effect</td>
<td>Only Mix Effect</td>
</tr>
</tbody>
</table>

We will see that there is no evidence of a change in policy at this threshold, suggesting that either there is no jump in the proposer function at this point or that \(D = R\). Furthermore, we will see that a marginal, exogenous change in the party share can affect policy, so we must have \(D \neq R\) for some policies. Taken together, these two results suggest \(p'(s) \neq 0\) in general, sometimes \(D \neq R\), and the best explanation for no policy change with shifts in control is that the proposal function does not jump.
2 Data

The data in this paper consist of a panel of political, demographic, economic, and policy variables for the 47 contiguous United States with partisan legislatures from 1970 to 2000.6

Following Reed (2006) and Besley and Case (2003), I first look for an effect of partisan control on state tax burden, defined by the total state tax receipts divided by the gross state income. The tax data were obtained from the Bureau of Census’s State Government Finances series.7 In all analysis I will lead and difference this variable by one year, so I am considering the effect of party power in, say, 1990 on the tax burden change from the year beginning in mid-1989 to the year beginning in mid-1990.

The other outcome variable I analyze is (the natural log of) the highest minimum wage that applied to permanent non-agricultural employees over 18 years of age on January 1st of the year in question in the state. These data were collected from the BLS Monthly Labor Review’s annual report on state labor regulation changes. I will again lead and difference this variable by one year, so I am looking at the effect of party power in 1990 on the change in minimum wage between January 1, 1990 and January 1, 1991.8

The political explanatory variables come from two sources. All state-level political variables were collected from the Book of the States. These include the percent Democratic in each chamber of the state legislature and the party of the governor. The state legislature election vote data were collected from a vast constellation of public data sources by James Snyder and Stephen Ansolabehere and include the number of votes received by each candidate in nearly every state legislative election

---

6 Nebraska is excluded, as in Minnesota prior to 1976, since they did not have formally partisan state legislatures.
7 Note that the states' fiscal years do not line up with calendar years, and so the data for year $t$ include taxes collected from mid-year $t - 1$ to mid-year $t$. Most states end their fiscal year on June 30th, although some are slightly later (Texas on August 31st, Alabama and Michigan on September 30th) and one is earlier (New York on March 31).
8 One can also investigate a simply dummy for whether the nominal minimum wage increased. The results are substantially similar for this specification
district. The data for Arkansas and Louisiana are sparse, however, so I will exclude them from the sample for this part of the analysis. For each election, I consider only single-member districts and two-candidate races, after dropping all candidates which received less than 1 percent of the vote. For the basic specification, I code an election as “close” if the winning candidate received less than 52 percent of the two-party voteshare.

3 Identification of the Political Effects of Parties

Each of the identification strategies in this paper is a variation of the “sharp” regression discontinuity design as proposed by Thistlewaite and Campbell (1960) and outlined by Van Der Klaauw (2002). The simplest version of this approach identifies the average effect of a binary treatment on some outcome, while recognizing that selection for treatment may be correlated with unobserved differences and so a simple regression of outcome on treatment may give a biased estimate of the effect. More formally, in the regression equation

\[ Y_i = \beta + \delta T_i + u_i, \]

a simple OLS estimate will be biased if \( E[u_i T_i] \neq 0 \). If treatment assignment occurs by a known deterministic process of a continuous control variable, however, we can uncover the causal effect of treatment as long as the effects of omitted variables are continuous in the control variable at the point of assignment. In other words, if treatment occurs for \( S > \bar{S} \), consistent estimation through

9 Their project is, actually, considerably broader, including all statewide and state legislative elections from 1942 to present. For details on data sources, see Ansolabehere and Snyder (2002) and Ansolabehere and Snyder (2004).
regression discontinuity requires

\[ \lim_{S \uparrow S} E[u|S] = \lim_{S \downarrow S} E[u|S]. \]

If this condition holds, the causal effect of treatment can be estimated by comparing those observations just below the cutoff to those just above. In the population,

\[ \delta = \lim_{S \uparrow S} E[Y|S] - \lim_{S \downarrow S} E[Y|S], \]

and there are various ways of estimating this parameter in the sample.

The most obvious and straightforward is simply to select a small window around \( S \), and estimate (1) directly on that subsample. This approach has the advantage of being completely agnostic with regards to the form of the effect of the control variable on the outcome, but it can be extremely inefficient in small samples (See, for more detail, Hahn, Todd and der Klaauw (2001)). A more common approach is to include a flexible parametric function of the control variable \( F(S_i) \) alongside the treatment indicator and estimate

\[ Y_i = \beta + \delta T_i + F(S_i) + u_i. \]

Now, as long as the control function is correctly specified, the least squares estimate of \( \delta \) will be unbiased. The tradeoff is to choose a sufficiently flexible function, \( F \), while still maintaining a relatively efficient estimator. In the analysis below, I will use both the non-parametric and control function approach under various polynomial specifications. A final approach splits the difference between these two by estimating the control function semi-parametrically, but it is probably too data-intensive for my application, due to the curse of multi-dimensionality. For an example of the
process, see Van Der Klaauw (2002).

In the applications below, I will use two variants of this simple approach to identify the effects of two political treatment variables on economic policy decisions in U.S. states. First, I will consider the effect of Democratic control of the state legislature. Second, I will consider the effect of a marginal change in the proportion Democratic in the state legislature. Each has its own identification problems, so I will deal with each in turn.

### 3.1 Democratic Control

Of the two treatment variables I will consider, identifying the causal effect of Democratic control of the state legislature on economic policies is the easiest extension of the basic RD model. Using the baseline of a control-function approach, the only real complication is the increase in dimensionality. With the exception of Nebraska and its non-partisan unicameral legislature, every U.S. state has a legislature consisting of an upper and lower chamber, and so the treatment variable can take 4 values: No Democratic Control, Full Democratic Control, and each sort of split control. Likewise, the control function now has two dimensions, percent Democratic in the lower house \((S^H_i)\) and percent Democratic in the senate \((S^S_i)\). Every estimation is of the form

\[
\Delta Y_{it} = \delta^B demboth_{it} + \delta^H demhos_{it} + \delta^S demsen_{it} + F(S^H_i, S^S_i) + \gamma_i + \phi_t + \beta'X_{it} + \epsilon_{it},
\]

where \(F()\) is a polynomial in the normalized percent Democratic in the upper and lower chambers (for ease of interpretation, each runs from \(-50\) to \(50\)), interacted with dummies for the 4 treatments. Controls include the log of state income, log of population, percent of the population over 65, percent under 18, and state and year fixed effects. Note the no regressors other than the control function is necessary for consistently estimating \(\delta\), but they can improve efficiency in small sam-
ples. Here, RD identification simply requires continuity of the control function at the cutoffs. In other words, it requires that there is nothing else which causes the outcome to change sharply at the assignment threshold other than the treatment itself. The trade-off with more flexible control functions is between robustness and efficiency. If the specified control function is more flexible than the actual effect, the results will remain consistent but be unnecessarily imprecise, while an insufficiently flexible control function can produce inconsistent results. For this reason, I will always display a range of control functions.  

Except for the complication introduced by the two-dimensionality, the procedure here is quite similar to that employed by Lee et al. (2004) at the federal level and Ferreira and Gyourko (2007) at the municipal level. But note that there is an additional important difference in interpretation. Both those papers look at how close elections change the party identity of an individual actor, and the outcome measures of interest are more-or-less choices made by that actor. Here, I identify the effect of control of the legislature by one party on some policy outcome, very much a reduced form outcome of a complex process. The theoretical section proposed one plausible story for the structure behind that relationship, which may be more or less convincing, but there is certainly some sort of organizational process by which these quasi-random shifts in control bring about changes in policy.

10 A second sort of robustness would be to check for policy jumps at other control cutoffs. Some states, for example, have supermajority voting requirements for tax increases. Perhaps when faced with a contrarian Governor, the veto-proof majority may be a cutoff of interest. I focus on simple majority, because it has received the most attention in the literature and in press. Nevertheless, repeating the analysis for these other cutoffs delivers substantially similar result: no effect of control.
3.2 Proportion Democratic

Identifying the causal effect of the proportion Democratic in each chamber of the state legislature takes a more roundabout approach than the straightforward RD design for Democratic control. In the simplest form, I would like to estimate $\beta$ in an equation like

$$y_{it} = \beta S_{it}^S + \beta^H S_{it}^H + \Gamma' X_{it} + \gamma_i + \phi_t + \epsilon_{it}.$$  \hspace{1cm} (4)

Again, the OLS estimate of $\beta$ is potentially inconsistent and biased, due to omitted variables correlated with the Democratic share in the legislature. Instead, I will use a second discontinuity, the discontinuity in votes at the individual-legislator election level, to form an instrument for proportion Democratic, and use this instrument in a two-stage least squares analysis. Here, instead of the control function approach, I will form the instrument by specifying a window of two percent and considering only elections in which the margin of victory/loss is within that window. I label these elections as “close”, and construct

$$cpctdemhos_{it} = \frac{\#\text{Close Democratic wins in most recent House election in state } i}{\#\text{Seats in House in state } i \text{ in most recent House election}} \times 100,$$

along with the parallel variables for the Republicans and the Senate. Since the presence of close elections may itself have a direct effect on policy, every regression will include a control for the percent of legislators elected in close elections ($cpcthos_{it}$ and $cpctsen_{it}$), and the instrument will consist of the difference between the party percentages

$$dcpcthos_{it} = cpctdemhos_{it} - cpctrephos_{it}$$

$$dcpctsen_{it} = cpctdemsen_{it} - cpctrepsen_{it}.$$
The exclusion restriction requires that, within the window of close elections, the party winner is uncorrelated with policy outcomes, other than through the Democratic party share. Formally,

$$E[\epsilon_{it}(dcpcthos_{it}, dcpctsen_{it})] = 0.$$ 

In fact, this restriction can be derived from the RD-assumption at the district level; the proof is presented in Appendix 1. The exclusion restriction, together with a strong first-stage relationship between the instruments and the party mix variables, allows the consistent estimation of $\beta$.

In contrast to the control effect in the last section, this identification strategy is very different from the other sorts of regression discontinuity used in the literature. Here, we are using a discontinuity at one level of analysis (individual electoral districts) to build an instrument at a higher level (legislative party mix), a novel strategy to my knowledge. To work effectively, it requires moderate levels of aggregation. Too few members per high-level unit and there is little power. Too many and the discontinuity has no bite, due to the law of large numbers. But the middle ground arises frequently in political settings, and could also have applications in other domains. For example, a discontinuity at the firm level could instrument for shifts in industry structure or a discontinuity in worker success/failure could instrument for shifts in firm-level productivity.

4 Baseline Specifications

This section presents the baseline results of the effects of partisan control and partisan mix on debt burden and minimum wage. I focus on one particular specification for each estimate in this section, while the next section will explore the results, both for robustness and in some subsamples of interest. In all the empirical analyses, standard errors are clustered at the state level, allowing
for any degree of heteroskedasticity as well as general autocorrelation matrices within states.

4.1 Effect of Partisan Control

In the simplest model of a two-party legislature with simple majority rule and identical exogenous preferences within a party, control should matter enormously. In fact, it is all that should matter in predicting policy outcomes. Even in a more complex system, we might think that control will still end up playing an important role in determining policy outcomes, even if the degree majority is also important. In fact, control has been the central focus of most of the work on the effects of party on policy. My results suggest that there is very little effect of party control on either tax burden or minimum wage policy. In terms of the stylized model from section one, there is little evidence that the proposal function jumps at $ s = 0.5 $, so there is no special proposal advantage derived from majority control of the legislature.

The descriptive statistics for the various policy outcomes are presented in Table 1, separated by degree of Democratic control. The simple sample means do not tell a very consistent story about the effect of party control on policy outcomes. If we compare full Democratic Control to full Republican control, the tax burden seems to increase slightly faster, on average, under Democrats, while the average downward trend in the real minimum wage seems the same regardless of who is in control.

Table 2 presents the results of the first regression-discontinuity analysis, using the control function approach. Each entry presents the estimated effect of the Democrats controlling both chambers of the state legislature, as compared to full Republican control. The first column displays the simple Fixed-Effects OLS (FE-OLS) estimates of (3), without any control function at all. Columns 2-4 display the estimates for linear, quadratic, and cubic control functions, together with interactions
between the polynomial and all three control dummies. Each entry represents the result of its own regression, with controls for the two split-control dummies, the log of state population, the log of state income, percent of the population under 18 and the percent of the population over 65, along with state and year fixed effects. Below each estimated effect is the p-value of clustered (on states) Wald test of the hypothesis that the estimated effect in the given specification is equal to the FE-OLS estimate.

In both the full sample and the non-south, the FE-OLS estimates suggest that the change in tax-burden is higher under full Democratic control than under Republican control. This finding is consistent with all of the more recent work in the literature (Reed 2006, Besley and Case 2003). But once we introduce the control function, the estimates change quite a bit. Even a simple linear control function, interacted with control, cuts the estimated effect of control down to a third of its FE-OLS value. More complex control functions seem to suggest that the effect of Democratic control may even be negative, although the effect is not statistically significant. These big changes in the estimated effect of control should make us quite skeptical of fixed-effects results. In fact, in the full sample, we can reject equality of the RD estimate and the FE-OLS estimate at the 5 percent level. In the non-south sample, the RD estimates are too noisy to reject equality, but their sign and absolute size are very similar to those of the full sample.

A similar pattern arises for the minimum wage, with the FE-OLS estimates suggesting a significant positive effect of Democratic Control on changes in the real minimum wage, but that result weakens once we include a continuous control function. Although a linear control function does little to upset the FE-OLS results, it too could be inconsistent if the true effect of Democratic mix is nonlinear. Just as the big changes between FE-OLS and all the RD estimates should make us uncomfortable with the OLS estimates, so should the big changes between the linear and higher-order control functions make us feel uncomfortable with the linear estimates, since insufficient
flexibility in the control function can lead to inconsistency. The estimated effect even turns negative, in the most flexible specification of the control function, although it is small and statistically insignificant. The best interpretation is probably that we cannot reject the null hypothesis of no effect of control on either policy outcome.

4.2 Effect of Partisan Mix

Although there is not much evidence that partisan control of the legislature affects policy, party may still have an effect at the margin. The sort of experiment to have in mind is what would happen if we randomly switched the party of a single legislator, holding all else equal. But, as with the literature on party control, the most sophisticated of the extant studies attempting to estimate the mix effect have relied on FE-OLS estimates. But unlike the results for control, the FE-OLS results for party proportion find some support in the Two-Stage Least Squares (2SLS) results. Although the increased variability of the 2SLS estimates make rejecting the null of no effect impossible, the point estimates are actually quite a bit larger than the FE-OLS estimates, suggesting that an increase in the proportion Democratic may lead to an increase in the tax burden but has little discernible effect on the minimum wage. Again returning to the model from section one, the evidence suggests that the proposal function for Democrats is increasing the Democratic share of the legislature.

