

# Bureaucrats in Congress: Strategic Information Sharing in Policymaking\*

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## Abstract

Given bureaucratic expertise and the critical role of information in policy production, what drives information sharing between bureaucrats and legislators? We argue that partisan alignment between the two drive the amount and type of information that bureaucrats choose to share with Congress. Using the most comprehensive data yet on agency affiliation, appointment type, and agency-level characteristics of each bureaucrat who testified in Congress from 1977-2014, as well as a new measure of informational content present in bureaucratic testimonies, we show that bureaucrats provide less analytical information under divided government. Further, we examine bureaucrat-legislator pair-level interactions in committee hearings and show that bureaucrats provide less analytical information to legislators who are presidential out-partisans than legislators who are presidential co-partisans even after controlling for legislators' questioning styles, and that this behavior is heightened among bureaucrats who are political appointees. These dynamics highlight bureaucrats' strategic incentives to selectively share information with Congress.

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# 1 Introduction

The relationship between Congress and the executive agencies is central to the separation of powers in American politics: Congress makes laws, and the executive branch, through its system of bureaucratic agencies, executes the laws (Bolton and Thrower 2021). The division of these responsibilities leads each side of this inter-branch relationship to gain different information and perspectives about policymaking. The bureaucrats in executive agencies, being the ones executing policy, acquire a relatively higher awareness and on-the-ground knowledge about the realities of policy implementation and its consequences compared to lawmakers in Congress. While Congress can also collect this information from others during the legislative process, bureaucrats remain one of their best sources of information about policy implementation and execution.

Scholars have recognized and documented bureaucrats' expertise (e.g., Gailmard and Patty 2012) and the information asymmetries between Congress and the bureaucracy (Banks and Weingast, 1992; Bendor, Taylor, and Gaalen, 1987). Most existing work focuses on how Congress can design administrative procedures to strike a balance between gains from bureaucrats' expertise on policy production and losses from bureaucratic drift when the preferences between Congress and bureaucrats are not aligned. Scholars suggest that Congress can control the degree of delegation to agencies (Calvert, McCubbins, and Weingast 1989; Huber and Shipan 2002; Epstein and O'Halloran 1999), use limitation riders (McDonald 2010) and committee reports (Bolton 2022), and invest in in-house policy development capacity (Hirsch and Shotts 2018). Throughout, this literature on managing the principal-agent problem between Congress and the agencies shares one common theme: the main actor deciding what to do and what strategic actions to take is Congress.

However, the literature on the bureaucracy shows that bureaucrats can also act strategically. Bureaucratic subversion, shirking, and sabotage has been well documented (Brehm and Gates 1997; Gailmard 2002; Wirsching 2023). Federal employees take political turnover into their career decisions, especially when their ideology diverges from the political principal's (Bolton, de Figueiredo, and Lewis 2021), and into their on-the-job decision making, such as with procurement contracts

(Lee 2023). During the rulemaking process, bureaucrats have been shown to strategically use procedural tools, such as the timing of the publication of the final rule, to avoid oversight by Congress and other political actors (Potter 2017, 2019). Evidence also has been found that bureaucrats behave strategically in their responsiveness to congressional requests (Lowande 2019).

This suggests that—given the value of bureaucratic expertise, evidence of bureaucrats being strategic actors themselves, and the critical role of information—bureaucrats can also be strategic when it comes to *sharing* their policy expertise with politicians. What drives information sharing between bureaucrats and Congress? We argue that the partisan alignment between the two drives the amount and type of information that bureaucrats share with Congress. For one, the partisan relationship between Congress and an executive agency, which is most acute under divided government, may incentivize bureaucrats to provide more or less information to Congress. As bureaucrats' information can help (or hinder) Congress in the production of effective legislation, or legislation that is aligned with the executive branch's goals, bureaucrats may be more (or less) willing to help members of Congress based on the partisan alignment or misalignment between the two branches.

Of course, within any Congress, members of both parties are present—at any time, there are members in Congress who are presidential co-partisans as well as members who are presidential out-partisans. Treating Congress as a unitary actor representative of its majority party may obscure informational dynamics at the individual level. Thus, we also extend the logic above to examine whether bureaucratic information provision is also driven by partisan alignment at the bureaucrat-legislator level. If bureaucrats are motivated by partisan incentives to provide more information to assist presidential co-partisans more than presidential out-partisans, regardless of whether government is divided or unified, then we would see bureaucrats sharing more information and expertise with a legislator who is a presidential co-partisan than with a presidential out-partisan.

Further, among bureaucrats, some face stronger partisan environments than others. Bureaucrats who are politically appointed are selected within an inherently partisan process and have shorter tenures in the bureaucracy, a setting that does not apply to careerists who are not appointed (Lewis

2011). The decision of how much to help Congress with information may thus depend on whether the bureaucrat faces partisan incentives that underlie their type of position, and may be especially salient when interacting with a presidential out-partisan.

We examine information sharing between bureaucrats and Congress in one major venue through which Congress can request, receive, and publicly disseminate information from the bureaucracy: committee hearings. While previous work has focused on hearings specific to oversight or investigative matters (McGrath, 2013; Kriner and Schickler, 2016), hearings can facilitate the exchange of information for legislative matters more broadly beyond the oversight context and reveal the *content* of the information provided to Congress (Quirk 2005).

As not all information is equal, we use House committee hearing transcript data and a crowd-sourced supervised learning method to capture a specific aspect of information conveyed in each witness's testimony—including both bureaucrats and other types of witnesses. While there are various ways to characterize informational content, we focus on a type of information that is closely linked to policy expertise, central to technical policy development, and applicable across issue areas: information that uses falsifiable statements on the policy under consideration, which we term analytical information. This approach significantly improves other dictionary-based measures of information (e.g., Esterling 2011; Ban, Park, and You 2023) as it uses human judgement to measure the concept of interest in the committee hearing context, rather than being dependent upon a set of researcher-selected words that may be incomplete. Specifically, we employed a highly sophisticated measurement process involving large-scale human coding of sample testimonies using online workers, training multiple machine learning algorithms to predict the level of analytical information conveyed in witness testimony, and combining their predictions through an optimization process to generate the final measurement for each of the 981,633 testimonial statements that witnesses made in 14,092 hearings. We then conducted a set of extensive statistical and substantive validation of our new measurement.

We use this new measure of information in combination with a new dataset on bureaucratic witnesses from 1977-2014. We collect the federal agency affiliation and appointment type for each

bureaucrat who testified in Congress during this expansive time span, as well as the content of their testimonies and responses to Congress in all committee hearings. What results is a dataset that, for the first time, provides the name of the agency of each bureaucrat who appeared in Congress, and links to the content of information bureaucrats provide to Congress. Further, while previous work on bureaucrats in hearings has been limited to aggregated counts of hearings or witnesses at the Congress-level, this newly collected data enables a bureaucrat- and hearing-level analysis. We also create pair-level data at politician-bureaucrat level by parsing hearing transcripts, which allows us to analyze dyadic interactions between a member and a witness.