But before detailing the 2SLS estimates of the effect of partisan mix on policy outcomes, first consider the effect of the instruments on the potentially endogenous regressors. The first two rows of Table 3 present first-stage regressions of each the party mix variable on the instruments, for various subsamples. They also report the p-value of an F-test of the joint hypothesis that the effect of the difference in close House elections on the Democratic share in the state House is zero and the effect of the difference in close Senate elections on the Democratic share in the state senate is zero.
All the appropriate effects are large and strongly significant, while there is very little evidence for cross-effects, such as close wins by Democrats in the Senate increasing the Democratic share in the House. The lack of cross-effects suggests that the instruments are doing the job we have asked of them: they are not correlated with a general shift in partisan valence, and can be thought of as exogenously shifting the mix in the legislature.

Table 4 presents the FE-OLS and 2SLS estimates for the effect of partisan mix on the first policy of interest, tax burden. Since the estimates for the individual chambers are not very stable, due to high correlation of \( pdh \) and \( pds \), I will concentrate on the “overall” effect of a shift in the Democratic share in both chambers. Specifically, I will focus on hypotheses of the form \( \beta^H + \beta^S = 0 \) from regression equation (4). The FE-OLS estimates suggest that increasing the percent Democratic in both chambers by 10 points (about a half a standard deviation) increases the change in the tax burden by about .04 percentage points. This compares to a mean growth rate of about .01 percent, with a standard deviation of about 0.39 percent points. Once instrumenting for the proportion Democratic with the close-election instruments, the effect intensifies, and a 10 point increase in the percent Democratic in both chambers increases the change in tax burden by between 0.15 and 0.19 percentage points. But note that the increased variability of the 2SLS estimates make it impossible to reject no effect at any reasonable level of significance for the baseline specification. Increasing the definition of “close,” to include a 3pct margin of victory, however, does allow us to reject no effect at the 10-percent level. An alternative interpretation of these results is that a GMM distance test cannot reject equality of the OLS and 2SLS estimates (p-value of C Statistic of 0.62), and so we may prefer to accept the more-efficient, positive, and significant OLS estimates.

The respective estimates for the second policy, minimum wage, are presented in Table 5. Here, by contrast, there is very little evidence for much effect of parties, in either the OLS or the IV. According to the OLS estimates, a 10 percentage point increase in the Democratic proportion
of both chambers of the legislature increases the minimum wage an infinitesimal 0.1 percentage points. This compares to an average decrease of about 1 percent and a standard deviation of about 6 percent. Unlike the case of tax burden, however, here the 2SLS estimates reveal very little difference either. The most conservative conclusion seems to be that the Democratic mix in the legislature has very little effect on changes in the minimum wage.

5 Alternative Specifications and Robustness

In this section I will return to the estimated party effects above and consider alternative specifications and subsample restrictions. The party control effects are quite robust to various control functions and non-parametric RD estimates with various windows, as well as considering a number of geographic and temporal sub-samples. Similarly, the party mix effects are fairly consistent across various definitions of “close” elections and subsamples of the states and decades. The estimates of the effect of party mix, however, do change substantially if we consider sub-samples of periods of Democratic party control, versus Republican party control. Of course, these estimates may not be well identified, as argued above, so they are only suggestive.

5.1 Partisan Control

To check the robustness of the findings on the effects of party control on policy, consider first some variants of the control function. The baseline specification included a polynomial control function, interacted with indicator variables for the 4 control configurations (full Republican, Democratic House, Democratic Senate, and Full Democratic). But at its most flexible, the cubic polynomial, this amounts to thirty-six variables for the control function alone, and we may worry that this is
asking too much of the data. If the “slope” does not differ by control configuration, a more efficient approach would be to consider a simpler control function than that presented in the baseline specification, a polynomial on its own. As this polynomial becomes sufficiently flexible, the control effect should still be consistently estimated, and the estimates should be more efficient. Table 6 presents results from a linear, cubic, and quintic control function for the two policies. The results do not seem to differ much from the baseline specification, however, and there remains very little evidence for a strong effect of partisan control.

At the opposite extreme, I implement a completely non-parametric design. Instead of specifying some particular control function, we can limit our attention to observations near the cutoff for control. In this two-dimensional setting, this means looking at observations within a small box around the 50-50 even split point for both chambers. Figure 1 illustrates the sample for two windows, a 5-percent and a 10-percent box. In the regressions, before limiting the sample, I first regress the policies and control indicators on state and year fixed effects and demographic controls. The non-parametric estimation, then, is done on the residuals from these regressions. I do this to maintain comparability with the foregoing estimates. If, instead, I included the fixed effects after limiting the sample, we would lose most of our variation, since most states/years have very few observations in the limited window. In this case, the estimates are too noisy to be given any interpretation at all. The non-parametric results are presented in Table 7. As before, the absolute size of the estimated effect of full Democratic control (as compared to full Republican control) deceases as the window narrows.
A final robustness check splits the sample into decades. Table 8 presents the results of these analyses. If anything, these results are stronger than the baseline specification, with FE-OLS indicating even larger positive effects of Democratic control, in every period and for both policies. But once again, the inclusion of the control function consistently decreases the estimated magnitude of the effect. The sole exception is the minimum wage in the 1980s, which can probably be dismissed as sampling variation.

The main point, here, is that the null estimated effect of Democratic control is robust to different specifications of the control functions, a non-parametric specification, and the consideration of decade-specific effects. Consider, now, the robustness of the partisan mix effect estimates.
5.2 Partisan Mix

The first robustness check for the partisan mix effect comes from simply comparing the estimates for the various definitions of “close” (looking across the last three columns in Tables 4 and 5). At least in the full sample, the overall effect estimates are fairly stable for both policies, where by the overall effect I mean the effect of increasing Democratic mix in both chambers ($\beta^S + \beta^H$). This suggests that the exact definition of “close” is not crucial to the overall results, but we should certainly be suspicious of the estimates on the individual chambers.

Next, Tables 9 and 10 break the partisan mix effect into decades. For tax burden, the effect is everywhere positive, as in the basic results, but it seems to be larger in the 1980s and 1990s than in the 1970s. In fact, in these later periods, a 10-percent increase in the Democratic share in both chambers increases the tax burden by about .30 percentage points, about 3/4 of a standard deviation. For minimum wage, however, the breakdown by decade suggests that the overall estimates may be obscuring a differential effect over time. Although not statistically significant at traditional levels, there is some evidence that an increase in the Democratic share did indeed lead to an increase in the minimum wage in the 1970s and 1980s, but this effect seems to have reversed in the most recent period. Perhaps, then, the null effect in the whole sample is the result of these two effects offsetting.

Finally, the effect of increasing the proportion Democratic in the legislature may be very different if the Democrats have control, versus if the Republicans have control. Of course, these two situations may be different for all kinds of reasons. But the endogeneity of control does not overturn the consistency of the estimation of the marginal effects; it merely makes the reasons for any estimated difference hard to interpret. Tables 11 and 12 present the results from limiting the sample to state-year pairs where the Republicans control both chambers of the state legislature and to state-year
pairs where Democrats control both. For tax burden, increasing the Democratic share seems to increase the change in tax burden more when the Democrats control both chambers than when the Republicans do. For the minimum wage, by contrast, there still does not seem to be much of an effect.

To return to the stylized model from the first section, the results on control and mix, together with the interaction estimate, suggests the proposer function for tax policy has the general form in Figure 2. It increases concavely up to an even split, does not jump at 50-50 split, but continues to increase convexly up to 1. If we believe that a common proposer function applies to all issues, this suggests that there is not much difference in preferred minimum wage policy between state Republican and Democratic parties, at least in expectation.

![Figure 2. Estimated Proposer Function](image)

6 Conclusions

This paper has introduced a novel identification strategy to try to uncover the effects of shifts in partisan control and partisan mix in US state legislature on two economic policies: tax burden and the minimum wage. Although naive FE-OLS suggests that both control and mix are important for both policies, more careful analyses based on regression discontinuity reveal that partisan control
has very little effect on either policy, but partisan mix may be important in explaining shifts in tax burden. In addition, it offers some suggestive evidence that the interaction of mix and control may be a fruitful grounds for future research.

7 Appendix: Derivation of Mix Instrument from RD-Identification

The exclusion restriction for the mix instrument \( E[e_{it}dcpcthos_{it}] = E[e_{it}dcpctsens_{it}] = 0 \) can be derived from the RD-identification assumptions on the individual districts. Take the case of the lower chamber, and let \( m_{it} \) be the number of house districts in state \( i \) in time \( t \). For district \( j \) in state \( i \) in time \( t \), let \( clsdemwinhos_{ijt} \) be a dummy variable equal to one if the Democratic candidate won a close election in that district-year and similarly for \( clsrepwinhos_{ijt} \) and \( clshoswin_{ijt} \) equal to 1 if either hold. Then the RD assumption, at the district level, is given by

\[
E[e_{it}(clsdemwinhos_{ijt} - clsrepwinhos_{ijt})|clshoswin_{ijt} = 1, X_{it}].
\]

The exclusion restriction is given by

\[
E[e_{it}dcpcthos_{it}|X_{it}] = E\left[\sum_{j=1}^{m_{it}} \frac{clsdemwinhos_{ijt} - clsrepwinhos_{ijt}}{m_{it}}\right]|X_{it} = \sum_{j=1}^{m_{it}} E[e_{it}(clsdemwinhos_{ijt} - clsrepwinhos_{ijt})|X_{it}, m_{it}].
\]

Furthermore,

\[
E\left[\frac{1}{m_{it}}E[e_{it}(clsdemwinhos_{ijt} - clsrepwinhos_{ijt})|X_{it}, m_{it}]\right].
\]
by the law of iterated expectations. Again, $E[\varepsilon_{it}(clsdemwinhos_{ijt} - clsrepwinhos_{ijt})|X_{it}, m_{it}]$ is equal to

$$E[\varepsilon_{it}(clsdemwinhos_{ijt} - clsrepwinhos_{ijt})|X_{it}, m_{it}, clshoswin_{ijt} = 1]p(clshoswin_{ijt} = 1)$$

$$+ E[\varepsilon_{it}(clsdemwinhos_{ijt} - clsrepwinhos_{ijt})|X_{it}, m_{it}, clshoswin_{ijt} = 0]p(clshoswin_{ijt} = 0).$$  

The first line is equal to zero, by the RD-identification assumption at the district level (that, conditional on an election being close, the party of the winner is as good as randomly assigned), and the second line is equal to zero, since both close win variables are identically zero. But, moving back to (6), this establishes the exclusion restriction for the 2SLS analysis as a consequence of RD-identification at the district level.

8 Appendix 2: Theoretical

8.1 Proof of Proposition 1

Let $x_j$ represent the proposal strategy of a member of party $j$, and $y_j(x) : x \rightarrow \{0, 1\}$ the acceptance strategy of a member of party $j$, as a function of the proposal, where 1 indicates acceptance of the proposal. Since the game is completely stationary, it suffices to consider these simple strategies. When

$$1 - (R - D) \leq \min\left\{\frac{\delta p}{1 - \delta p}, \frac{\delta (1 - p)}{1 - \delta (1 - p)}\right\},$$  

(9)
I'll check that the following strategy profile forms an interior equilibrium

\[ x_R^* = \delta p(R - 1) + (1 - \delta p)(1 + D) \]

\[ x_D^* = \delta(1 - p)(1 + D) + (1 - \delta(1 - p))(R - 1) \]

\[ y_D^*(x) = 1 \iff x \in [2D - x_R^*, x_R^*] \]

\[ y_R^*(x) = 1 \iff x \in [x_D^*, 2R - x_D^*]. \]

Consider first player D's approval decision when \( x \geq D \) (the other case will never occur in equilibrium and is symmetric). Given the proposed strategy profile, accepting policy \( x \) is preferred to waiting as long as

\[ 1 - x + D \geq \delta[p(1 - x_D^* + D) + (1 - p)(1 - x_R^* + D)] \]

\[ = \delta[p(1 - \delta(1 - p))(2 + D - R) + (1 - p)\delta p(2 + D - R)], \text{ so we require} \]

\[ x \leq (1 + D)(1 - \delta p) + \delta p(R - 1), \]

which holds with equality when \( x = x_R^* \). Similarly, player R's approval decision when \( x \leq R \) requires

\[ 1 - R + x \geq \delta[p(1 - R + x_D^*) + (1 - p)(1 - R + x_R^*)] \]

\[ = \delta[p\delta(1 - p)(2 + D - R) + (1 - p)(1 - \delta p)(2 + D - R)], \text{ so we require} \]

\[ x \geq (R - 1)(1 - \delta(1 - p)) + \delta(1 + D)(1 - p), \]

which holds with equality when \( x = x_D^* \). The proposals themselves are obviously optimal, given the approval strategies, as long as \( x_D^* \geq D \) and \( x_R^* \leq R \). But this is exactly what (9) guarantees. In
this equilibrium, expected policy is given by

\[ E(x) = px_D^* + (1 - p)x_R^* \]
\[ = (1 - p)(1 + D) + p(R - 1). \]

When (9) fails, at least one of the parties will propose its ideal point, but the conclusions of the proposition are unaffected. For illustration, consider the case in which

\[ \frac{\delta(1 - p)}{1 - \delta(1 - p)} \leq 1 - (R - D). \]

Here the equilibrium strategies will be

\[ x_R^* = \min\{R, (1 + D) - \frac{\delta p}{1 - \delta(1 - p)}\} \]
\[ x_D^* = D \]
\[ y_D^*(x) = 1 \iff x \in [D, (1 + D) + \delta(1 - p)[x_R^* - (1 + D)] - \delta p] \]
\[ y_R^*(x) = 1 \iff x \in [(R - 1)(1 - \delta) + \delta[pD + (1 - p)x_R^*], R]. \]

Again, consider D’s approval decision. Approval requires

\[ 1 - x + D \geq \delta[p(1 - x_D^* + D) + (1 - p)(1 - x_R^* + D)] \]
\[ = \delta[p + (1 - p)(1 + D - x_R^*)], \text{ so we require} \]
\[ x \leq (1 + D) + \delta(1 - p)[x_R^* - (1 + D)] - \delta p. \]

Replacing for the appropriate \( x_R^* \) demonstrates immediate approval in equilibrium. A similar calculation delivers the appropriate approval result for \( R \), and the optimality of the proposals are
obvious. Again, the expected policy is given by
\[ E(x) = pD + (1 - p)x^*_R, \] (14)
for which the proposition clearly holds.

### 8.2 Generalization of Bargaining Model

This appendix generalizes the model from section 1 to allow for heterogeneity within the party. Instead of homogeneous party membership, assume that the ideal points of the members of party \( i \) are distributed according to a pdf \( f_j(\theta) \) (with associated CDFs \( F_j(\cdot) \)), and in keeping with the earlier model
\[ F_D(\theta) \geq F_R(\theta), \forall \theta. \]

For simplicity, I assume the legislature consists of a unit mass of legislators. Assuming, as above, that the probability of recognition of a legislator from party \( D \) is given by \( p(s) \) and that, within the party, each type is recognized with likelihood \( f_j(\theta) \), then the proposer next period will be drawn from the distribution
\[ g(\theta) = p(s)f_D(\theta) + (1 - p(s))f_R(\theta). \]

Let \( G() \) represent the CDF of this distribution. If we maintain the unanimity requirement for accepting the proposed policy, we have the following proposition.

**Proposition 5.** For given distributions of ideal points, \( f_D(\theta) \) and \( f_R(\theta) \), and probability of proposal by party \( D \), \( p(s) \), there is a unique subgame perfect equilibrium in the repeated game. In this equilibrium, a proposer of type \( \theta \) offers the policy given by
where $\theta$ is the unique solution to

$$\theta(1 - \delta) + \delta \int_{\theta}^{\theta + (1 - \delta)} G(\theta) d\theta = \delta(1 - \delta).$$

And this policy is always accepted. Furthermore, the expected policy is a continuous and decreasing function of $p$, but a discontinuous change in $p$ leads to a discontinuous change in expected policy, as long as $F_D() \neq F_R()$ for at least one type in the range of interest.

Proof. I will first calculate the expected policy, given the policy function and distribution of types. I will then show that given the policy function above, every type of legislator prefers to accept the proposed policy versus rejecting and waiting for next period. Next, I will show that some type would prefer to reject any more extreme policy that those proposed in equilibrium, so following the above function is optimal for all types.

Let $\bar{\theta} = \theta + (1 - \delta)$. Given the policy function above, the expected policy is given by

$$G(\theta)\theta + (1 - G(\bar{\theta}))\bar{\theta} + \int_{\theta}^{\bar{\theta}} \theta g(\theta) d\theta.$$

Integrating by parts, this expression is equal to

$$E[x] = \bar{\theta} - \int_{\theta}^{\bar{\theta}} G(\theta) d\theta.$$

(16)
To see that all types will accept the proposed policy, we check that they prefer the proposed policy to their expected utility of waiting. For a legislator of type \( \theta \) the key condition is

\[ 1 - |x - \theta| \geq \delta(1 - E[|x(\theta) - \tilde{\theta}|]), \forall x \in [\theta, \tilde{\theta}]. \]  

(17)

Splitting the space into three regions:

a) \( \tilde{\theta} \leq \theta \): The condition in (17) becomes

\[ 1 + \tilde{\theta} \geq \frac{x - E[x]}{1 - \delta}, \forall x \in [\theta, \tilde{\theta}], \]

which is at its most restrictive when \( x = \tilde{\theta} \) and \( \tilde{\theta} = 0 \), leaving

\[ 1 - \delta \geq \tilde{\theta} - \delta E[x]. \]

Replacing for the expected policy from (16) and for the integrand from (15), we see that this condition holds with equality for the given policy function.

b) \( \tilde{\theta} \geq \theta \): The condition in (17) becomes

\[ 1 - \tilde{\theta} \geq \frac{\delta E[x] - x}{1 - \delta}, \forall x \in [\theta, \tilde{\theta}], \]

which is at its most restrictive when \( x = \theta \) and \( \tilde{\theta} = 1 \), leaving

\[ \theta \geq \delta E[x]. \]

Replace, again, for the expected policy and compare to (15) to see that this condition holds.
with equality.

These two cases, alone, show that any deviation to a policy proposal outside \([\theta, \bar{\theta}]\) will be rejected by either \(\theta = 0\) or \(\theta = 1\).

c) \(\theta < \bar{\theta} < \frac{\bar{\theta} + \theta}{2}\) (and the opposite interval by symmetry): The condition in (17) is a little more complicated to analyze. The key is that

\[
E[|x(\theta) - \bar{\theta}|] = G(\theta)(\bar{\theta} - \theta) + \int_{\theta}^{\bar{\theta}} (\bar{\theta} - \theta)g(\theta) + \int_{\theta}^{\bar{\theta}} (\theta - \bar{\theta})g(\theta) + (1 - G(\theta))(\bar{\theta} - \theta)
\]

\[
= \bar{\theta} - \bar{\theta}G(\bar{\theta}) + \int_{\theta}^{\bar{\theta}} G(\theta) - \int_{\theta}^{\bar{\theta}} G(\theta), \text{ integrating by parts}
\]

\[
= \bar{\theta} - \int_{\theta}^{\bar{\theta}} G(\theta) + 2 \int_{\theta}^{\bar{\theta}} G(\theta) - \bar{\theta}G(\bar{\theta}).
\]

The condition in (17) becomes

\[
\bar{\theta} - \theta \leq (1 - \delta) + \delta\{\bar{\theta} - \int_{\theta}^{\bar{\theta}} G(\theta) + 2 \int_{\theta}^{\bar{\theta}} G(\theta) - \bar{\theta}G(\bar{\theta})\}, \text{ or}
\]

\[
[\delta G(\bar{\theta}) - 1] \bar{\theta} \leq (1 - \delta)(1 - \bar{\theta} + \theta - \delta) + \delta\{2 \int_{\theta}^{\bar{\theta}} G(\theta)\}, \text{ from (15)}
\]

\[
= \delta 2 \int_{\theta}^{\bar{\theta}} G(\theta), \text{ since } \bar{\theta} = \theta + (1 - \delta).
\]

But the left hand side of this inequality is nonpositive while the right is nonnegative, so the result holds and the type \(\bar{\theta}\) legislator will accept the proposed policy.
References


Table 1. Sample Means and Standard Deviations by Party Control

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Both Republican</th>
<th>Democrat Senate</th>
<th>Democrat House</th>
<th>Both Democratic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tax Burden</td>
<td>6.67</td>
<td>6.27</td>
<td>7.08</td>
<td>6.68</td>
<td>6.80</td>
</tr>
<tr>
<td></td>
<td>(1.24)</td>
<td>(1.51)</td>
<td>(1.08)</td>
<td>(0.96)</td>
<td>(1.12)</td>
</tr>
<tr>
<td>Log Real Minimum Wage</td>
<td>1.15</td>
<td>1.15</td>
<td>1.13</td>
<td>1.11</td>
<td>1.16</td>
</tr>
<tr>
<td></td>
<td>(0.13)</td>
<td>(0.13)</td>
<td>(0.13)</td>
<td>(0.13)</td>
<td>(0.13)</td>
</tr>
<tr>
<td>Change in Tax Burden</td>
<td>0.011</td>
<td>0.007</td>
<td>-0.060</td>
<td>0.018</td>
<td>0.025</td>
</tr>
<tr>
<td></td>
<td>(0.390)</td>
<td>(0.467)</td>
<td>(0.445)</td>
<td>(0.386)</td>
<td>(0.342)</td>
</tr>
<tr>
<td>Change in Real Minimum Wage</td>
<td>-0.010</td>
<td>-0.012</td>
<td>-0.007</td>
<td>-0.010</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.060)</td>
<td>(0.053)</td>
<td>(0.060)</td>
<td>(0.060)</td>
<td></td>
</tr>
<tr>
<td>Normalized Percent Dem House</td>
<td>8.84</td>
<td>-12.35</td>
<td>-5.53</td>
<td>7.71</td>
<td>21.56</td>
</tr>
<tr>
<td></td>
<td>(18.55)</td>
<td>(8.36)</td>
<td>(4.89)</td>
<td>(5.21)</td>
<td>(13.14)</td>
</tr>
<tr>
<td>Normalized Percent Dem Senate</td>
<td>9.33</td>
<td>-12.44</td>
<td>7.79</td>
<td>-5.10</td>
<td>23.06</td>
</tr>
<tr>
<td></td>
<td>(19.32)</td>
<td>(7.69)</td>
<td>(5.19)</td>
<td>(3.88)</td>
<td>(13.54)</td>
</tr>
<tr>
<td>n</td>
<td>1404</td>
<td>372</td>
<td>108</td>
<td>146</td>
<td>776</td>
</tr>
<tr>
<td>Close Percent House</td>
<td>3.77</td>
<td>3.67</td>
<td>3.99</td>
<td>4.79</td>
<td>3.57</td>
</tr>
<tr>
<td></td>
<td>(3.71)</td>
<td>(4.22)</td>
<td>(3.98)</td>
<td>(4.42)</td>
<td>(3.15)</td>
</tr>
<tr>
<td>Diff. Close Percent House</td>
<td>0.04</td>
<td>-0.31</td>
<td>-0.55</td>
<td>0.50</td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td>(2.16)</td>
<td>(2.15)</td>
<td>(2.28)</td>
<td>(2.22)</td>
<td>(2.09)</td>
</tr>
<tr>
<td>Close Percent Senate</td>
<td>3.81</td>
<td>4.47</td>
<td>4.98</td>
<td>2.90</td>
<td>3.49</td>
</tr>
<tr>
<td></td>
<td>(4.11)</td>
<td>(4.36)</td>
<td>(5.03)</td>
<td>(3.49)</td>
<td>(3.86)</td>
</tr>
<tr>
<td>Diff. Close Percent Senate</td>
<td>-0.12</td>
<td>-0.22</td>
<td>0.56</td>
<td>-0.65</td>
<td>-0.06</td>
</tr>
<tr>
<td></td>
<td>(3.16)</td>
<td>(3.65)</td>
<td>(3.50)</td>
<td>(2.73)</td>
<td>(2.89)</td>
</tr>
<tr>
<td>n</td>
<td>1322</td>
<td>359</td>
<td>106</td>
<td>146</td>
<td>711</td>
</tr>
</tbody>
</table>

Sample means and standard deviations by party control for continental U.S. States from 1970-2000, excluding NE for all years and MN prior to 1976. The Party Mix variables (second panel) also exclude AR and LA for reasons of data quality.
Table 2. Effect of Democratic Control versus Republican Control on 1-year Changes

<table>
<thead>
<tr>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tax Burden</td>
<td>0.103</td>
<td>0.032</td>
<td>-0.103</td>
</tr>
<tr>
<td>Different from (1) (p-value)</td>
<td>(0.047)*</td>
<td>(0.054)</td>
<td>(0.072)</td>
</tr>
<tr>
<td>Minimum Wage</td>
<td>0.007</td>
<td>0.006</td>
<td>0.002</td>
</tr>
<tr>
<td>Different from (1) (p-value)</td>
<td>(0.003)*</td>
<td>(0.002)**</td>
<td>(0.004)</td>
</tr>
<tr>
<td>Different from (1) (p-value)</td>
<td>0.685</td>
<td>0.305</td>
<td>0.187</td>
</tr>
</tbody>
</table>

Full Sample n=1404

Non-South n=924

| Tax Burden | 0.108 | 0.042 | -0.084 | -0.091 |
| Different from (1) (p-value) | (0.052)* | (0.058) | (0.089) | (0.161) |
| Minimum Wage | 0.008 | 0.010 | -0.001 | -0.005 |
| Different from (1) (p-value) | (0.003)* | (0.004)** | (0.006) | (0.010) |
| Different from (1) (p-value) | 0.550 | 0.167 | 0.179 |

Control Function

| none | Linear x Control | Quadratic x Control | Cubic x Control |

Each entry is a separate regression, containing dummies for Democratic Senate only, Democratic House only, state fixed effects, year fixed effects, log of population, log state income, percent 65+, and percent under 18. Control functions include a polynomial of the stated order, interacted control indicators. Standard errors are clustered by state.
Table 3. Partial First Stage Regressions on Various Sub-samples

<table>
<thead>
<tr>
<th></th>
<th>Both Chambers</th>
<th>Both Chambers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Republican</td>
<td>Democratic</td>
</tr>
<tr>
<td>Pct. Dem. House</td>
<td>0.48</td>
<td>0.34</td>
</tr>
<tr>
<td>Pct. Dem. Senate</td>
<td>0.08</td>
<td>0.19</td>
</tr>
<tr>
<td></td>
<td>0.34</td>
<td>0.14</td>
</tr>
<tr>
<td></td>
<td>0.12**</td>
<td>0.14</td>
</tr>
<tr>
<td></td>
<td>(0.14)***</td>
<td>(0.13)***</td>
</tr>
<tr>
<td></td>
<td>-0.07</td>
<td>-0.01</td>
</tr>
<tr>
<td></td>
<td>0.47</td>
<td>0.45</td>
</tr>
<tr>
<td></td>
<td>0.07</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td>(0.08)***</td>
<td>(0.09)***</td>
</tr>
<tr>
<td>Close House Difference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Close Senate Difference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joint F-Test (p-value)</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

"Close"=2 Percent

<table>
<thead>
<tr>
<th></th>
<th>Both Chambers</th>
<th>Both Chambers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Republican</td>
<td>Democratic</td>
</tr>
<tr>
<td>Pct. Dem. House</td>
<td>0.58</td>
<td>0.33</td>
</tr>
<tr>
<td>Pct. Dem. Senate</td>
<td>-0.13</td>
<td>0.46</td>
</tr>
<tr>
<td></td>
<td>0.53</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>0.27</td>
<td>0.15**</td>
</tr>
<tr>
<td></td>
<td>(0.29)*</td>
<td>(0.23)</td>
</tr>
<tr>
<td></td>
<td>-0.02</td>
<td>-0.12</td>
</tr>
<tr>
<td></td>
<td>0.11</td>
<td>0.45</td>
</tr>
<tr>
<td></td>
<td>0.12**</td>
<td>0.14**</td>
</tr>
<tr>
<td>Close House Difference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Close Senate Difference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joint F-Test (p-value)</td>
<td>0.0000</td>
<td>0.0065</td>
</tr>
</tbody>
</table>

"Close"=1 Percent

<table>
<thead>
<tr>
<th></th>
<th>Both Chambers</th>
<th>Both Chambers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Republican</td>
<td>Democratic</td>
</tr>
<tr>
<td>Pct. Dem. House</td>
<td>0.55</td>
<td>0.33</td>
</tr>
<tr>
<td>Pct. Dem. Senate</td>
<td>0.01</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
<td>0.44</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>0.07</td>
<td>0.14</td>
</tr>
<tr>
<td></td>
<td>(0.11)***</td>
<td>(0.11)</td>
</tr>
<tr>
<td>Close House Difference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Close Senate Difference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joint F-Test (p-value)</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

"Close"=3 Percent

<table>
<thead>
<tr>
<th></th>
<th>Both Chambers</th>
<th>Both Chambers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Republican</td>
<td>Democratic</td>
</tr>
<tr>
<td>Pct. Dem. House</td>
<td>0.33</td>
<td>0.12</td>
</tr>
<tr>
<td>Pct. Dem. Senate</td>
<td>0.13</td>
<td>0.56</td>
</tr>
<tr>
<td></td>
<td>0.44</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>0.07</td>
<td>0.14</td>
</tr>
<tr>
<td></td>
<td>(0.07)***</td>
<td>(0.09)***</td>
</tr>
<tr>
<td>Close House Difference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Close Senate Difference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joint F-Test (p-value)</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

n

1367  1367  377  377  727  727

Partial regression coefficients after controlling for state fixed effects, year fixed effects, the percent of close election in each chamber, log of population, log state income, percent 65+, percent under 18, and a dummy for a Democratic Governor.
### Table 4. OLS/2SLS Regressions of Tax Burden on Various Sub-samples