We find support for our theoretical expectations. Under divided government, bureaucrats provide significantly less analytical information to members of Congress in both legislative hearings and oversight hearings, even after controlling for the member's questioning style captured by the grandstanding score (Park 2021). Using bureaucrat fixed effects, we also find that the same bureaucrat provides significantly less information to members who are presidential out-partisans compared to presidential co-partisans in the same hearing. The effect of partisan alignment is more salient among political appointees in oversight hearings, hearings on more polarized issues, and in more prestigious and policy oriented committees. A placebo test with non-bureaucratic witnesses shows that these information sharing dynamics are not present for other types of witnesses, suggesting that partisan alignment has a distinct effect on bureaucrats that leads them to change their information provision to Congress.

Altogether, this article advances and tests a theory of how partisan incentives for bureaucrats drive information exchange from the executive branch to the legislative branch. Expertise and information are critical sources of the bureaucracy's power. While there has been ample theoretical attention devoted to information asymmetries between the two branches and to how the selection of bureaucrats can affect the development of expertise within the executive branch (e.g., Gailmard and Patty 2012), the literature has predominantly focused on how Congress can design procedures to gain expertise from the agencies (e.g., Hirsch and Shotts 2018). There has been surprisingly little attention paid to the decisions that *bureaucrats* make when faced with the prospect of sharing

information and expertise with Congress.

Our findings advance the literature by revealing how bureaucrats, in responding to partisan incentives present in the degree of alignment between Congress and the executive branch, affect how much information—how much bureaucratic expertise—they provide to members of Congress, in both legislative and oversight contexts. As information is the input to policy, our findings shed new light on how the inter-branch relationship can affect the policymaking process vis-à-vis strategic bureaucratic control of information.

## 2 Inter-Branch Information Sharing

What drives information sharing between bureaucrats and Congress? While the extant literature focuses on the information that bureaucrats possess or the oversight relationship between Congress and bureaucrats, as we discuss below, the question of when and why bureaucrats may be more likely to provide higher levels of information useful for policymaking to Congress remains unanswered.

The information advantage that bureaucrats have on program implementation is a crucial factor in the canonical power balance between Congress and the bureaucracy. While traditional delegation models, such as [Huber and Shipan \(2002\)](#), focus on how Congress can influence this power balance by choosing the amount of delegation Congress gives to the bureaucracy, another way to influence the inter-branch relationship is by controlling *information*. Who has the advantage in this inter-branch relationship has been theorized to be the institution that has more information about the costs and consequences of policy implementation—an “informational advantage” ([Banks and Weingast, 1992](#); [Bendor, Taylor, and Gaalen, 1987](#)).

Scholars have documented how bureaucrats, by being responsible for the implementation and evaluation of their agencies’ programs and policies, have deep familiarity and expertise specific to their agency’s jurisdiction. This work has focused on how bureaucrats both bring expertise to, and develop expertise on, the job. Research has argued that politically appointed bureaucrats

bring high levels of human capital, responsiveness, and energy to the executive agencies (Moe, 1985). Career bureaucrats, especially those who have advanced through the ranks, have been seen to possess subject area expertise and public management skills (Helco, 1977), and research has shown that this translates to higher federal program performance (Lewis, 2007; Gallo and Lewis, 2012). Further, Gailmard and Patty (2012) emphasize how bureaucrats learn and acquire expertise on the job, saying that “bureaucrats are not born with all the skills they need” and that this expertise is gained through incentives in public service.

Regardless of where bureaucratic expertise originates, it remains constant in the literature that bureaucrats possess expertise and an informational advantage over Congress. Recent research has shown that politicians do, in fact, seek to obtain and rely on this information, and that politicians’ preferences can indeed be shaped by how bureaucrats frame an issue (Blom-Hansen, Baekgaard, and Serritzlew, 2020) and the ideological alignment with bureaucrats (Esterling, 2009; Bellodi, 2022).

Given bureaucrats’ informational advantage, and that Congress can benefit from this information when producing policy, how, then, is information shared between the bureaucracy and Congress? Congress can request information from bureaucrats through a variety of ways, such as members making calls or sending letters to agencies (e.g. Lowande 2018), but one formal, public way that Congress can request and receive information from the bureaucracy is through congressional committee hearings (Quirk and Bendix 2011; Park 2017). Hearings are a main way that Congress can examine how much information bureaucrats have and request specific pieces of information. Committees call bureaucrats to testify at hearings and question them; they do so armed with the power of subpoena if necessary (Heitshusen, 2017). Perhaps the most conspicuous way bureaucrats appear in hearings is when committees conduct oversight of the bureaucracy. Not surprisingly, scholars have used oversight hearings as a measure of the amount of oversight that committees conduct (e.g. Kriner and Schickler 2016; McGrath 2013).

Outside of the studies that examine the frequency of congressional oversight on agencies, there is limited work on the information exchange between bureaucrats and members of Congress. May,

Koski, and Stramp (2016) find that bureaucrats' testimony is an important conduit of expertise, and that issue maturity and salience affect the supply and demand for this expertise. Their analysis, however, is limited to hearings about critical infrastructure protection specifically. Ban, Park, and You (2023) find that when committees hold legislative hearings, they invite fewer bureaucrats during periods of divided government and substitute with witnesses from think tanks and universities. Eldes, Fong, and Lowande (2022), in analyzing the content of oversight hearings, show that oversight hearings can be informational and confrontational at the same time, and that confrontation decreases when the legislator shares the same partisanship with the president. Bellodi (2022) analyzes legislators' use of bureaucratic information in floor and committee speeches, and shows that ideological differences and agency independence are important factors that determine how often members of Congress use the information provided by bureaucrats.

This existing research, though, neglects a fundamental question: What determines bureaucrats' decision to share information with Congress in the first place? While bureaucrats are compelled to appear when invited by Congress to testify, they can control how much, and what, information to actually share with Congress. We go beyond what the previous literature has observed: we argue and provide evidence for how bureaucrats are incentivized by the partisan alignment between the two branches to provide more (or less) information when requested by Congress. We start by developing our theoretical predictions below.

## **2.1 Partisan Alignment and Bureaucratic Information Provision**

A pair of hearings in the Judiciary Committee provides a motivating example for our theoretical predictions. Alejandro Mayorkas was appointed by President Barack Obama to be the director of US Citizenship and Immigration Services (USCIS) from 2009-2016. On March 23, 2010, when the Democratic Party had control of both the House and the White House, Director Mayorkas testified in front of the Judiciary Committee in a hearing set to examine USCIS's efforts to update its business and technology processes. When Subcommittee Chairwoman Zoe Lofgren (D-CA16) asked Director Mayorkas to produce information on how USCIS would work through the extreme



backlog of petitions for relatives wishing to immigrate, Director Mayorkas responded with the following:<sup>1</sup>

MR. MAYORKAS. Most certainly, Madam Chairwoman. We will provide this Committee with a report that identifies the benchmarks we currently have in place for the immediate future and for the longer term future of the transformation effort...We have distributed the I-130 caseload throughout our offices across the country, in light of the significance of that caseload. We anticipate that the majority of the caseload will be worked through by the end of fiscal year 2010, this year. We intend to complete the processing of all the I-130's currently pending by the first quarter of fiscal year 2011, as that caseload has already been distributed throughout the field office across the country for adjudication...