<table>
<thead>
<tr>
<th></th>
<th>OLS</th>
<th>2SLS (2pct)</th>
<th>2SLS (1pct)</th>
<th>2SLS (3pct)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Full Sample n=1322</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent Dem House</td>
<td>0.000</td>
<td>0.005</td>
<td>0.016</td>
<td>0.011</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.007)</td>
<td>(0.021)</td>
<td>(0.008)</td>
</tr>
<tr>
<td>Percent Dem Senate</td>
<td>0.004</td>
<td>0.010</td>
<td>0.003</td>
<td>0.010</td>
</tr>
<tr>
<td></td>
<td>(0.001)**</td>
<td>(0.013)</td>
<td>(0.009)</td>
<td>(0.007)</td>
</tr>
<tr>
<td>Test (p-value): B₁+B₂=0</td>
<td>0.03</td>
<td>0.32</td>
<td>0.33</td>
<td>0.08</td>
</tr>
<tr>
<td><strong>Non-South n=907</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent Dem House</td>
<td>-0.000</td>
<td>-0.002</td>
<td>0.001</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.009)</td>
<td>(0.015)</td>
<td>(0.007)</td>
</tr>
<tr>
<td>Percent Dem Senate</td>
<td>0.004</td>
<td>0.004</td>
<td>0.001</td>
<td>0.007</td>
</tr>
<tr>
<td></td>
<td>(0.002)*</td>
<td>(0.007)</td>
<td>(0.010)</td>
<td>(0.006)</td>
</tr>
<tr>
<td>Test (p-value): B₁+B₂=0</td>
<td>0.13</td>
<td>0.87</td>
<td>0.89</td>
<td>0.28</td>
</tr>
</tbody>
</table>

Partial regression coefficients after controlling for state fixed effects, year fixed effects, the percent of close elections in each chamber, log of population, log state income, percent 65+, and a percent under 18.
Table 5. OLS/2SLS Regressions of Minimum Wage on Various Sub-samples

<table>
<thead>
<tr>
<th>Variable</th>
<th>OLS</th>
<th>2SLS (2pct)</th>
<th>2SLS (1pct)</th>
<th>2SLS (3pct)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent Dem House</td>
<td>0.0001</td>
<td>-0.0003</td>
<td>0.0002</td>
<td>0.0000</td>
</tr>
<tr>
<td></td>
<td>(0.0001)</td>
<td>(0.0005)</td>
<td>(0.0007)</td>
<td>(0.0004)</td>
</tr>
<tr>
<td>Percent Dem Senate</td>
<td>0.0000</td>
<td>0.0003</td>
<td>-0.0002</td>
<td>0.0005</td>
</tr>
<tr>
<td></td>
<td>(0.0001)</td>
<td>(0.0006)</td>
<td>(0.0005)</td>
<td>(0.0004)</td>
</tr>
<tr>
<td>Test (p-value): B_1+B_2=0</td>
<td>0.35</td>
<td>0.98</td>
<td>0.95</td>
<td>0.37</td>
</tr>
<tr>
<td></td>
<td>Non-South n=907</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent Dem House</td>
<td>0.0002</td>
<td>-0.0002</td>
<td>0.0003</td>
<td>0.0002</td>
</tr>
<tr>
<td></td>
<td>(0.0002)</td>
<td>(0.0006)</td>
<td>(0.0010)</td>
<td>(0.0006)</td>
</tr>
<tr>
<td>Percent Dem Senate</td>
<td>-0.0000</td>
<td>0.0001</td>
<td>-0.0005</td>
<td>0.0005</td>
</tr>
<tr>
<td></td>
<td>(0.0001)</td>
<td>(0.0007)</td>
<td>(0.0006)</td>
<td>(0.0004)</td>
</tr>
<tr>
<td>Test (p-value): B_1+B_2=0</td>
<td>0.39</td>
<td>0.98</td>
<td>0.83</td>
<td>0.28</td>
</tr>
</tbody>
</table>

Partial regression coefficients after controlling for state fixed effects, year fixed effects, the percent of close elections in each chamber, log of population, log state income, percent 65+, and a percent under 18.
**Table 6. Effect of Democratic Control versus Republican Control on 1-year Changes, Simple Control Function**

<table>
<thead>
<tr>
<th>Function</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Full Sample n=1404</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tax Burden</strong></td>
<td>0.103</td>
<td>0.052</td>
<td>0.001</td>
<td>0.014</td>
</tr>
<tr>
<td></td>
<td>(0.047)*</td>
<td>(0.052)</td>
<td>(0.062)</td>
<td>(0.078)</td>
</tr>
<tr>
<td><strong>Different from (1) (p-value)</strong></td>
<td>0.046</td>
<td>0.021</td>
<td>0.144</td>
<td></td>
</tr>
<tr>
<td><strong>Minimum Wage</strong></td>
<td>0.007</td>
<td>0.006</td>
<td>0.006</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>(0.003)*</td>
<td>(0.003)*</td>
<td>(0.003)*</td>
<td>(0.004)</td>
</tr>
<tr>
<td><strong>Different from (1) (p-value)</strong></td>
<td>0.976</td>
<td>0.787</td>
<td>0.327</td>
<td></td>
</tr>
</tbody>
</table>

| **Non-South n=924** |     |     |     |     |
| **Tax Burden** | 0.108 | 0.046 | 0.001 | 0.019 |
| | (0.052)* | (0.070) | (0.081) | (0.092) |
| **Different from (1) (p-value)** | 0.186 | 0.102 | 0.289 |     |
| **Minimum Wage** | 0.008 | 0.008 | 0.002 | -0.000 |
| | (0.003)* | (0.004)* | (0.004) | (0.005) |
| **Different from (1) (p-value)** | 0.995 | 0.221 | 0.105 |     |

Control Function: none, Linear, Cubic, Quintic

Each entry is a separate regression. Estimation is performed on the residuals of regressions of the policies and Democratic control dummies on state fixed effects, year fixed effects, log of population, log state income, percent 65+, and percent under 18. The window is a sphere of given radius around perfectly even split in both chambers. Standard errors are clustered by state.
### Table 7. Effect of Democratic Control versus Republican Control on 1-year Changes, Non-Parametric

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Full Sample n=1404</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tax Burden</td>
<td>0.103</td>
<td>0.011</td>
<td>0.039</td>
<td>0.036</td>
</tr>
<tr>
<td></td>
<td>(0.047)*</td>
<td>(0.066)</td>
<td>(0.069)</td>
<td>(0.087)</td>
</tr>
<tr>
<td>Minimum Wage</td>
<td>0.007</td>
<td>0.006</td>
<td>0.006</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>(0.003)*</td>
<td>(0.003)*</td>
<td>(0.003)*</td>
<td>(0.004)</td>
</tr>
<tr>
<td>n</td>
<td>1404</td>
<td>316</td>
<td>99</td>
<td>61</td>
</tr>
<tr>
<td><strong>Non-South n=924</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tax Burden</td>
<td>0.108</td>
<td>0.031</td>
<td>0.036</td>
<td>0.040</td>
</tr>
<tr>
<td></td>
<td>(0.052)*</td>
<td>(0.075)</td>
<td>(0.081)</td>
<td>(0.098)</td>
</tr>
<tr>
<td>Minimum Wage</td>
<td>0.008</td>
<td>0.008</td>
<td>0.002</td>
<td>-0.000</td>
</tr>
<tr>
<td></td>
<td>(0.003)*</td>
<td>(0.004)*</td>
<td>(0.004)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>n</td>
<td>924</td>
<td>282</td>
<td>89</td>
<td>54</td>
</tr>
</tbody>
</table>

Each entry is a separate regression. Estimation is performed on the residuals of regressions of the policies and Democratic control dummies on state fixed effects, year fixed effects, log of population, log state income, percent 65+, and percent under 18. The window is a sphere of given radius around perfectly even split in both chambers. Standard errors are clustered by state.
## Table 8. Effect of Democratic Control versus Republican Control on 1-year Changes by Decade

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1970s n=464</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tax Burden</td>
<td>0.204</td>
<td>0.136</td>
<td>0.116</td>
<td>-0.016</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.084)*</td>
<td>(0.110)</td>
<td>(0.178)</td>
<td>(0.245)</td>
<td></td>
</tr>
<tr>
<td>Minimum Wage</td>
<td>0.007</td>
<td>0.005</td>
<td>-0.001</td>
<td>-0.009</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td>(0.009)</td>
<td>(0.011)</td>
<td>(0.019)</td>
<td></td>
</tr>
<tr>
<td><strong>1980s n=470</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tax Burden</td>
<td>0.153</td>
<td>0.012</td>
<td>-0.283</td>
<td>-0.231</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.185)*</td>
<td>(0.196)</td>
<td>(0.258)</td>
<td>(0.329)</td>
<td></td>
</tr>
<tr>
<td>Minimum Wage</td>
<td>0.015</td>
<td>0.011</td>
<td>0.016</td>
<td>0.015</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.003)**</td>
<td>(0.004)**</td>
<td>(0.012)</td>
<td>(0.019)</td>
<td></td>
</tr>
<tr>
<td><strong>1990s n=470</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tax Burden</td>
<td>0.162</td>
<td>0.080</td>
<td>-0.078</td>
<td>-0.165</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.078)**</td>
<td>(0.090)</td>
<td>(0.110)</td>
<td>(0.159)</td>
<td></td>
</tr>
<tr>
<td>Minimum Wage</td>
<td>0.011</td>
<td>0.008</td>
<td>0.011</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.008)</td>
<td>(0.010)</td>
<td>(0.018)</td>
<td></td>
</tr>
</tbody>
</table>

Control Function  none  Linear x Control  Control  Cubic x Control

Each entry is a separate regression, containing dummies for Democratic Senate only, Democratic House only, state fixed effects, year fixed effects, log of population, log state income, percent 65+, and percent under 18. Control functions include a polynomial of the stated order, interacted control indicators. Standard errors are clustered by state.
## Table 9. OLS/2SLS Regressions of Tax Burden by Decade

<table>
<thead>
<tr>
<th></th>
<th>Change in Tax Burden</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OLS</td>
</tr>
<tr>
<td>1970s n=429</td>
<td></td>
</tr>
<tr>
<td>Percent Dem House</td>
<td>-0.001</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
</tr>
<tr>
<td>Percent Dem Senate</td>
<td>0.006</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
</tr>
<tr>
<td>Test (p-value): B_1+B_2=0</td>
<td>0.13</td>
</tr>
<tr>
<td>1980s n=443</td>
<td></td>
</tr>
<tr>
<td>Normalized Percent Dem House</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
</tr>
<tr>
<td>Normalized Percent Dem Senate</td>
<td>0.006</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
</tr>
<tr>
<td>Test (p-value): B_1+B_2=0</td>
<td>0.14</td>
</tr>
<tr>
<td>1990s n=450</td>
<td></td>
</tr>
<tr>
<td>Normalized Percent Dem House</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
</tr>
<tr>
<td>Normalized Percent Dem Senate</td>
<td>0.007</td>
</tr>
<tr>
<td></td>
<td>(0.003)*</td>
</tr>
<tr>
<td>Test (p-value): B_1+B_2=0</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Partial regression coefficients after controlling for state fixed effects, year fixed effects, the percent of close elections in each chamber, log of population, log state income, percent 65+, and a percent under 18.
Table 10. OLS/2SLS Regressions of Minimum Wage by Decade

<table>
<thead>
<tr>
<th></th>
<th>OLS</th>
<th>2SLS (2pct)</th>
<th>2SLS (1pct)</th>
<th>2SLS (3pct)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970s n=429</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent Dem House</td>
<td>-0.0000</td>
<td>0.00010 †</td>
<td>0.00021 †</td>
<td>0.0003</td>
</tr>
<tr>
<td></td>
<td>(0.0002)</td>
<td>(0.0013)</td>
<td>(0.0030)</td>
<td>(0.0009)</td>
</tr>
<tr>
<td>Percent Dem Senate</td>
<td>0.0002</td>
<td>-0.0002 †</td>
<td>-0.0004 †</td>
<td>0.0011</td>
</tr>
<tr>
<td></td>
<td>(0.0002)</td>
<td>(0.0009)</td>
<td>(0.0016)</td>
<td>(0.0009)</td>
</tr>
<tr>
<td>Test (p-value): B₁+B₂=0</td>
<td>0.57</td>
<td>0.33 †</td>
<td>0.33 †</td>
<td>0.19</td>
</tr>
<tr>
<td>1980s n=443</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent Dem House</td>
<td>0.0002</td>
<td>0.0003 †</td>
<td>-0.0010 †</td>
<td>0.0011</td>
</tr>
<tr>
<td></td>
<td>(0.0004)</td>
<td>(0.0019)</td>
<td>(0.0014)</td>
<td>(0.0016)</td>
</tr>
<tr>
<td>Percent Dem Senate</td>
<td>0.0003</td>
<td>0.0013 †</td>
<td>0.0005 †</td>
<td>0.0013</td>
</tr>
<tr>
<td></td>
<td>(0.0002)</td>
<td>(0.0011)</td>
<td>(0.0010)</td>
<td>(0.0009)</td>
</tr>
<tr>
<td>Test (p-value): B₁+B₂=0</td>
<td>0.17</td>
<td>0.58 †</td>
<td>0.74</td>
<td>0.29</td>
</tr>
<tr>
<td>1990s n=450</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent Dem House</td>
<td>0.0007</td>
<td>-0.0020 †</td>
<td>-0.0022 †</td>
<td>-0.0024</td>
</tr>
<tr>
<td></td>
<td>(0.0005)</td>
<td>(0.0024)</td>
<td>(0.0060)</td>
<td>(0.0018)</td>
</tr>
<tr>
<td>Percent Dem Senate</td>
<td>-0.0000</td>
<td>-0.0005 †</td>
<td>-0.0001 †</td>
<td>-0.0002</td>
</tr>
<tr>
<td></td>
<td>(0.0004)</td>
<td>(0.0013)</td>
<td>(0.0040)</td>
<td>(0.0009)</td>
</tr>
<tr>
<td>Test (p-value): B₁+B₂=0</td>
<td>0.25</td>
<td>0.40 †</td>
<td>0.52</td>
<td>0.20</td>
</tr>
</tbody>
</table>

Partial regression coefficients after controlling for state fixed effects, year fixed effects, the percent of close elections in each chamber, log of population, log state income, percent 65+, and a percent under 18.
Table 11. OLS/2SLS Regressions of Tax Burden on Various Sub-samples

<table>
<thead>
<tr>
<th></th>
<th>OLS</th>
<th>2SLS (2pct)</th>
<th>2SLS (1pct)</th>
<th>2SLS (3pct)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Full Sample n=1322</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent Dem House</td>
<td>0.000</td>
<td>0.005</td>
<td>0.016</td>
<td>0.011</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.007)</td>
<td>(0.021)</td>
<td>(0.008)</td>
</tr>
<tr>
<td>Percent Dem Senate</td>
<td>0.004</td>
<td>0.010</td>
<td>0.003</td>
<td>0.010</td>
</tr>
<tr>
<td></td>
<td>(0.001)**</td>
<td>(0.013)</td>
<td>(0.009)</td>
<td>(0.007)</td>
</tr>
<tr>
<td>Test (p-value): B_1+B_2=0</td>
<td>0.03</td>
<td>0.32</td>
<td>0.33</td>
<td>0.08</td>
</tr>
<tr>
<td><strong>Both Chambers Republican n=359</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent Dem House</td>
<td>-0.005</td>
<td>-0.003</td>
<td>0.040</td>
<td>0.020</td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
<td>(0.022)</td>
<td>(0.150)</td>
<td>(0.025)</td>
</tr>
<tr>
<td>Percent Dem Senate</td>
<td>0.001</td>
<td>-0.008</td>
<td>0.011</td>
<td>-0.009</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.012)</td>
<td>(0.019)</td>
<td>(0.016)</td>
</tr>
<tr>
<td>Test (p-value): B_1+B_2=0</td>
<td>0.45</td>
<td>0.70</td>
<td>0.76</td>
<td>0.59</td>
</tr>
<tr>
<td><strong>Both Chambers Democratic n=711</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent Dem House</td>
<td>-0.003</td>
<td>0.021</td>
<td>0.027</td>
<td>0.005</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.013)</td>
<td>(0.025)</td>
<td>(0.013)</td>
</tr>
<tr>
<td>Percent Dem Senate</td>
<td>0.004</td>
<td>0.015</td>
<td>0.008</td>
<td>0.024</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.023)</td>
<td>(0.021)</td>
<td>(0.019)</td>
</tr>
<tr>
<td>Test (p-value): B_1+B_2=0</td>
<td>0.60</td>
<td>0.15</td>
<td>0.22</td>
<td>0.24</td>
</tr>
</tbody>
</table>

Partial regression coefficients after controlling for state fixed effects, year fixed effects, the percent of close elections in each chamber, log of population, log state income, percent 65+, and a percent under 18.
Table 12. OLS/2SLS Regressions of Minimum Wage on Various Sub-samples

<table>
<thead>
<tr>
<th></th>
<th>OLS</th>
<th>2SLS (2pct)</th>
<th>2SLS (1pct)</th>
<th>2SLS (3pct)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Sample n=1322</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent Dem House</td>
<td>0.0001</td>
<td>-0.0003</td>
<td>0.0002</td>
<td>0.0000</td>
</tr>
<tr>
<td></td>
<td>(0.0001)</td>
<td>(0.0005)</td>
<td>(0.0007)</td>
<td>(0.0004)</td>
</tr>
<tr>
<td>Percent Dem Senate</td>
<td>0.0000</td>
<td>0.0003</td>
<td>-0.0002</td>
<td>0.0005</td>
</tr>
<tr>
<td></td>
<td>(0.0001)</td>
<td>(0.0006)</td>
<td>(0.0005)</td>
<td>(0.0004)</td>
</tr>
<tr>
<td>Test (p-value): B_1+B_2=0</td>
<td>0.35</td>
<td>0.98</td>
<td>0.95</td>
<td>0.37</td>
</tr>
<tr>
<td>Both Chambers Republican n=359</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent Dem House</td>
<td>-0.0003</td>
<td>0.0041</td>
<td>-0.0123</td>
<td>0.0024</td>
</tr>
<tr>
<td></td>
<td>(0.0003)</td>
<td>(0.0034)</td>
<td>(0.0343)</td>
<td>(0.0025)</td>
</tr>
<tr>
<td>Percent Dem Senate</td>
<td>0.0002</td>
<td>-0.0012</td>
<td>-0.0018</td>
<td>-0.0003</td>
</tr>
<tr>
<td></td>
<td>(0.0003)</td>
<td>(0.0009)</td>
<td>(0.0048)</td>
<td>(0.0007)</td>
</tr>
<tr>
<td>Test (p-value): B_1+B_2=0</td>
<td>0.74</td>
<td>0.36</td>
<td>0.70</td>
<td>0.33</td>
</tr>
<tr>
<td>Both Chambers Democratic n=711</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent Dem House</td>
<td>0.0000</td>
<td>-0.0020</td>
<td>-0.0012</td>
<td>-0.0005</td>
</tr>
<tr>
<td></td>
<td>(0.0002)</td>
<td>(0.0012)</td>
<td>(0.0014)</td>
<td>(0.0010)</td>
</tr>
<tr>
<td>Percent Dem Senate</td>
<td>-0.0001</td>
<td>0.0016</td>
<td>-0.0001</td>
<td>0.0019</td>
</tr>
<tr>
<td></td>
<td>(0.0001)</td>
<td>(0.0014)</td>
<td>(0.0009)</td>
<td>(0.0016)</td>
</tr>
<tr>
<td>Test (p-value): B_1+B_2=0</td>
<td>0.86</td>
<td>0.84</td>
<td>0.49</td>
<td>0.54</td>
</tr>
</tbody>
</table>

Partial regression coefficients after controlling for state fixed effects, year fixed effects, the percent of close elections in each chamber, log of population, log state income, percent 65+, and a percent under 18.
I want to thank my advisers Daron Acemoglu, Bob Gibbons, and Jim Snyder for their encouragement and advice. The participants of the Political Economy breakfast and summer applied micro lunch gave excellent suggestions, many of which have improved the paper greatly. I want specifically to thank Steve Ansolabehere, Alex Debs, Leopoldo Fergusson, Tal Gross, Jeanne Lafortune, Gabe Lenz, Pablo Querubin, Eric Weese, and Tom Wilkening. This research was undertaken while studying under a National Science Foundation Graduate Research Fellowship.
Third-Party Auditors and Political Accountability

Abstract

This paper identifies the causal effect of partisan power on tax and labor policies in the context of U.S. state legislatures from 1970 to 2000. Using a two dimensional regression discontinuity design, I identify the effect of Democratic control of the state legislature, as compared to divided control or Republican control, on tax burden and the state minimum wage. Using a novel instrumental variables approach, where the instrument is derived from the outcome of close legislative election, I also identify the effect of a marginal shift in the share of Democrats in the legislature on these same policies. To my knowledge this is the first paper to cleanly identify these pure partisan effects. In contrast to its prominence in popular discussions, the resulting estimates for control are quite small, suggesting that the pure partisan effect of control is relatively unimportant in understanding changes in these fiscal and labor policies. The estimates for party mix, however, are larger, suggesting this may be the more important channel by which party affects policy in this setting.
The most important tool that citizens have to police the decisions of their elected representatives is the ballot box. But the effectiveness of this tool depends crucially on the citizens’ ability to correctly judge whether the politicians they select are doing their best to act in the interests of their constituents. This paper asks when and how specialist third-party auditors, people whose incentives come from outside the particular citizen-politician relationship under consideration, can nonetheless improve the ballot box as a tool of political accountability. I will look at three sorts of auditors: journalist, bureaucrat, and the opposition party, and show that because of the way that they respond to career-concern incentives, by auditing asymmetrically, auditors with incentives similar to journalists are particularly well suited to this role.

This paper looks at a particular form of auditing, in which success reveals what information a politician had when he took the action under consideration. The importance of just this sort of auditing has been particularly salient in the past few years. In the wake of controversial decisions, the question always arises “what did they know?” Much of the debate over how to interpret the decision to invade Iraq has turned on what information President Bush had about the presence of weapons of mass destruction (WMDs), both at the time and since. Likewise, scholars wait expectantly for each release of historical records from Presidential libraries to help interpret policymaking within the context of the President’s information at the time.¹

To understand how this sort of auditor might improve electoral accountability, the next section reviews briefly the literature on control and third-party auditing, both in a political setting and more generally. The unique feature of this paper is its comparative perspective, which allows me to identify a new advantage of journalist auditors. Section 2 introduces the model, defines a series of equilibria that vary in the degree of accountability, and establishes the conditions for their

¹See, for example, a special Summer 2006 issue of Public Historian dedicated to just this topic, especially (Fawcett 2006)
existence in a simplified version of the game in which the auditing is exogenous. The important result is the advantage of asymmetric auditing. Section 3 reintroduces strategic auditing with reduced-form auditor incentives and derives the conditions for full electoral control under different auditing regimes. Importantly, the incentives faced by journalist auditors end up leading them to audit asymmetrically. Section 4 endogenizes the proposed auditor incentives by deriving them as the result of the economic environment in which each auditor finds herself. Finally, Section 5 briefly discusses how multiple auditors interact and, specifically, how journalist auditors react to auditing elsewhere by increasing their own auditing, a sort of strategic complementarity.

1 Third-Party Auditors and Accountability

The ballot box is the instrument of political control that has received more attention in the formal literature than either other. Beginning with the earliest median-voter theorems ((Downs 1957)) and continuing through the work on political agency ((Barro 1973)), scholars have worried about when the ballot box will suffice to discipline elected officials to act in the interests of their constituents. Following in this tradition, this paper maintains the centrality of electoral accountability but now under less than ideal conditions, since voters' are imperfectly informed.

Voters' imperfect information has loomed large among the reasons the ballot box may fail as an instrument of political accountability. Voters may not know what action the politician has taken ((Ferejohn 1986)), they may observe the politician's policy decision perfectly but be uncertain about the payoff-relevant underlying state of the world ((Maskin and Tirole 2004)), or they may know both these things but not know what information the politician had when he made his decision. In this paper, the voters suffer from both of the last two problems, uncertainty about the state of the world and about the politician's information. In this sense, if follows very closely the model

116
in Prat (2005), Canes-Wrone, Herron and Shotts (2001), and even more so, Maskin and Tirole (2004). Just as in Maskin and Tirole (2004), a voter who is imperfectly informed as to the state of the world tries to discriminate between a politician who has interests congruent to the voters and one with antithetical preferences. The novelty here is the introduction of a third-party auditor, a maximizing agent outside the voter-politician relationship who may reveal what information the politician had when he acted.

Outside of the political sphere, there is a substantial literature on the way that third-party auditors can improve the incentives in standard principal-agent relationships. In corporate finance, equity analysts ((Morgan and Stocken 2003), (Womack 1996)) and bond rating agencies ((Goh and Ederington 1993), (Hand, Holthausen and Leftwich 1992)) play the role of a third-party auditor. Peer review ideally fits this model, in which third-party reviewers gain no benefit from the result of this particular editor-author interaction but have incentives to demonstrate their competence/dedication/intelligence(?) by correctly judging the quality of the paper submitted (See, e.g., (Ellison 2002)). The defining feature of third-party auditors is that their incentives to audit must not come from within the principal-agent relationship. More formally, their payoff cannot depend on the outcome of the principal-agent relationship. A supervisor, for example, would not qualify, and neither would a union representative. The similarity of these other contexts to an electoral decision, where keeping/selling an equity or approving/rejecting a paper looks quite similar to re-electing/dismissing an incumbent politicians, suggests that there might also be an important role for third-party auditors to play in the political setting.

In the political domain, certainly, the media is the third-party that has received the most attention. Of particular interest has been the way the incentives of the media shape the news they report and how that, in turn, affects policy. From a political agency point of view, Besley and Prat (2006) concern themselves primarily with media capture and the way the industrial structure of the media
can affect its susceptibility to that capture. The media in their model, however, is not technically third-party in the sense above, since it can receive side-payments from the politician. Relatedly, but in a distributional context, Stromberg (2004) finds that the incentives the media has to target their product to certain groups can slant public policy toward those groups as well. Since my concern is political agency and control, this paper abstracts from distributional concerns by positing a unitary representative voter. In an extension of Canes-Wrone et al. (2001), Ashworth and Shotts (2008) show that the introduction of the media can either help or hurt incumbents' incentives to pander, depending on parameters, since the media's incentives to look smart can in turn lead them to pander. Their model is the closest to the one presented in this paper, but with a key difference. Their journalists are more pundits than investigators; they get a signal and make an educated guess about the state of the world. Here, instead, a journalist works to uncover some documents or evidence that they then release to the public.

More generally, none of the extant literature considers the media as auditors per se. Instead of working to reveal what information the politician had when he made the decision, all of these papers have the media trying to reveal either the politician's action or the underlying state of the world. This seemingly mild change uncovers a new advantage for journalistic auditors in helping to maintain accountability, the tendency of journalistic career concerns to induce asymmetric auditing. Additionally, none of these papers try to assess why the media might be particularly well suited to help maintain accountability, as compared to other sorts of auditors.

In addition to journalist auditors, at least two other sorts of third-party auditors have appeared in the literature on political control: bureaucratic auditors and opposition party auditors. For bureaucratic auditors to derive their incentives from outside the citizen-politician relationship, for them to be third-party in the sense above, they cannot be beholden to the incumbent politician. A good example of this sort of auditor is described in Ferraz and Finan (2006), which considers the ef-
fect of the introduction of federal auditors on the outcome of Brazilian mayoral elections. Even a well-insulated investigator at the same level of government would qualify, such as the U.S. Government Accountability Office in their self-directed investigations ((O'Connell 2007)) or, perhaps, the Inspector Generals of the various cabinet level agencies ((Light 1993)).

The opposition as auditor has also featured prominently in political theory, although they are not generally referred to explicitly as auditors. More often, scholars discuss the “watchdog” function of a robust opposition. Any opposition party member or operative who works to reveal what information drove the decision-making of the party in power, for whatever reason, is an auditor in my parlance. To qualify as a third-party auditor, however, the incentives to audit must not depend on the result of this particular election but, instead, depend on a general incentive to discredit the incumbent party. Kristopher Ramsay talks about the out party performing this function in the context international negotiations ((Ramsay 2004)). Mayhew (1991) discusses the minority party playing this role in the U.S. Congress.

2 Basic Model, Equilibria, and The Simplified Game

To understand the ways in which third-party auditors can affect political accountability, this section presents a game-theoretic model of policymaking, auditing, and voting with imperfect information. The first subsection presents the general model, the second defines some equilibria of interest to characterize the degree of accountability, and the final subsection derives the conditions for the existence of these equilibria in a simplified version of the game.
2.1 Basic Model

The model consists of a two-period game between a representative voter, an auditor, and a politician. I will first outline the timing of the game, then the actors' preferences, and finally the informational structure.

Before the first period commences, a politician is chosen from an infinite pool of two types, Congruent and Non-Congruent ($\{C, NC\}$), where the proportion of Congruent politicians is $\pi$. In each period, the state of the world is realized ($S \in \{X, Y\}$). This realization is independent across periods, and the ex-ante probability that the state is $X$ is $\theta > \frac{1}{2}$. After the state is realized, the politician receives a private signal, $s \in \{x, y, \phi\}$. With probability $q$, the signal will perfectly reveal the state; otherwise it reveals nothing. Next the politician will choose an action ($a \in \{x, y\}$), and this action is publicly observable. Represent the action taken by a politician of type $t$ after receiving signal $s$ as $a(s, t)$. After the politician's action, the auditor decides how much effort to put into investigating ($p \in [0, 1]$). If the politician has received an informative signal, that signal is then publicly revealed with probability $p$. Let $r \in \{x, y, \phi\}$ represent the auditor's publicly verifiable report, where $\phi$ represents no verifiable information. Finally, the voter decides whether to keep the current politician in the next period or to draw a new politician from the population ($v \in \{Keep, Drop\}$) and the game repeats.$^2$ Where appropriate, for mixed strategies, $a(s, t)$ and $v(a, r)$ also represent the probability of choosing $a = x$ and $v = Keep$.

The politicians' and voters' per-period payoffs are as follows. The voter cares only that the politician's action matches the state, so he receives a positive payoff in that case and zero otherwise.