Director Mayorkas, in the above answer, responds to Lofgren's request for information not only with an agreement to provide a report, but continues in his responses to voluntarily provide details about their outlook for managing the petition caseload. Contrast this with a second example of Director Mayorkas's behavior in a hearing during the next Congress, the 112th Congress, in the same Judiciary Committee. While the Democratic Party was still in control of the White House, under President Obama, unlike the previous example in the 111th Congress, in this new 112th Congress, there was a Republican majority in the House. In this hearing, Representative Elton Gallegly, a Republican from California, asks Director Mayorkas to produce information on how USCIS detects fraud in a visa program:<sup>2</sup>

MR. GALLEGLY: "What I would ask then, Director, is can you please provide me by the end of the work day today a copy of that draft benefit fraud and compliance assessment?"

MR. MAYORKAS: Thank you, Mr. Chairman.

MR. GALLEGLY: Can you do that?

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<sup>1</sup><https://www.congress.gov/event/111th-congress/house-event/LC6660/text> (accessed December 10, 2022)

<sup>2</sup><https://www.congress.gov/event/112th-congress/house-event/LC2022/text> (accessed December 10, 2022)

MR. MAYORKAS: I certainly can, and whether it is at the end of the day or forthwith we certainly will.

MR. GALLEGLY: As long as we have forthwith I would say by noon tomorrow, okay?

MR. MAYORKAS: Very well, Chairman.

Note how in this exchange, Director Mayorkas responds to the request for a report with a “Thank you,” and when pressed, merely offers a perfunctory answer and does not voluntarily provide any additional details.

Of course, this pair of examples is a single illustration of how bureaucratic information provision differs based on whether there is unified (first example) or divided (second example) control of government, and whether the bureaucrat is responding or providing information to a presidential co-partisan (first example) or out-partisan (second example). But it illustrates how partisan alignment could be a driver of the amount of information shared by bureaucrats with members of Congress. To investigate this systematically, we begin by detailing our hypotheses.

First, one of the starkest divergences in partisan alignment happens under divided government, when the majority party in Congress is different from the party in the White House. Research shows that the majority party in Congress strategically uses hearings to control the executive branch and exploit political benefits. [Kriner and Schickler \(2016\)](#), when examining oversight and investigative hearings in particular, find that divided government—by pitting an executive branch of one party against the legislative branch of the other party—introduces a strong partisan incentive that Congress uses to their benefit at the expense of the president during investigative hearings. [McGrath \(2013\)](#) shows that oversight hearings under divided government increased when the committee’s median ideology was further away from the president’s ideology.

We expect that this partisan incentive also drives the behavior of *bureaucrats* in terms of what information they provide, and in hearings more broadly. Put simply, bureaucrats are more likely to assist Congress by providing expertise that can be used by legislators to develop effective policy when bureaucrats are more assured of Congress having similar policy preferences, when the executive branch is of the same party as Congress (unified government). When bureaucrats are mis-

aligned with Congress, however, as when the executive branch is of the opposite party of Congress (divided government), bureaucrats are less likely to assist Congress by withholding expertise, since providing this expertise could be used by legislators to develop policy that might be against bureaucrats' preferences.

Furthermore, we taken into consideration the partisan alignment between the bureaucrat and individual legislator that the bureaucrat responds to during a hearing. When looking at a bureaucrat-legislator exchange in a hearing, we expect that the bureaucrat is more likely to assist that legislator in providing expertise in response to that legislator when the legislator is a presidential co-partisan. We expect that the bureaucrat is less likely to assist that legislator in providing expertise in response to that legislator when the legislator is a presidential out-partisan.

What do we mean by expertise? Bureaucratic expertise has been measured in a variety of ways. For instance, [Clinton et al. \(2012\)](#) measures the policy expertise of federal bureaucrats in each agency using the proportion of technical and proportion of professional employees. As another example, [Richardson, Clinton, and Lewis \(2018\)](#) take a survey approach, and ask federal bureaucrats how skillful the workforce is to construct a measure of skill and competency for each agency. This work shows that expertise varies across agencies, and implies that it varies across bureaucrats within agencies as well. In this paper, we focus on a type of information that is closely linked to policy expertise and central to technical policy development: information that uses falsifiable statements on the policy under consideration, which we term analytical information (more explanation is provided in Section 3.3)

Combining this with our argument above about partisan alignment, we hypothesize that *under divided government, bureaucrats will provide less analytical information to Congress in committee hearings*. Given that within any hearing, members of both parties are present regardless of whether it is divided or unified government, we also consider the dynamics at the bureaucrat-legislator level. We hypothesize that *bureaucrats will provide less analytical information to Congress in committee hearings when facing a presidential out-partisan*.

While a bureaucrat's testimony and answers to questions are heard by all—the hearing is a pub-

lic hearing—the information they provide is still tailored to who they are responding to. In other words, if a bureaucrat provides more information to a member who is a presidential co-partisan, that information is heard by the presidential out-partisans, but the information given is relevant to the question that the co-partisan member asked. For instance, in a hearing about Obamacare, Democrats commonly ask bureaucratic witnesses about the beneficial impacts of Obamacare, while Republicans ask those same witnesses about the costs or potential waste in the reform. A witness giving a detailed, high quality response to Democrats about the benefits of Obamacare, even if that information is heard by Republicans, is information that is targeted to serve the Democrats' questions, rather than information that would serve Republicans' purposes.

Additionally, bureaucrats vary across one stark partisan-driven characteristic: whether they are politically-appointed bureaucrats or career bureaucrats. Bureaucrats who are politically appointed may face a different political context due to their position hinging on the president who appointed them (Lewis 2008). Their positions may be subject to that president remaining in power or to maintaining the favor of the president, and they are more likely to have shorter-term outlooks that are more sensitive to the current political environment compared to careerists. Further, existing literature has argued and shown that political appointees are more responsive to the partisan goals of the president (Lewis 2008; Dahlstrom, Fazekas, and Lewis 2021).

Thus, aligning with the party of their appointing president and working to ensure that Congress produces (doesn't produce) legislation that is aligned (mis-aligned) with the president may be a more salient concern for politically appointed bureaucrats than for non-appointed careerists. The decision of how much to help Congress with information may, accordingly, depend on whether the bureaucrat faces partisan incentives that underlie their position. Therefore, when examining interactions between bureaucrat-legislator pairs, we expect that *the effect of the legislator being an out-partisan on a bureaucrat's information sharing will be more salient among bureaucrats who are political appointees compared to bureaucrats who are careerists (non-appointees).*

## 3 Data and Descriptive Statistics

### 3.1 Data on Bureaucrats Testifying in Congress

We construct a new dataset on bureaucratic witnesses in congressional hearings using ProQuest Congressional. We begin by using data from [Ban, Park, and You \(2023\)](#) to identify witnesses who are federal bureaucrats. We clean these affiliations in order to match them with the official name of the federal agency. This is necessary because while the hearing transcripts provide affiliations for bureaucratic witnesses, they vary in the level of the agency or the name of an agency. For instance, a witness' affiliation could be recorded at a sub-agency level (e.g., "National Agricultural Statistics Service," which is within the Department of Agriculture) or as an acronym (e.g., "AEC" for Atomic Energy Commission). Since most of the agency-level variables are available at the parent agency level, we matched each bureaucratic affiliation to the parent agency. We use various sources, such as the Office of Personnel Management (OPM) website, to find the list of federal government agencies and their parent organizations, spanning the 15 executive departments and 55 independent agencies as defined by the OPM.<sup>3</sup> We used both an automated and an extensive manual cleaning process to identify the parent agency of each bureaucratic witness's affiliation.

What results is a comprehensive dataset providing the official name of a parent agency for each bureaucrat appearing in a congressional committee hearing from 1961-2018. Outside of [MacDonald and McGrath \(2016\)](#), who extract the agency information for bureaucrats in oversight hearings from 1999 to 2011, existing research has only tracked the aggregate number of bureaucrats' appearances in hearings without examining the agency to which the bureaucrat is attached. Our dataset, thus, provides the first opportunity to link a bureaucrat's appearance in a hearing to the agency that the bureaucrat represents, in all types of hearings from 1961-2018.

Next, we use the OPM data to identify whether a bureaucratic witness is a political appointee or a career bureaucrat. We use the data from BuzzFeed News's Freedom of Information Act re-

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<sup>3</sup>OPM website: <https://www.opm.gov/about-us/open-government/Data/Apps/Agencies/>; USA.GOV website: <https://www.usa.gov/branches-of-government>.

quest<sup>4</sup> for federal government personnel records from 1977 to 2015.<sup>5</sup> Following Lewis (2011), we identify political appointees if the appointment type in the OPM data is one of the following codes: PAS (presidential appointments with senate confirmation), PA (presidential appointment without senate confirmation), SES (senior executive service), and C (schedule C appointments). To merge this political appointee data to the witness data, we use a bureaucrat’s last name, first name, agency name, and year to identify political appointees in the witness data. Given the OPM data’s time span, our main analysis is thus limited to the years from 1977 to 2014.

Then, for each hearing, we include variables for its committee, its type (legislative or oversight), whether it is held at the subcommittee-level, its major issue, and its attached bill(s) if it is a referral hearing. We also include the total number of witnesses invited.

Our main dataset includes 100,703 bureaucrats from 15 executive departments and 55 independent agencies. This spans bureaucrats who testified in Congress from 1977 to 2014. We classify the 38,717 hearings (65.2% in the House and 34.8% in the Senate) in our data into two types—legislative or oversight/investigative—following the classification by McGrath (2013).<sup>6</sup> We classify hearings that are not oversight or investigative as legislative hearings.<sup>7</sup> Among the hearings that have at least one bureaucrat appearing, 74% are legislative and 26% are oversight.

Appendix Figure A1 shows the share of oversight hearings among all hearings that featured at least one bureaucrat. As the existing literature finds for congressional hearings in general (e.g., Lewallen 2020), the share of legislative hearings with a bureaucrat has declined and the share of oversight hearings with a bureaucrat has increased in both chambers. Among legislative hearings, the top three issues were Defense, Domestic Commerce, and International Affairs. For oversight hearings, the top three issues were Defense, Government Operations, and Domestic Commerce.<sup>8</sup>

Figure 1 shows the number of legislative and oversight hearings in which bureaucrats testified

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<sup>4</sup><https://www.buzzfeed.com/tag/opm>

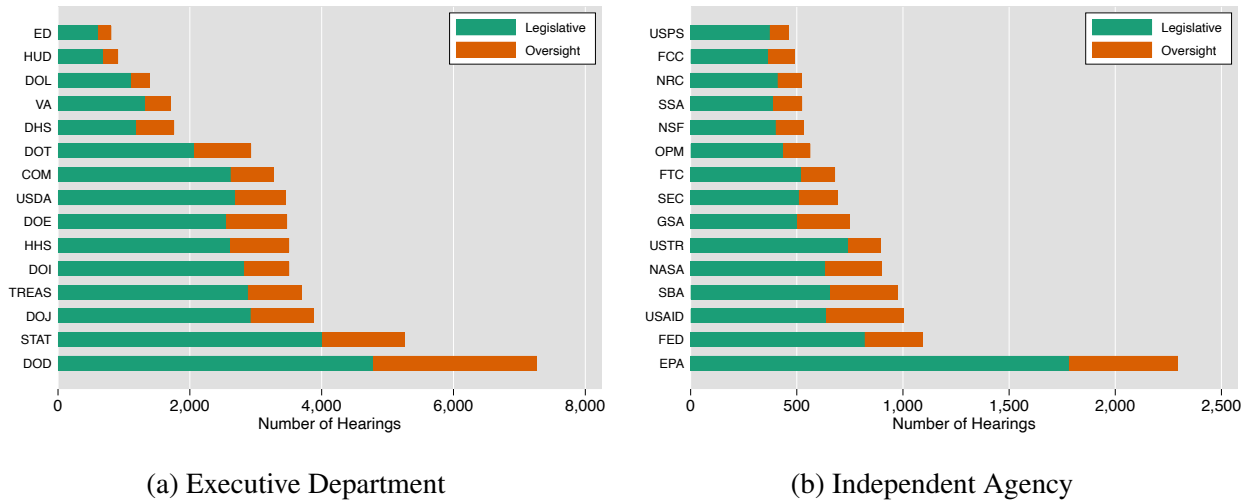
<sup>5</sup>One limitation of this data is that it omits some agencies or individuals, such as agencies directly related to national security. Given the significant number of Department of Defense bureaucrats in our dataset, we filled in this gap by manually coding their political appointee status based on the bureaucrat’s title, following Marcum et al. (2001).

<sup>6</sup>McGrath (2013) uses a dictionary and the Policy Agenda Project’s hearing descriptions to classify hearings.

<sup>7</sup>We exclude Senate nomination hearings.

<sup>8</sup>Appendix Table A1 presents the distribution of major issues in legislative and oversight hearings.

Figure 1: Legislative and Oversight Hearings with Bureaucratic Witnesses, 1977-2014



by the executive departments (a) and independent agencies (b). These graphs show significant variation in the frequency that bureaucrats from a particular department testified in hearings. Figure 2 shows the number of career bureaucrats and political appointees testifying, by executive department in Panel (a) and by the top 15 independent agencies who had the highest numbers of testifying bureaucrats in Panel (b). The ratio of testifying bureaucrats who are political appointees ranges from 11% in Veterans Affairs (VA) to 51% in the National Transportation Safety Board (NTSB).<sup>9</sup>