$^2$ The assumption that the new politician is drawn from the same population as the old accords with Maskin and Tirole (2004) but contrasts with Canes-Wrone et al. (2001) and Ashworth and Shotts (2008), who assume the quality of the challenger may differ from that of the incumbent, and perform many of their comparisons with respect to this difference. When the challenger is of a different expected quality, the voter will not be indifferent after receiving no information, making the construction of pooling equilibria much more difficult.
The politician's payoff depends on his type. Both types receive a rent \( R > 0 \) for holding office, and a Congruent politician receives a payoff of 1 if his action matches the state and zero otherwise, while a Non-Congruent politician receives a payoff of 1 if his action does not match the state and a payoff of zero otherwise. Finally, for notational simplicity, let \( Z \) represent the inverse of the expected value to the politician of holding office in the second period, i.e.,

\[
Z = \frac{1}{R + q + (1 - q)\theta}.
\]

I will consider three types of auditors, in turn, each with their own sort of preferences: journalist, opposition, and bureaucrat. In the base model, I take those preferences as exogenously given, but in section 4, I show how the preferences outlined here could arise endogenously as a result of the economic environment face by each type of auditor. Of course, auditors may exist which are combinations of these idealized types or which share similar payoffs to those below. The defining feature of a journalist auditor is that she receives a positive payoff for revealing the politician's signal, even if that signal is not very informative about his type. The defining feature of an opposition auditor is that she receives a positive payoff only for revealing bad news about the incumbent, i.e., that he failed to follow his signal. Finally, the defining feature of a bureaucrat auditor is that her payoff is independent of the content of the audit report, but it may depend on her effort. More formally, with details, the payoffs in the game are as follows:

a) A journalist cares about successful reporting, about catching lying politicians, and about the cost of investigating. Specifically, she receives a payoff \( B \) if she successfully reveals that \( a \neq s \), a payoff of \( b \) if she successfully reveals that \( a = s \), and zero if she fails to uncover an informative signal, where \( B, b > 0 \). Investigation costs \(-cp^2/2\), where \( c > q\max\{B, b\}\) to avoid cornering. Taking the example of WMDs and the invasion of Iraq, a journalist
would get a positive payoff for any story which could reliably reveal what information the President had about WMDs when the decision was made to invade. Note that the setup allows the payoff to be different (presumably larger) if the information suggests that the politician acted contrary to his signal, but it also requires a positive payoff for "good" news.

b) An opposition auditor shares the cost of auditing with the journalist, but her payoffs of uncovering the incumbents signal differ. Specifically, she receives $A$ for revealing a politician has failed to follow his signal and $a$ for revealing that he has followed it, where $A \geq 0 \geq a$. The important difference here is that an opposition auditor gets a non-positive payoff for revealing "good" news about the incumbent.

c) A bureaucratic auditor gets no return for successful auditing, although she has a related cost structure. Specifically, assume the bureaucrat receives a linear wage contract in probability, with wage rate $w$, i.e., $wp - cp^2/2$. The important difference here is that the bureaucrat does not care how likely the audit is to be successful, so will audit at the same rate regardless of the politician's action. An alternative specification that would lead to the same results is to assume the bureaucrat also gets no return for effort, but has a cost function of the form $c(p - w/c)^2$, so that the cost of doing no auditing at all is actually higher than doing some minimal level, perhaps because hiding her shirking is costly.

Finally, there are two types of uncertainty we need to keep track, the voter's beliefs concerning the politician's type and the auditor's beliefs concerning what signal the politician has received. Let $\pi^*(a, r)$ represent the voter's belief that the politician's type is $C$, after observing action $a$ and report $r$. Let $\chi_s(a)$ represent the auditor's belief that the politician's signal was $s$, given action $a$. 

122
2.2 Equilibria

My goal here is not to characterize all the various equilibria that could arise in the game above. Instead, I want to determine whether third-party auditing, together with the power of the ballot box, make it possible to discipline potentially recalcitrant politicians to act in the citizen's best interests. I will focus on "possibility" theorems concerning the existence of equilibria with the most complete sorts of political control. One could ask a related question, as to whether the auditing conditions \textit{guarantee} performance by the Non-Congruent politician, but the answer to that question is unambiguously "no", without some equilibrium selection criteria.\footnote{The Intuitive Criterion, for example, would clearly limit things some. Politicians always choosing y and voters always keeping politicians who choose y and dropping those who choose x would be an equilibrium, sustained by out-of-equilibrium beliefs that those who choose x are Non-Congruent, regardless of the results of the audits. But these beliefs fail the Intuitive Criterion, since if a politician chooses x and the audit reveals that his signal was x, that choice is equilibrium-dominated for the Non-Congruent types. Nevertheless, running through all the potential equilibria, even under some plausible selection criteria, is a distraction from the central point concerning the possibility of electoral accountability.}

The following Perfect Bayesian Equilibria are ranked in terms of how closely the politicians' first-period actions align with those preferred by the voter, from most to least. All of the equilibria below have the attractive feature that the Congruent politician acts as the citizen would, by following his signal if he receives one and otherwise choosing x, and they completely cover the parameter space.

\textbf{Definition 1.} A \textit{No Pandering Equilibrium} is a Perfect Bayesian Equilibrium in which both types of politician always follow their informative signals and choose action x in the absence of an informative signal \((a(s,t) = s \text{ and } a(\phi,t) = x \text{ for } s \in \{x,y\} \text{ and } t \in \{C,NC\})\)

\textbf{Definition 2.} A \textit{Truth-Telling Equilibrium} is a Perfect Bayesian Equilibrium in which both types of politician always follow their informative signals if they receive one \((a(s,t) = s \text{ for } s \in \{x,y\} \text{ and } t \in \{C,NC\})\).
Definition 3. A Partial-Pandering Equilibrium is a Perfect Bayesian Equilibrium in which Congruent politicians always follow their informative signal if they receive one and Non-Congruent politicians follow their signal after \( s = x \) but randomize after \( s = y \) (\( a(s, C) = s \) for \( s \in \{x, y\} \), \( a(x, NC) = x \), and \( a(y, NC) \in (0, 1) \)).

Definition 4. A Full-Pandering Equilibrium is a Perfect Bayesian Equilibrium in which Congruent politicians always follow their informative signal if they receive one and Non-Congruent politicians choose \( x \) after any signal (\( a(s, C) = s \) and \( a(s, NC) = x \), for \( s \in \{x, y\} \)).

Definition 5. A No-Control Equilibrium is a Perfect Bayesian Equilibrium in which Congruent politicians always follow their informative signal if they receive one and Non-Congruent politicians choose \( x \) after signal \( y \), and mix after signal \( x \). (\( a(s, C) = s \) for \( s \in \{x, y\} \), \( a(y, NC) = x \), and \( a(x, NC) \in [0, 1] \)).

2.3 Simplified Game with Exogenous Auditing

Before looking for equilibria of these types in the full game, consider first a simplified game in which the auditor is not a strategic player. By putting the auditor in the background temporarily, we can highlight how the election game itself plays out. This separation clearly delineates the equilibrium features which arise from the politician-voter strategic interactions from those with their origins in the strategic play of the auditor. We will see, for example, that asymmetric auditing is more effective than symmetric auditing, not because it is easier for a strategic auditor to implement, but rather because it improves the incentives in the voter-politician game. Furthermore, the auditor's problem in the complete game will differ by auditor type (journalist versus bureaucrat versus opposition), and carrying all three types through the discussion of politician-voter interaction would be needlessly cumbersome.
Assume for this section alone, therefore, that the probability of an informative signal being revealed after the politician takes action $a$ is fixed and exogenously given by $p(a)$. So for signal $s$ and action $a$,

$$r(s,a) = \begin{cases} 
  s, & \text{with probability } p(a) \\
  \phi, & \text{with probability } 1 - p(a).
\end{cases}$$

Note that $r(\phi, a) = \phi$ for sure, since an auditor can never reveal a signal if the politician did not receive one. To summarize payoffs, in this simplified game:

$$EU_P(a|t,s,v) = R + 1(t = NC) + (-1)^{1(t=NC)}\text{Prob}(a = S|s) + \sum_r \{v(a,r)\text{Prob}(r|s,a)1/Z\}$$

$$EU_V(v|r,a) = \text{Prob}(a = S|a,r) + (1 - q)(1 - \theta) + [v\pi^*(a,r) + (1 - v)\pi][2(2q - 1) + 2q(1 - \theta)]$$

In this simplified setting, a Perfect Bayesian Equilibrium consists of a signal- and type-dependent mixed-strategy for the politician $a^*(t,s)$, an action- and report-dependent mixed-strategy by the citizen $v^*(a,r)$, and action- and report-dependent beliefs by the citizen $\pi^*(a,r)$, such that:

a) $EU_P(a^*(t,s)|t,s,v^*) \geq EU_P(a|t,s,v^*)$ for all $(a,t,s)$

b) $EU_V(v^*(a,r)|a^*,r) \geq EU_C(v^*|a^*,r)$ for all $(v,a,r)$

c) $\pi^*(a,r)$ is consistent with Bayes' Rule

In this simplified game, the existence of the aforementioned equilibria will depend directly on the exogenous auditing probabilities. Specifically,

**Lemma 1.** A necessary condition for a No-Pandering equilibrium to exist in the simplified game
is
\[ p(x) + p(y) \geq 2Z. \]  

Together with the above necessary condition, either of these two conditions is sufficient and the satisfaction of (at least) one of them is necessary:

\begin{enumerate}
  \item For \( p(y) \geq p(x) \): need \( p(y) \geq Z[1 + (1 - p(x))(2\theta - 1)] \)
  \item For \( p(x) \geq p(y) \): need \( p(x) \geq Z[1 + (1 - p(y))(2\theta - 1)] \).
\end{enumerate}

**Proof.** If the Congruent type wants to deviate from equilibrium, so does the Non-Congruent type, and so it suffices to check the Non-Congruent type’s three IC-constraints. The equilibrium strategy needs to be optimal after a signal of \( x \), i.e.,

\[ [p(x)v(x,x) + (1 - p(x))v(x,\phi)]R + q + (1 - q)\theta \geq 1 + [p(y)v(y,x) + (1 - p(y))v(y,\phi)]R + q + (1 - q)\theta. \]  

(2)

Similarly, after the signal \( y \),

\[ [p(y)v(y,y) + (1 - p(y))v(y,\phi)]R + q + (1 - q)\theta \geq 1 + [p(x)v(x,y) + (1 - p(x))v(x,\phi)]R + q + (1 - q)\theta. \]  

(3)

Finally, in the absence of a signal, the Non-Congruent type should prefer to choose \( x \), so

\[ (1 - \theta) + v(x,\phi)[R + q + (1 - q)\theta] \geq \theta + v(y,\phi)[R + q + (1 - q)\theta]. \]  

(4)

Since the equilibrium is completely uninformative, any voting strategies are consistent with optimization by the voter. Setting \( v(x,y) = v(y,x) = 0 \) and \( v(x,x) = v(y,y) = 1 \) only slackens the
constraints. Making those substitutions results in three inequalities in $v(x, \phi)$ and $v(y, \phi)$.

\begin{align*}
  p(x) + (1 - p(x))v(x, \phi) - (1 - p(y))v(y, \phi) & \geq Z \\
  p(y) + (1 - p(y))v(y, \phi) - (1 - p(x))v(x, \phi) & \geq Z \\
  v(x, \phi) - v(y, \phi) & \geq (2\theta - 1)Z
\end{align*}

For any given $v(y, \phi)$, (5) and (6) give a range of $v(x, \phi)$ which would satisfy both. Specifically

\[ v(x, \phi) \in \left[ \frac{(1 - p(y))v(y, \phi)}{1 - p(x)} + \frac{Z - p(x)}{1 - p(x)}, \frac{(1 - p(y))v(y, \phi)}{1 - p(x)} + \frac{p(y) - Z}{1 - p(x)} \right]. \]

For this set to be non-empty, we need $Z - p(x) \geq p(y) - Z$, the necessary condition in Lemma 1. Since the boundaries of the range above are linear (in terms of $v(y, \phi)$), as is condition (7), if any $(v(x, \phi), v(y, \phi))$ pair in the necessary range will satisfy (7), so will one of the two ends. It suffices to check whether the upper bound of the necessary range exceeds the minimum required by (7) when $v(y, \phi) = 0$ or when $v(y, \phi) = 1 - (2\theta - 1)Z$. When $v(y, \phi) = 0$ a satisfactory pair requires

\[ \frac{p(y) - Z}{1 - p(x)} \geq (2\theta - 1)Z, \]

the requirement of the first sufficient condition in Lemma 1. When $v(y, \phi) = 1 - (2\theta - 1)Z$, (7) requires $v(x, \phi) = 1$, so we need

\[ \frac{(1 - p(y))[1 - (2\theta - 1)Z]}{1 - p(x)} + \frac{p(y) - Z}{1 - p(x)} \geq 1, \]

which reduces to the second sufficient condition in Lemma 1.

\hfill \Box

In addition to the obvious point that more auditing improves accountability, Lemma 1 establishes
the non-obvious result that asymmetric auditing is better. For any level of total auditing \((p(x) + p(y))\), an allocation of auditing probabilities will support a No-Pandering equilibrium only if any more asymmetric allocation also will. To highlight this fact, Figure 1 illustrates the necessary and sufficient conditions for a No-Pandering equilibrium. The shaded (red) region represents those reporting probabilities that satisfy the necessary condition but fail both sufficient conditions. The intuition for this result comes from the voter’s strategies. Basically, the voter has two sorts of reelection strategies when the politician’s signal has not been revealed. He can either keep for sure the politicians who choose \(x\) and keep with a large probability those who choose \(y\), or he fire for sure the politicians who choose \(y\) and fire with large probability those who choose \(x\). With linear constraints, if some interior strategy satisfies the Non-Congruent politician’s IC-conditions, so will one of these two extreme voting strategies. The first strategy works well when \(p(x)\) is large and \(p(y)\) small, and the second works well when \(p(y)\) is large and \(p(x)\) is small, but neither works well for middling values of both.

![Figure 1. Necessary and Sufficient Conditions for No-Pandering Equilibrium](image)

It may seem from the above Lemma that the requirement to choose action \(x\) after no signal is what
limits the parameter space of the No-Pandering Equilibrium, and if we were willing to allow the Non-Congruent type to choose \( a = y \) in the absence of a signal we could maintain truth-telling for a much bigger range of auditing probabilities. In fact, the following Lemma establishes that this intuition does not hold. The idea is that once the Non-Congruent type separates for any signal, the voter’s indifference is broken, and it becomes much more difficult to construct equilibria. Surprisingly, the parameters needed for constructing a No-Pandering equilibria are actually identical to those needed for constructing the, seemingly less demanding, Truth-Telling equilibria.

Lemma 2. A Truth-Telling equilibrium exists in the simplified game if and only if a No-Pandering equilibrium exists.

Proof. Certainly a No-Pandering equilibrium is a Truth-Telling equilibrium. In a Truth-Telling equilibrium in which the politicians pool on action \( y \) after no signal, the restrictions are the same as above, except now it is the Congruent type’s constraint that binds in the absence of a signal. Specifically, we need

\[ v(y, \phi) - v(x, \phi) \geq (2\theta - 1)Z. \]

Unlike the No-Pandering case, however, this restriction definitely fails when \( v(y, \phi) = 0 \), so we need only consider the other extreme, when \( v(y, \phi) = 1 \). At that extreme, a satisfactory pair requires

\[ v(x, \phi) \leq 1 - (2\theta - 1)Z. \]

There will be a pair which satisfies this and the necessary condition as long as

\[ -(2\theta - 1)Z \geq \frac{Z - p(y)}{1 - p(x)}. \]

This condition reduces to the first sufficient condition in Lemma 1, so if pooling on \( y \) after no signal is Truth-Telling equilibrium so is pooling on \( x \).