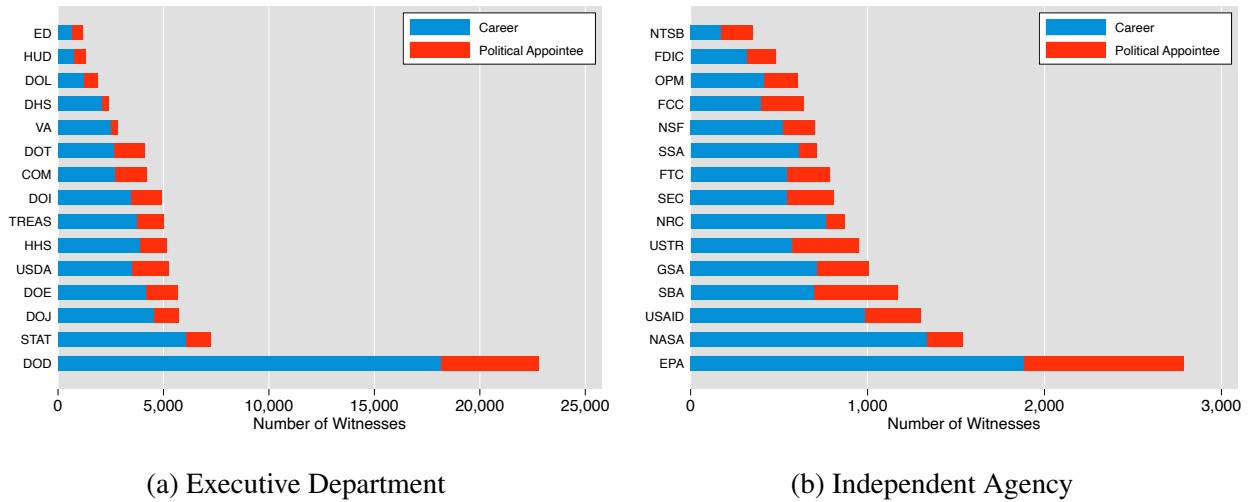
### 3.2 A New Measure of Analytical Information in Bureaucratic Testimony

In order to test our hypotheses on what impacts bureaucrats’ information sharing with Congress, we develop a new measure that captures the level of analytical information conveyed in witness testimonies. We include all testimonies made by both bureaucrats and non-bureaucrat witnesses.

Witnesses can provide various types of information, such as an analytical, scientific analysis of the current state of a program or its potential causes and consequences, personal experiences of practitioners or those affected by a policy, or political information identifying groups benefiting

<sup>9</sup>In Appendix Figures A2 and A3, we present the over time patterns for the types of bureaucratic witnesses and the share of political appointees.

Figure 2: Career vs. Political Appointees among Bureaucratic Witnesses, 1997-2014



from or harmed by a policy. In this study, we focus on the analytical aspect of witness testimonies for several reasons. First, previous studies have shown that legislators engage in searching for “falsifiable” or “technical” information, which we alternatively call “analytical,” when making laws (Esterling 2004; Krehbiel 1991). Second, the analytical information is a necessary component to write technical parts of a bill. Third, as recent studies find that the analytical capacity of Congress has declined over time (LaPira, Drutman, and Kosar 2020), it is important to construct a valid measurement for analytical testimony provided by external witnesses to Congress.

To construct this measurement, we use U.S. House committee hearing transcripts from 1997-2018 from the Government Publishing Office<sup>10</sup> and a crowd-sourced supervised learning method that follows previously established practices (Carlson and Montgomery, 2017; Park, 2021).<sup>11</sup> This approach improves upon previous methods such as in Ban, Park, and You (2023), which only used a dictionary of researcher-selected words. Instead, by using a large-scale human coding of sample testimonies and training machine learning algorithms, we arrive at a significantly improved

<sup>10</sup><http://www.govinfo.gov>.

<sup>11</sup>A supervised learning method is preferred over unsupervised learning models when a researcher has a preset idea on how to classify texts. It provides a more delicate measurement than a dictionary-based approach. The dictionary method is often agnostic about 1) the importance of each word in relation to the concept and treats each with an equal weight and 2) has a potential problem with a homonym being used for a different meaning. Our approach solves these issues because it relies on human judgment, which more holistically captures the concept of interest, and it considers context in which a word is used through a construction of n-grams or word-embeddings.



measure of analytical information for testimonies in Congress.

First, we define a testimony as analytical if it is 1) fact-based, 2) verifiable through research or data-driven analysis, or 3) objective, the set of concepts largely consistent with the definition of “falsifiable” information presented in Esterling (2004).<sup>12</sup> Second, 3,929 sample statements were coded by online workers at Amazon Mechanical Turk (MTurk). (Details on the coding are in Appendix Section C.1 and C.2.) We presented a randomly selected pair of two statements to the online workers and asked them to choose the one that was more analytical. Using their binary responses to 43,000 of these pairwise comparisons, we fit a Bradley-Terry model which is a Bayesian model that facilitates estimating the probability that a document  $j$  will be chosen when compared with another document  $i$  by a worker  $k$  using Hamiltonian Markov Chain Monte Carlo sampling.<sup>13</sup> The following equation presents the model specification and the priors for key parameters.

$$Pr(y_{ijk} = j) = \frac{\exp(b_k(a_j - a_i))}{1 + \exp(b_k(a_j - a_i))} \quad (1)$$

$$a_j \sim N(0, 1) \quad b_k \sim trN(0, \sigma^2) \quad \sigma \sim trN(0, 3) \quad (2)$$

where  $N$  denotes the normal distribution, and  $trN$  denotes the normal distribution truncated at zero to allow positive values only. The model estimates the analytical feature of each document,  $a_j$ , and each worker’s quality,  $b_k$ . The model produced a score for each sample statement ranging from -2.7 to 2.8. The graph on the left side of Figure 3 presents the distribution of the human-coded scores for the sample paragraphs.

Third, we randomly selected 3,500 sample statements to be used as a training set, set aside 426 statements as a validation set, and ran eight machine learning models.<sup>14</sup> Fourth, we constructed

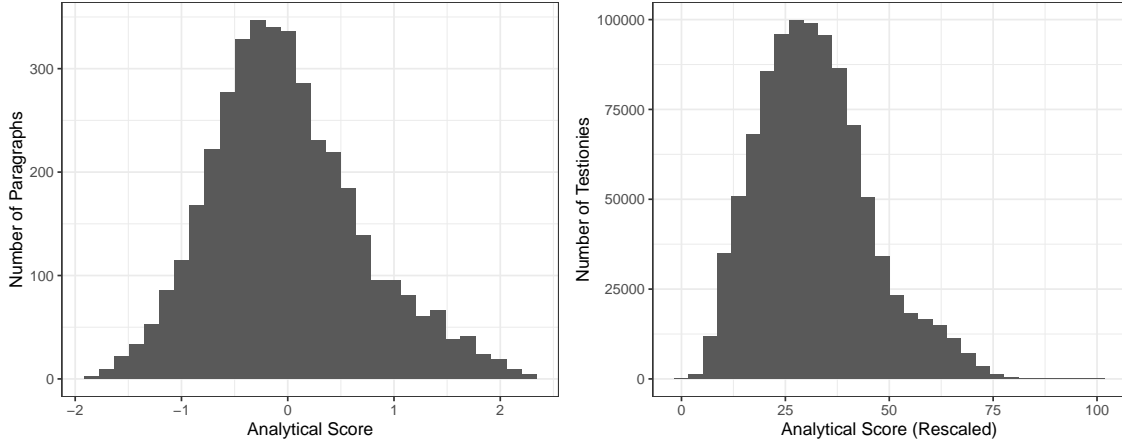
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<sup>12</sup>To help clarify the concept, we also define what is non-analytical. A statement is non-analytical if it is 1) opinion-based or normative, 2) anecdotal or experiential, 3) subjective or preferential which means revealing preferences of certain groups, 4) procedural statements, 5) anything else not containing the analytical information as defined above.

<sup>13</sup>See Carlson and Montgomery (2017) for other cases of using this model to generate a continuous measurement from pair-wise comparisons.

<sup>14</sup>We constructed two document-level matrices: a term-document frequency matrix and a doc2vec matrix. For each matrix, we fit four learners: support vector machine, Kernlab’s support vector machine, LASSO, and Gradient Boosting Machine. These choices are explained in Appendix Section C.3.

Figure 3: Distribution of the Analytical Score



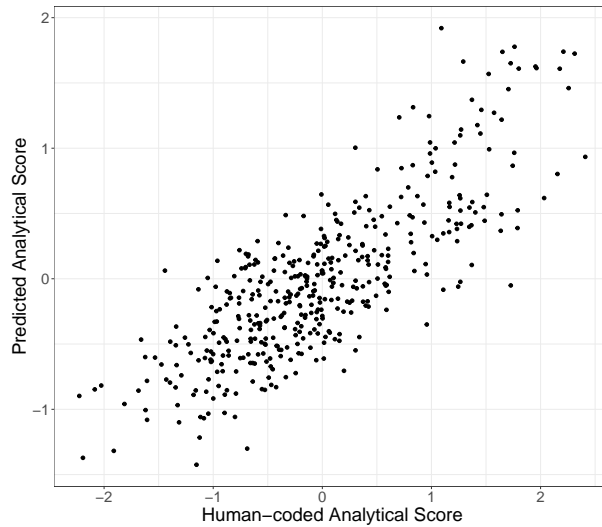
*Notes:* The left panel shows the distribution of the analytical score for the sample statements. The right panel shows the distribution of the (rescaled) analytical score for the entire corpus of the witness testimonies for the 105th-115th Congresses.

the final model using the ensemble Bayesian model averaging technique that assigns weights to each model to achieve the optimal prediction performance (Montgomery, Hollenbach, and Ward 2012). Using the final model, we predicted the score for the entire corpus of witness testimonies and rescaled the measurement to range between 0 and 100. For the rest of the paper, we will refer to the predicted score as the “analytical score.” The graph on the right side of Figure 3 shows the distribution of rescaled, predicted scores for all witness testimonies in the entire corpus.

To statistically validate the measurement, we check how our final model predicts the human-coded labels of the validation set that was set aside. The Pearson correlation coefficient between the human-coded labels and the model predictions is 0.81, and the Root Mean Squared Errors (RMSE) is 0.53 (see Figure 4). Compared to other prediction practices (Park 2021; Park and Montgomery 2022) that used similar measurement processes, this indicates a highly satisfactory performance of our model, suggesting that it effectively captured the aspects of the latent trait we aimed to measure statistically. Examples of analytical statements and additional validation of the scores are in Appendix Section C.4.

Figure 5 Panel (a) shows that there is more within-department variation than across-department variation in the distribution of the analytical score. For independent agencies, since there are 55

Figure 4: Validation of the Final Ensemble Model



in our sample, for illustrative purposes, in Panel (b) we present the analytical information score distribution for the top 15 agencies with the highest number of bureaucrats who testified in hearings. Agencies such as the National Science Foundation (NSF) show a higher median value than other agencies, and bureaucrats from the Federal Reserve Board (FED) show significantly less variance in their analytical scores than bureaucrats from, for example, the Environmental Protection Agency (EPA). While there is more variation across independent agencies than across executive departments, the amount of within-agency variation still exceeds across-agency variation.

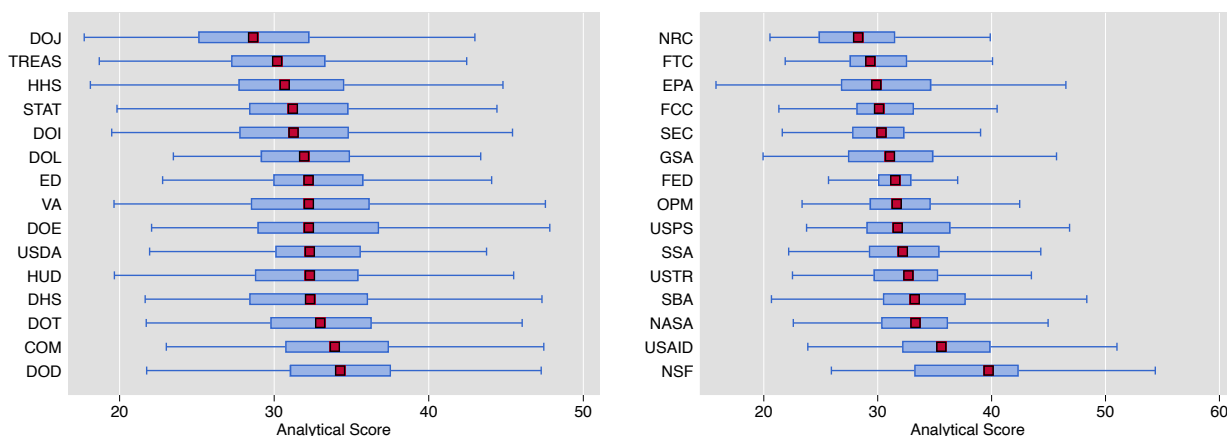
### 3.3 Legislator-Witness Interactions

To test the effect of partisan incentives on bureaucrats' information sharing with members of Congress, we create a pair-level dataset. The unit of observation is a pair of a legislator and a bureaucrat witness who interacted in a House committee hearing, and it covers the period 1997-2014.<sup>15</sup> To construct this dataset, we extracted the committee member who made a statement preceding the witness's<sup>16</sup> and then aggregated the hearing transcript data by witness, member, and

<sup>15</sup>This time period results from merging various datasets; Appendix Table A2 shows the coverage of individual datasets.

<sup>16</sup>Since witnesses speak only when they are given a chance to speak, in most cases witnesses' statement is preceded by a member's statement. This feature facilitates analyzing dyadic interactions between a member and a witness in a

Figure 5: Analytical Score Distributions By Agencies



(a) Executive Department

(b) Independent Agencies

*Notes:* The bars' ranges indicate the minimum and maximum values, the boxed area indicates the interquartile range, and the red squares indicates each agency's median analytical score.

hearing. We computed the average analytical score measured based on a witness's testimonies for each pair.

In total, we have 64,168 pairs of bureaucrat-member observations from 6,769 hearings for the period 1997-2014. On average, we have 10 pairs of bureaucrat-member interactions per hearing, ranging from 1 to 102. In a given hearing, two bureaucrats were invited as witnesses and seven members asked questions to bureaucratic witnesses on average.