If the agents separate after no signal, the citizen can no longer mix after observing \((x, \phi)\) or \((y, \phi)\),
since one makes the congruent type more likely and the other makes the non-congruent type more likely. This means any equilibrium with separation after no-signal either has \( v(x, \phi) = 1 \) and \( v(y, \phi) = 0 \) or vice-versa. In the first case, the non-congruent type receiving the \( y \) signal might want to pretend to have heard nothing and choose \( x \) the action which will lead to reelection for sure in the absence of a report. The condition that would make him not want to do this is more restrictive than the conditions above. Specifically, you need

\[
p(x) + p(y) \geq 1 + Z,
\]

and any parameters which satisfy this will satisfy one of the two sufficient conditions above as well as the necessary condition.

Although the primary interest of this paper is establishing the conditions under which the ballot box is sufficient for disciplining politicians, for completeness, the following three Lemmas establish what occurs if the auditing probabilities are not sufficiently large for maintaining a No-Pandering equilibrium. As one might expect, pandering gets worse and worse until finally all control of the Non-Congruent politician is lost. The proofs for all three are relegated to the Appendix for interested readers.

**Lemma 3.** A Partial-Pandering equilibrium exists if \( p(x) + p(y) \geq 2Z \) and one of the following two conditions hold:

a) For \( p(x) \geq p(y) \), need \( p(y) \leq \min \{1 - \frac{1 - q}{q(1 - \theta)}, \frac{28Z - p(x)}{Z(2\theta - 1)}\} \)

b) For \( p(y) \geq p(x) \), need \( p(x) \leq \min \{1 - \frac{1 - q}{q(1 - \theta)}, \frac{28Z - p(y)}{Z(2\theta - 1)}\} \)
**Lemma 4.** A Full-Pandering equilibrium exists if and only if

\[ \min(p(x), p(y)) \geq 1 - (\frac{1-q}{q})(\frac{1}{1-\theta}) \]

and one of the following two conditions hold:

a) For \( p(x) \geq p(y) \), need \( 2Z - p(y) \leq p(x) \leq \frac{2BZ - p(y)}{Z(2B-1)} \) or \( 2Z - p(y) \geq p(x) \geq \frac{2BZ - p(y)}{Z(2B-1)} \)

b) For \( p(y) \geq p(x) \), need \( 2Z - p(x) \leq p(y) \leq \frac{2BZ - p(x)}{Z(2B-1)} \) or \( 2Z - p(x) \geq p(y) \geq \frac{2BZ - p(x)}{Z(2B-1)} \)

**Lemma 5.** A No-Control equilibrium exists if and only if \( p(x) + p(y) \leq 2Z \).

**Proof.** Appendix

Figures 2 and 3 illustrate the best equilibrium for the voter for two parameter configurations. In Figure 2, all 4 types of equilibria are possible, while in Figure 3 the Partial Pandering equilibria have collapsed completely. This occurs when the probability that the politician is informed is too low. These 4 sorts of equilibria (No-Pandering, Partial-Pandering, Full-Pandering, and No-Control) almost exactly partition the parameter space (i.e., they are mutually exclusive and cover the space). The only overlap occurs when the probability that the politician is informed to low enough that the Full-Pandering equilibria continue below the “necessary constraint” from Lemma 1. In this case, there is a small range of parameters (with very asymmetric auditing) for which both Full-Pandering and No-Control equilibria exist.
Since the primary purpose here is to discover the conditions under which different sorts of auditors can strengthen election-based accountability, the remaining sections will concentrate on the existence of No-Pandering equilibria under different auditing regimes. Certainly, partial compliance may be interesting. After all, it may be the best you can do, but I leave those cases for future work. The next section will reintroduce a reduced-form payoff for each sort of auditor and see how dif-
ferent sorts of payoffs affect auditing probabilities, and thereby, the existence of a No-Pandering equilibrium. Having established these reduced-form relationships, I’ll endogenize the payoffs of each type of auditor by looking at a plausible career-concerns game for the auditors. Finally, I’ll consider how multiple auditors might interact in this setting.

3 Endogenous Reporting in the No-Pandering Equilibrium

Having characterized the way that voters and politicians will respond to different auditing probabilities, we can now look at how different sorts of auditors will affect the equilibrium policies. Reintroducing the auditors as described in the original model to the simplified game above adds as many as three additional conditions for a Perfect Bayesian Equilibrium, depending on the type of auditor. These maximizing conditions for the auditor are in addition to the conditions outlined for the voter and politician in the last section.

a) Journalist

1) \( p(x) \in \arg\max_p \ p[\chi_x(x)b + \chi_y(x)B] - cp^2/2 \)

2) \( p(y) \in \arg\max_p \ p[\chi_y(y)b + \chi_x(y)B] - cp^2/2 \)

3) \( \chi_s(a) \) consistent with Bayes’ Rule

b) Opposition

1) \( p(x) \in \arg\max_p \ p[\chi_x(x)a + \chi_y(x)A] - cp^2/2 \)

2) \( p(y) \in \arg\max_p \ p[\chi_y(y)a + \chi_x(y)A] - cp^2/2 \)

3) \( \chi_s(a) \) consistent with Bayes’ Rule
c) Bureaucrat \( p(a) \in \arg \max p \cdot wp - cp^2 / 2. \)

The foregoing conditions simply require that the auditors are maximizing given their beliefs about the politician’s signal and that those beliefs are rational. From these conditions, together with the similar requirements for the citizen and politician, we can characterize the parameters sufficient to sustain a No-Pandering equilibrium in the endogenous reporting game.

**Proposition 1.** In the endogenous reporting game, a No-Pandering Equilibrium

a. exists with a journalist auditor if and only if

\[
\frac{b}{c} \geq \max \left\{ \left( \frac{q\theta + (1 - q)}{2q\theta + (1 - q)} \right)^2 \frac{2Z}{\theta(1 + Z(2\theta - 1))}, \left( \frac{q\theta + (1 - q)}{q\theta[1 + Z(2\theta - 1)] + (1 - q)} \right)^2 \theta Z \right\}.
\]

b. exists with a bureaucrat auditor if and only if

\[
\frac{w}{c} \geq \frac{2\theta Z}{1 + Z(2\theta - 1)}.
\]

c. never exists with an opposition auditor.

**Proof.** Bayesian updating in a No-Pandering equilibrium requires

\[
\chi_x(y) = 0 \quad \chi_y(y) = 1
\]

\[
\chi_x(x) = \frac{q\theta}{q\theta + (1 - q)} \quad \chi_y(x) = 0,
\]

and they are independent of the type of auditor. Given these beliefs, straightforward maximization demonstrates that the auditors choose
• Journalist: \( p(y) = \frac{b}{c} \) and \( p(x) = \frac{b}{c} \frac{q^\theta}{q^\theta + (1 - q)} \)

• Bureaucrat: \( p(y) = p(x) = \frac{w}{c} \)

• Opposition: \( p(x) = p(y) = 0 \)

For all auditor types \( p(y) \geq p(x) \), and so the first sufficient condition in Lemma 1 will apply. The opposition’s auditing will certainly never satisfy the conditions in Lemma 1, and so there cannot be a No-Pandering equilibrium with that sort of auditor. With the bureaucratic auditor, auditing is perfectly symmetric, the sufficient condition will bind, and simple algebra delivers the cutoff.

With the journalist auditor the situation is more complicated, since either the necessary or the sufficient condition can bind, depending on parameters. Specifically, as \( b/c \) increases, the journalist’s auditing probabilities increase along ray with slope

\[
\frac{p(x)}{p(y)} = \frac{q^\theta}{q^\theta + (1 - q)}
\]

The necessary and sufficient conditions in from Lemma 1 intersect when

\[
\frac{p(x)}{p(y)} = \frac{1 - \theta}{\theta - Z(2\theta - 1)}
\]

with the necessary condition binding for smaller slopes and the sufficient condition for large slopes.

The necessary condition will bind for small \( q \) and the sufficient condition for large \( q \). When the necessary condition binds, \( b/c \) needs to be large enough that

\[
\frac{b}{c} \left[ 1 + \frac{q^\theta}{q^\theta + (1 - q)} \right] \geq 2Z,
\]
the first term above. When the sufficient condition binds $b/c$ needs to be large enough that

$$\frac{b}{c} \left[ 1 + Z(2\theta - 1) \frac{q\theta}{q\theta + (1-q)} \right] \geq 2Z\theta,$$

the second term above. For completeness, the cutoff $q$ is given by

$$\bar{q} = \frac{1 - \theta}{\theta^2 - \theta + 1 - Z(2\theta - 1)}.$$

Remark 2. In a No-Pandering equilibrium the equilibrium levels of auditing are given by

- Journalist: $p(y) = \frac{b}{c}$ and $p(x) = \frac{b}{c} \frac{q\theta}{q\theta + (1-q)}$
- Bureaucrat: $p(y) = p(x) = \frac{w}{c}$
- Opposition: $p(x) = p(y) = 0$

There are three key results from Proposition 1 and Remark 1. First, absent a payoff for reporting boring news (i.e., revealing that the politician has followed his signal), it is impossible to maintain a No-Pandering Equilibrium. This suggests that depending on a purely adversarial system of information disclosure is already settling for some degree of pandering.

Second, since the journalist can receive a positive payoff only if the politician has received a signal, she will audit more after the politician takes an action that makes it more likely that he received a signal. In the No-Pandering equilibrium, this means that the journalist will audit more when the politician takes action $y$, since politicians take this action only when they receive a signal. This asymmetry is in stark contrast to the bureaucratic auditor, who audits the same amount regardless of the politician’s action.
Finally, the degree to which the Journalist audits asymmetrically depends directly on the probability that the politician is informed, with more asymmetric auditing occurring as the politician is less likely to be informed. If the politician is perfectly informed, both types of auditor will audit symmetrically, and the only remaining difference between the bureaucrat and journalist is their different benefit ratios.

As we saw in Lemma 1, No-Pandering equilibria are best maintained by asymmetric auditing. We can formalize that notion here by comparing the total resources required (in terms of auditing time) to maintain a No-Pandering equilibrium with each sort of auditor. First, identify the minimum level of auditing resources required to maintain a No-Pandering equilibrium as follows.

**Definition 6.** For any \((q, \theta, R)\), the most efficient No-Pandering Equilibrium with a journalist (bureaucratic) auditor is that induced by the minimum benefit ratio \(b/c\) \((w/c)\) which satisfies the conditions of Proposition 1.a (1.b).

![Figure 4. Minimum Benefit Ratio to Maintain NP-Equilibrium for Bureaucrat and Journalist Auditors](image)

Having identified the least extensive auditing needed to maintain a No-Pandering equilibrium for each auditor type, we can now compare them to find which sort of auditor is best able to aid the
voter in maintaining electoral control. Figure 4 presents the minimum benefit ratio necessary to sustain a No-Pandering equilibrium, as a function of the probability that the politician is informed. For any imperfectly informed politician, the journalist requires a larger benefit ratio than the bureaucrat to maintain a No-Pandering equilibrium, but the difference declines as the politician is more and more informed. This is because an investigation of an uninformed politician is worthless to a journalist auditor, so she simply will not audit in those circumstances.

Directly comparing the benefit ratios needed to maintain No-Pandering would suggest that the bureaucrat is the more effective auditor, since she requires a lower ratio than the journalist. But this comparison ignores all the “wasted” auditing done by the bureaucrat. From an economic standpoint, the only true “cost” of maintaining an equilibrium is the effort put in by the auditor. If we think that the likelihood of maintaining an equilibrium is related to its costliness, finding the least costly set of institutions may be of interest. Alternatively, even if both types of auditor would induce compliance, we may want to compare them from a welfare point of view. In either case, the proper comparison would be in terms of the expected amount of auditing required to maintain a No-Pandering equilibrium. The following proposition compares the auditors in just those terms.

**Proposition 2.** For any \((q, \theta, R)\), the most efficient No-Pandering equilibrium with a journalist auditor includes less auditing, in expectation, than the most efficient No-Pandering equilibrium with a bureaucratic auditor.

**Proof.** For journalist,

\[
E[p] = q(1 - \theta)p(y) + (1 - q(1 - \theta))p(x) = \frac{b}{c}q.
\]

For bureaucrat,

\[
E[p] = \frac{w}{c}.
\]
Simply evaluate each at the minimum benefit threshold and compare.

Figure 5. Expected Auditing Level in Most Efficient NP-Equilibrium for Bureaucrat and Journalist Auditor

\[ E[p] = \frac{2q^\theta}{1 + 2(1-\theta)} \]

Just as the simplified game suggested, the asymmetric auditor is the more efficient choice to maintain the No-Pandering equilibrium. Figure 5 illustrates Proposition 2, presenting the relationship between the expected amount of auditing and the probability that the politician is informed in the most efficient No-Pandering equilibrium for each auditor type. Here, the journalist auditor always has an advantage in terms of auditing efficiency, but that advantage decreases as the politician is becoming more and more likely to be informed. This static occurs because the journalist’s advantage comes from auditing asymmetrically (i.e., auditing more when the politician is more likely to be informed), and this advantage weakens as the politician is always more informed.

This section has shown that as long as journalists get a payoff for revealing good news about the politician, they will more efficiently maintain a No-Pandering equilibrium than either a bureaucrat or opposition auditor. The source of their advantage was hinted at in the last section, where we saw that asymmetric auditing is better for maintaining these equilibria, but this section showed the origins come from journalists wanting to audit more when the politician is more likely to receive
a signal. So far, those differential incentives have been taken as exogenously given. In the next section, I will derive them from an equilibrium model of audits with career concerns.

4 Endogenous Auditor Incentives

So far, we have taken as exogenously given the incentives different sorts of auditors have to undertake investigations. In this section, I place the auditors in a plausible economic environment and have those reduced-form incentives arise endogenously. I claimed at the beginning that these auditors were interesting because their incentives derived from outside the relationship under consideration (the voter-politician electoral relationship), so a plausible explanation for the actual origins of those incentives is required to interpret the baseline model. The central interest, here, is to show how the career-concerns faced by journalists induce exactly the sort of reduced-form incentives proposed in the basic model. Therefore, they also bring about the asymmetric auditing that is especially well suited to maintaining election-based accountability. I also discuss plausible origins for the proposed incentives of opposition and bureaucrat auditors, but in less detail, since in the No-Pandering case their incentives are quite straightforward.

- **Journalist:** Assume the journalist comes endowed with an ability parameter $\rho \in \{1, \rho_L\}$, unknown to both herself and the market, where $0 < \rho_L < 1$, and the ex-ante likelihood that a journalist is high ability is $\psi$. At the beginning of the second period the journalist will be paid a wage equal to the Bayesian updated probability that she is high ability.\(^4\) Furthermore, instead of directly choosing the probability of revealing the politician's signal, assume that

---

\(^4\)This model is a traditional career-concerns setup in the tradition of Holmstrom (1982/99). Although the model is described in terms of a unitary auditor, say an independent investigative journalist, a very similar story could be told for a news organization trying to establish or maintain its reputation in the market as a news-breaker.
the journalist chooses an effort level $e$ at cost $de^2/2$, and the politician's signal is revealed with probability $e\rho$.