## 4 The Effect of Partisan Alignment on Information Sharing

In this section, we empirically test our hypotheses for how incentives underlying the partisan alignment between Congress and the agency as well as the type of bureaucrat drive the amount of analytical information that bureaucrats share. Using the pair-level data, we estimate the following hearing.

regression:

$$\text{Analytical Information}_{bmh} = \beta_1 \text{Divided Government}_h + \beta_2 \text{President Out-partisan}_m + \Gamma X_{bmh} + \alpha_a + \alpha_c + \alpha_i + \alpha_p + \varepsilon_{bmh} \quad (3)$$

where the subscripts indicate bureaucrat  $b$ , member  $m$ , hearing  $h$ , agency  $a$ , committee  $c$ , issue  $i$ , and president  $p$ . The unit of observation is bureaucrat-member pair conditional on a member asking at least one question of a bureaucrat in a given hearing. The outcome variable *Analytical Information*<sub>bmh</sub> is the average analytical score of bureaucrat  $b$ 's testimony to member  $m$ 's question in hearing  $h$ .<sup>17</sup>

We measure partisan alignment with two variables. First, we use an indicator for the presence of divided government (*Divided Government*), which equals 1 if the majority party in the House is different from the party of the president and equals 0 otherwise. In this case, we assume that the effect of the *Divided Government* variable is homogeneous across all members: under divided government, bureaucrats' testimony will exhibit lower analytical scores. However, this variable does not capture a bureaucrat's varying incentives to provide analytical information depending on which politician asks a question. To capture the partisan misalignment at member-bureaucrat level, we include the *President Out-partisan* variable, which equals 1 if the questioning member's party affiliation is different from the party of the president and equals 0 otherwise. In some specifications, we include witness fixed effects to see if the same witness transmits different levels of analytical information depending on a questioning member's party.

$X_{bhm}$  includes various bureaucrat-level and hearing-level control variables (i.e. the number of witnesses in a hearing, the total number of words that a bureaucratic witness spoke). To capture a bureaucrat's characteristics, we include the *Political Appointee* variable which takes the value of 1 if a bureaucrat is a political appointee with Senate confirmation required (PAS).

Crucially, the member statements preceding a witness statement can shape the witness's response, especially if the question is asked for political purposes versus for actual information-

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<sup>17</sup>We trimmed the observations with the outlier value of the outcome measures below 1% and above 99%.

seeking. To account for this, we include a control using the political grandstanding score for each legislator-witness pair to proxy for the behavior of a given legislator, as the legislator may intend to use the hearing for grandstanding purposes rather than to solicit analytical information from a member. Using House hearing transcript data from the 105th to 114th Congresses, [Park \(2021\)](#) constructed the grandstanding score which measures the intensity of political messages conveyed in each member statement.<sup>18</sup> We aggregate the grandstanding score at the legislator-witness pair-level: we compute the average grandstanding score based on a member’s question(s) asked to each witness in a hearing. We also notate if a questioning member is a committee chair or a ranking member. A member’s majority party status is also included as is the members’ ideological extremism, measured by an absolute difference between a member’s DW-NOMINATE score and 0, and legislative effectiveness scores from [Volden and Wiseman \(2014\)](#).

We include bureaucrat’s agency fixed effects ( $\alpha_a$ ) to control for agency-specific characteristics. We also include issue fixed effects ( $\alpha_i$ ) based on major issue codes from the Policy Agenda Project ([Baumgartner and Jones 2015](#)) and committee fixed effects ( $\alpha_c$ ). The *Divided Government* variable varies at the Congress-level; in order to estimate the effect of this variable and to control for time-trend, we include president fixed effects ( $\alpha_p$ ).  $\varepsilon_{bmh}$  is clustered at the hearing-level. Appendix Table A3 presents the summary statistics on the variables included in the regression analysis.

#### 4.1 Bureaucratic Witnesses’ Provision of Analytical Information

Table 1 presents the results of estimating equation (3) for legislative hearings (columns 1 and 2) and oversight hearings (columns 3 and 4). Across both types of hearings, partisan misalignment between members of Congress and bureaucrats affects the amount of analytical information that bureaucrats share during hearings. Overall, bureaucrats provide less analytical information

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<sup>18</sup>The operational definition of grandstanding includes 1) denouncing or praising a person or an institution, 2) taking a position on a policy (which includes subjective interpretation of a policy-relevant situation), or 3) asking questions meant to attack or embarrass a witness. The study defines non-grandstanding statements as those 1) offering an objective description of a policy-relevant situation or 2) asking a witness a question with the purpose of finding facts or seeking an expert opinion. The member statements preceding a witness statement, and thus relevant to this study, are likely to be either asking questions of the witness for political purposes or for information-seeking. The score was constructed using crowd-sourced supervised learning method at the statement level, and it runs from 0 to 100.

in their testimonies under divided government. Our pair-level data allows us to estimate whether bureaucrats respond differently to questions asked by the president's co-partisan members vs. out-partisan members. The result shows that bureaucrats' responses to the president's out-partisan members have lower levels of analytical information and the effect is robust. We include an interaction term between *President Out-Partisan* and *Political Appointee* variables to examine whether the partisan incentives of bureaucrats are more salient among political appointees.<sup>19</sup> Columns (2) and (4) show that political appointees tend to provide less analytical information when they respond to a member who is an out-partisan of the president and this pattern is particularly robust in oversight hearings.<sup>20</sup>

The results also show that bureaucrats do not necessarily share more analytical information when they are asked by majority party members, but that their statements include significantly higher analytical information when questions come from the committee chair and ranking member (Park 2019). Bureaucrats' testimonies have lower levels of analytical information when they respond to members whose ideology is more extreme. There is one counterintuitive result. When a members' question has a higher grandstanding score, bureaucrats' responses tend to have a higher analytical score, although the magnitude is quite small. One potential explanation is that when the intention of a member's questioning is clearly grandstanding instead of seeking analytical information, bureaucrats may intentionally try to be more analytical in their statements to defend their position.<sup>21</sup>

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<sup>19</sup>We do not include *Divided Government*  $\times$  *Political Appointee* since this does not capture dynamics at the member-bureaucrat level. If political appointees respond differentially to presidential co-partisans and out-partisans under divided government, a simple interaction term would generate a null result that hides this kind of dynamics. Instead, in our analysis with witness FEs, we divide samples into divided vs. unified government and examine if *President Out-Partisan*  $\times$  *Political Appointee* shows different results under the different forms of government. See Table 2 and Table A4.

<sup>20</sup>We also include the ideological difference between the committee and the agency as another measure of partisan alignment for robustness. We use the absolute difference between the committee chair's DW-NOMINATE score and the ideology of the testifying bureaucrat's agency, as measured by Chen and Johnson (2014) at the hearing-level; see Appendix Table A5. Greater ideological difference is associated with less analytical information provision from bureaucrats, although it is only statistically significant among oversight hearings. The main results on the variables *Divided Government* and *President Out-Partisan* are robust.

<sup>21</sup>Figure A4 shows the distribution of grandstanding scores in members' questions to bureaucratic witnesses by members who are president co-partisans vs. members who are president out-partisans. There is no distinctive pattern between the two groups.