In this extended game, let $\alpha(a)$ represent the journalist belief about the probability that the politician received a signal, given action $a$ (so $\alpha(x) = \chi_x(x) + \chi_y(x)$ and $\alpha(y) = \chi_x(y) + \chi_y(y)$). Bayesian updating requires that, if politicians are following some strategies which induce beliefs $\chi_x(a)$ and equilibrium effort is given by $e^*(a)$, the updated belief that the journalist is high ability after observing action $a$ and report $r$ is $\psi^*(a,r)$, where

$$\psi^*(a,a) = \psi^*(a,-a) = \frac{\psi}{\psi + (1-\psi)\rho_L} \geq \psi$$

$$\psi^*(a,\phi) = \frac{\psi[(1-e)\alpha(a) + (1-\alpha(a))]}{\psi(1-e)\alpha(a) + (1-\psi)(1-e\rho_L)\alpha(a) + (1-\alpha(a))} \leq \psi.$$  

Taking these updates as given, after observing action $a$ a career-concerned journalist solves

$$\max_e e\alpha(a)(\psi + (1-\psi)\rho_L)[\psi^*(a,a) - \psi^*(a,\phi)] - de^2/2. \quad (8)$$

In the particular case of a No-Pandering equilibrium, beliefs are given by

$$\chi_x(y) = 0 \quad \chi_y(y) = 1$$

$$\chi_x(x) = \frac{q\theta}{q\theta + (1-q)} \quad \chi_y(x) = 0,$$

and so the maximization (8) nearly replicates the reduced-form maximization from section 3, except now the payoff $b$ will depend on the action $a$. Following the analysis in section 3, we reinterpret $[\psi(a,a) - \psi(a,\phi)]$ as $b(a)$ and $\frac{d}{(\psi + (1-\psi)\rho_L)^2}$ as $c$. Specifically, we can directly
apply Lemma 1 to derive the conditions for the existence of a No-Pandering equilibrium.

**Proposition 3.** In the endogenous reporting game with career-concerns payoffs, a No-Pandering Equilibrium exists with a journalist auditor if and only if both

\[ \bar{p}(x) + \bar{p}(y) \geq 2Z, \text{ and} \]

\[ \bar{p}(y) \geq Z[1 + (1 - \bar{p}(x))(2Z - 1)], \text{ where} \]

\[ \bar{p}(a) \equiv \chi_a(a)(\psi + (1 - \psi)\rho_L)^2[\psi^*(a,a) - \psi^*(a,\phi)]] / d. \]

**Proof.** Assuming the politician is playing the equilibrium strategies of a No-Pandering equilibrium, \( \bar{p}(a) \) comes directly from the maximization in (8), where \( \bar{p}(a) = e^*(a)E[p] \). Given these expected auditing probabilities, we can apply Lemma 1 directly, noticing that since \( \chi_x(x) \leq \chi_y(y) \), \( \bar{p}(x) \leq \bar{p}(y) \), and the first sufficient condition will apply.

- Bureaucrat: Perhaps the defining characteristic of a bureaucratic auditor is that her returns very rarely depend directly on her performance. Instead, regulations tend to include input standards, and the bureaucrat risks losing her position if she does not meet those standards. Assume that the bureaucrat receives some fixed wage rate in the next period, \( W \), and will receive that wage unless she is found to have failed to put in the requisite effort. As with the other two auditors, the bureaucrat puts in effort \( e \) in performing and documenting investigations at cost \( de^2/2 \), where \( d > W \). But unlike the market driven auditors above, she is judged in terms of his inputs, not her outputs. Specifically, assume the auditor’s work will meet standards with probability \( e \) and successfully reveal a received signal with probability \( (\psi + (1 - \psi)\rho_L)e \). Concerns about maintaining her position will lead the bureaucrat to
choose \( e = W/d \), inducing auditing probability \( W/(\psi + (1 - \psi)\rho_L)/d \), regardless of the politician’s action. This maximization replicates the reduced-form maximization from section 3, where we reinterpret \( W/(\psi + (1 - \psi)\rho_L) \) as \( w \) and \( \frac{d}{(\psi + (1 - \psi)\rho_L)^2} \) as \( c \).

- Opposition: Instead of being concerned about demonstrating herself to be a good type, as in traditional career-concerns model, assume that the opposition auditor instead attempts to demonstrate that the incumbent politician is a bad type. Just as for the journalist, we could assume that the opposition chooses an effort level \( e \) at cost \( de^2/2 \), and the politician’s signal is revealed with probability \( (\psi + (1 - \psi)\rho_L)e \) (just to maintain comparability with the journalist). Say, for example, that the citizen’s equilibrium updated beliefs of the politicians type are given by \( \pi^*(a, r) \), and the auditor’s beliefs are given by \( \chi_s(a) \), then an opposition auditor chooses \( e \) to minimize the expected belief about the incumbent’s type, i.e.

\[
\min_{e(a)} \left\{ \sum_r [\pi^*(a, r)\chi_r(a)e(\psi + (1 - \psi)\rho_L) + (1 - e(\psi + (1 - \psi)\rho_L))\pi^*(a, \phi)] - de^2/2 \right\}.
\]

In the no-pandering case, however, the details here do not matter much, equilibrium auditing could not change the voter’s beliefs about the incumbent’s type. The incumbents are completely pooling, so auditing cannot reveal any relevant information. The opposition will always do zero auditing in this equilibrium. If there was some separation, however, an opposition auditor might be willing to audit after a suspicious action by the incumbent, and the willingness would be magnified if the auditor had the option of holding back information.
5 Multiple Auditors and Independently Informed Citizens

Until this section, the model has included a single auditor, while reality consists of multiple auditors of different types, often working in tandem. Of particular policy interest is how the incentives of the market-oriented auditors, such as journalists, are affected by the introduction of public-sector auditors. Do public-sector auditors crowd out journalists, or is their auditing activity complementary? The extension in this final section sheds some light on this question by introducing a journalist together with a bureaucrat. It also lets us answer a related question. Sometimes, for reasons outside the model, citizens may become informed as to the state of the world before the first period expires. These independently informed citizens will certainly improve accountability, all else equal, but how too will their introduction affect the journalist’s auditing incentives?

I make two changes to the model in section 4 with a journalist auditor. First, with probability $\nu$ the politician’s signal will be revealed publicly prior to voting for reasons outside the model. Note that this is isomorphic to adding a second, bureaucratic, auditor to the model. Second, with probability $\nu$ the underlying state will be revealed publicly prior to voting for reasons outside the model. One can interpret this revelation as an improvement in non-auditing accountability. The timing of these revelations (whether before or after the journalist audits) will affect the consequences of this change to the model, so we will consider each timing independently. Regardless of timing, the updated beliefs of the journalist’s quality will depend on the results of her audits, the politician’s action, the equilibrium auditing effort, and the exogenous revelations. Specifically, let $\psi^*(a, r|s, S)$ be the Bayesian updated belief that the journalist is high-quality, given action $a$, report $r$, revealed signal $s$ (where $\emptyset$ represents no revelation), and revealed state $S$ (where $\emptyset$ represents no revelation).

As in the last section, assume we are in a No-Pandering Equilibrium. If the journalist auditor has successfully audited, nothing changes from the last section, nor does anything change after the
politician takes action $y$, since in both these cases everything about the state and the politicians signal is already known in the equilibrium, but no-report after action $x$ will be interpreted differently depending on what else is revealed. We still have

$$\psi^*(x, \phi|s, S) = \frac{\psi}{1 + \frac{(1-p_L)(1-\psi)}{1/(\chi_t(x|s,S)\psi^*(a))-1}},$$

but now $\chi_t(x)$ will depend on the revealed signal/state. Specifically,

$$\chi_t(x|x, \phi) = \frac{q(1-v)\theta}{q(1-v)\theta + (1-q)}, \quad \chi_t(x|\phi, X) = \frac{q(1-v)}{q(1-v) + (1-q)}$$

$$\chi_t(x|x, \phi) = \chi_t(x|x, X) = 1, \text{ and } \chi_t(x|\phi, Y) = 0.$$

If the journalist moves first, after observing an action $y$, a journalist auditor's maximization is unchanged from (8), but after observing action $x$ she now solves

$$\max_e e \chi_t(x)(\psi + (1-\psi)p_L)Q - de^2/2,$$

where

$$Q = [\psi(x,x) - (1-v)(1-V)\psi(x,\phi|\phi, \phi) - (1-v)V\psi(x,\phi|\phi, X) - V\psi(x,\phi|x, X)].$$

Given this maximization, the following remark establishes the complementarity of independently informed citizens and journalist auditing and the conditional complementarity of bureaucratic and journalistic auditing.

**Remark 3.** When moving first, the journalist auditor's effort is increasing in the probability of independent revelation of the state ($V$) and probability of the independent revelation of the signal...
These comparative statics come directly from the implicit function theorem on the auditor’s maximization problem. The intuition is that a high probability of independent revelation makes the results of the audit a better signal of quality, so a failed audit looks a lot worse when the citizens know there was a signal there to reveal. The improvement in updating by the citizen increases the marginal returns to effort, increasing the equilibrium effort by the journalist.

If the journalist moves second, after the independent revelations, her incentives to audit can go either way. In general, if the independent revelations make the signal be more likely to be received, the journalist will audit more, but if revelations make a signal less likely to be received, she will audit less. At the extreme, when a received signal is impossible (after an action $x$ and a revelation that the state is $Y$), the journalist will not audit at all.

6 Conclusions

This paper considered the role of third-party auditors in the maintenance of election-based political accountability. A formal model compared three idealized types of auditor: journalist, opposition, and bureaucrat, in order to see whether any of them is particularly well suited to helping citizens keep their elected officials in line. Since asymmetric auditing tends to reduce pandering, and the career incentives of journalists encourage asymmetric auditing, journalist auditors have an advantage over the other two auditor types. Furthermore, in a context of multiple auditors, we find that journalist demonstrate strategic complementarity in auditing when matched with other auditors, again making them particularly attractive in this setting.

The major limitation of this paper is that it only considered one sort of equilibria in any depth,
No-Pandering equilibria. In many contexts, however, this extreme sort of discipline may not be feasible. Although section 2 characterized the equilibria with incomplete control in the simplified game, future work should explore the different types of auditors in these other equilibria. The opposition auditor, for example, is particularly stunted in the No-Pandering equilibria, but she could be quite effective in limiting (but not eliminating) self-serving policy choices in an equilibrium with some pandering, perhaps even more so than a journalist auditor. But I leave this for future work, perhaps with a more stripped-down model.

7 Appendix

7.1 Proof of Lemma 3

The three IC-conditions for the NC-type are that after a signal of $x$,

$$p(x) + (1 - p(x))v(x, \phi) - (1 - p(y))v(y, \phi) \geq Z.$$  

(10)

Similarly, after the signal $y$,

$$p(y) + (1 - p(y))v(y, \phi) - (1 - p(x))v(x, \phi) = Z.$$  

(11)

In the absence of a signal, the Non-Congruent type should prefer to choose $y$, so

$$v(x, \phi) - v(y, \phi) \leq Z(2\theta - 1).$$  

(12)

Just as in the No-Pandering case, the first two IC-constraints directly imply the necessary condition
\[ p(x) + p(y) \geq 2Z. \]

Bayesian updating also requires that

\[ \pi^*(x) \leq \pi \iff q(1 - p(x))(1 - \theta)a(y, NC) \geq (1 - q)[a(\phi, C) - a(\phi, NC)] \quad (13) \]

and

\[ \pi^*(y) \leq \pi \iff q(1 - p(y))(1 - \theta)a(y, NC) \leq (1 - q)[a(\phi, C) - a(\phi, NC)]. \quad (14) \]

If \( p(x) \geq p(y) \), satisfying the IC-constraints requires \( v(y, \phi) < 1 \), which in turn requires \( \pi^*(y) \leq \pi \).

But if \( \pi^*(y) \leq \pi \), then \( \pi^*(x) > \pi \) and so \( v(x, \phi) = 1 \). Replacing for \( v(x, \phi) \) in (11), gives \( v(x, \phi) = 1 + \frac{Z - p(x)}{1 - p(y)} \), and so \( v(x, \phi) - v(y, \phi) = \frac{p(x) - Z}{1 - p(y)} \). Given this, (12) requires \( p(x) \leq Z[p(y) + (1 - p(y))2\theta] \), the second term in the inequality.

Finally, since \( v(y, \phi) \in (0, 1) \), we need \( \pi^*(y) = \pi \). From (14), this requires

\[ a(y, NC) = \frac{1 - q}{q} \frac{1}{(1 - p(y))(1 - \theta)}, \]

but for that to be feasible (less than 1), we need \( p(y) \leq 1 - \frac{1 - q}{q(1 - \text{theta})} \), the first term in the inequality.

The proof for \( p(y) \geq p(x) \) is identical.

### 7.2 Proof of Lemma 4

The three IC-conditions for the NC-type are that after a signal of \( x \),

\[ p(x) + (1 - p(x))v(x, \phi) - (1 - p(y))v(y, \phi) \geq Z. \quad (15) \]
Similarly, after the signal $y$,

$$p(y) + (1 - p(y))v(y, \phi) - (1 - p(x))v(x, \phi) \leq Z. \quad (16)$$

In the absence of a signal, the Non-Congruent type should prefer to choose $y$, so

$$v(x, \phi) - v(y, \phi) = Z(2\theta - 1). \quad (17)$$

Bayesian updating also requires that

$$\pi^*(x) \leq \pi \iff q(1 - p(x))(1 - \theta) \geq (1 - q)[a(\phi, C) - a(\phi, NC)] \quad (18)$$

and

$$\pi^*(y) \leq \pi \iff q(1 - p(y))(1 - \theta) \leq (1 - q)[a(\phi, C) - a(\phi, NC)]. \quad (19)$$

If $p(x) \geq p(y)$ and $p(x) \geq 2Z - p(y)$, satisfying the first two IC-constraints requires

$$\frac{Z - p(x) + (1 - p(y))v(y, \phi)}{1 - p(x)} \leq v(x, \phi) \leq \frac{Z + p(y) + (1 - p(y))v(y, \phi)}{1 - p(x)},$$

and so $v(x, \phi) - v(y, \phi) \geq \frac{p(y) - Z}{1 - p(x)}$. In order to satisfy (17), therefore, requires $\frac{p(y) - Z}{1 - p(x)} \leq Z(2\theta - 1)$, the first inequality condition.

If $p(x) \geq p(y)$ and $p(x) \leq 2Z - p(y)$, satisfying the first two IC-constraints requires

$$\frac{p(y) - Z + (1 - p(y))v(y, \phi)}{1 - p(x)} \leq v(x, \phi) \leq \frac{Z + p(y) + (1 - p(y))v(y, \phi)}{1 - p(x)},$$

and so $v(x, \phi) - v(y, \phi) \geq \frac{Z - p(y)}{1 - p(x)}$. In order to satisfy (17), therefore, requires $\frac{Z - p(y)}{1 - p(x)} \leq Z(2\theta - 1)$,
the second inequality condition.

Both these situations require \( v(y, \phi) \in (0, 1) \), and so \( \pi^*(y) = \pi \). This requires

\[
a(\phi, NC) = 1 - \frac{q}{1 - q} (1 - p(y))(1 - \theta),
\]

and for this to be feasible (greater than 0) requires \( p(y) \geq 1 - \frac{1 - q}{q(1 - \theta)} \).

The proof for \( p(y) \geq p(x) \) is identical.

### 7.3 Proof of Lemma 5

Follows exactly the proofs for the last two Lemmas, dividing the space for

\[
a(\phi, NC) = 0, \quad a(x, NC) \in (0, 1)
\]

and

\[
a(\phi, NC) \in (0, 1), \quad a(x, NC) = 0.
\]

### References