Table 1: Bureaucrat's Provision of Analytical Information

	Legislative		Oversight	
	(1)	(2)	(3)	(4)
Divided Government	-0.935*** (0.187)	-0.941*** (0.187)	-0.973*** (0.210)	-0.984*** (0.210)
President Out-Partisan	-1.482*** (0.127)	-1.367*** (0.150)	-1.830*** (0.152)	-1.472*** (0.180)
Political Appointee	0.202 (0.185)	0.374 (0.220)	-0.0686 (0.198)	0.434* (0.239)
President Out-Partisan × Political Appointee		-0.331 (0.240)		-0.924*** (0.253)
Majority Party	-0.260 (0.137)	-0.263 (0.137)	-0.0712 (0.151)	-0.0555 (0.150)
Committee Chair	4.274*** (0.188)	4.276*** (0.188)	4.755*** (0.219)	4.750*** (0.219)
Ranking Member	1.229*** (0.279)	1.238*** (0.279)	1.711*** (0.274)	1.747*** (0.274)
IDW-NOMINATE - 01	-2.021*** (0.444)	-2.035*** (0.444)	-3.063*** (0.463)	-3.084*** (0.463)
Grandstanding Score	0.0311*** (0.00586)	0.0310*** (0.00585)	0.0599*** (0.00637)	0.0595*** (0.00636)
LES	0.0137 (0.0445)	0.0130 (0.0445)	-0.0241 (0.0483)	-0.0244 (0.0482)
Subcommittee	1.007*** (0.202)	1.008*** (0.202)	1.877*** (0.233)	1.876*** (0.233)
Referral Hearing	-0.260 (0.223)	-0.259 (0.223)	-0.425 (0.379)	-0.422 (0.379)
Number of Witnesses	0.0417 (0.0215)	0.0416 (0.0215)	0.0617** (0.0236)	0.0615** (0.0236)
(ln) Number of Words	-0.512*** (0.148)	-0.512*** (0.148)	0.153 (0.145)	0.152 (0.145)
Agency FE	✓	✓	✓	✓
Committee FE	✓	✓	✓	✓
Issue FE	✓	✓	✓	✓
President FE	✓	✓	✓	✓
Mean Outcome Measure	33.3	33.3	33.5	33.5
<i>N</i>	27630	27630	23286	23286
adj. <i>R</i> <sup>2</sup>	0.082	0.082	0.113	0.113

Notes: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Standard errors are clustered at the hearing-level.



Our pair-level data allows us to estimate equation (3) with witness fixed effects. We examine how the same witness in a given hearing responds differently to different members.<sup>22</sup> By including witness fixed effects, we are unable to measure the effect of some variables that do not vary at the witness-level such as divided government or political appointee, but this exercise is the most rigorous estimation of how bureaucrats respond to partisan misalignment with politicians in hearings. We use the same previous specification but with witness fixed effects. Since we examine within-bureaucrat variation in a given hearing, other fixed effects such as time, issue, agency, or committee are not included. The result is presented in Table 2.<sup>23</sup> We see consistent results from Table 1: the same bureaucrat's response includes a lower level of analytical information when she responds to members from the president's out-partisans and this effect is more salient when the bureaucrat is a political appointee who appears in oversight hearings.<sup>24</sup>

Regarding the substantive effect, each bureaucrat provides 4.1% less analytical information when they are asked by members who are president out-partisans and this reduction increases to 7.5% when political appointees interact with president out-partisans in hearings.<sup>25</sup> Considering that 45,345 bureaucrats were invited to congressional hearings during the period of our study's focus (1997-2014), and 25% of them were political appointees, at the aggregate level, this is a substantial reduction in the amount of analytical information that bureaucrats share with members of Congress.

We examine whether the effect of partisan alignment on bureaucrats' provision of analytical information varies by issue polarization, types of committees, and the presidents' issue priorities. A full discussion of these heterogeneous effects is in Appendix Section B. Overall, we find that bureaucrats provide significantly less analytical information when they appear in hearings that address highly polarized issues. Additionally, the negative effect of partisan misalignment is larger

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<sup>22</sup>The unique witness ID is assigned at the witness-hearing level. If the same bureaucrat appeared in different hearings, the bureaucrat is assigned different witness IDs.

<sup>23</sup>Note that the coefficient on *Political Appointee* is subsumed due to witness fixed effects.

<sup>24</sup>In Appendix Table A4, we further confirm that the negative coefficient on the interaction term *President Out-Partisan x Political Appointee* is more salient under divided government.

<sup>25</sup>This calculation is based on the results in Column (4) in Table 2. Given the mean outcome measure of analytical information of 33.5, the coefficients on the variable *President Out-Partisan* and *President Out-Partisan x Political Appointee* indicate the 4.1%  $(-1.370/33.5)$  and 7.5%  $((-1.370-1.148)/33.5)$  reduction.

Table 2: Bureaucrat’s Provision of Analytical Information with Witness FE

	Legislative		Oversight	
	(1)	(2)	(3)	(4)
President Out-Partisan	-1.504*** (0.148)	-1.424*** (0.175)	-1.831*** (0.167)	-1.370*** (0.201)
President Out-Partisan × Political Appointee		-0.216 (0.281)		-1.148*** (0.281)
Majority Party	-0.347* (0.159)	-0.350* (0.159)	-0.274 (0.165)	-0.257 (0.164)
Committee Chair	4.134*** (0.223)	4.136*** (0.223)	4.387*** (0.243)	4.380*** (0.243)
Ranking Member	1.115*** (0.330)	1.122*** (0.330)	1.687*** (0.312)	1.739*** (0.312)
IDW-NOMINATE - 0	-1.663** (0.507)	-1.676*** (0.506)	-2.258*** (0.515)	-2.288*** (0.515)
Grandstanding Score	0.0475*** (0.00709)	0.0475*** (0.00709)	0.0769*** (0.00734)	0.0764*** (0.00732)
LES	0.0285 (0.0523)	0.0280 (0.0523)	-0.00888 (0.0512)	-0.00955 (0.0510)
Witness FE	✓	✓	✓	✓
Mean Outcome Measure	33.3	33.3	33.5	33.5
<i>N</i>	27630	27630	23286	23286
adj. <i>R</i> <sup>2</sup>	0.231	0.231	0.257	0.258

Notes: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Standard errors are clustered at the hearing-level.

in prestigious and policy committees than constituent service committees. Third, when looking across issues based on the president’s issue mentions in State of the Union speeches, we do not see a statistically significant difference in our main effects between high vs. low priority issues.

## 4.2 Placebo Test: Non-Bureaucratic Witnesses

Finally, we examine whether these partisan misalignment effects are unique to bureaucrats, or shared among other witnesses as well. Should other non-bureaucratic witnesses be affected by the inter-branch relationship between the legislative and executive branches, as those witnesses are not from the executive agencies? As a “placebo” test, we run the same analysis on all other

non-bureaucratic witnesses.<sup>26</sup>

We measure the analytical score for all other witnesses, create a pair-level dataset for non-bureaucratic witnesses, and run the same specification as in equation (3) to examine whether there is an effect of divided government and president’s out-partisan on the provision of analytical information.<sup>27</sup> Table 3 presents the regression results for non-bureaucratic witnesses.<sup>28</sup> Note that for specifications with witness fixed effects, many variables do not vary within the same witness in a given hearing and so are not identified, including *Divided Government*.

There are no statistically significant effects of partisan misalignment on non-bureaucratic witnesses’ sharing of analytical information in their testimonies. This is in stark contrast with the previous results on bureaucratic witnesses, where both variables that capture partisan misalignment between the committee and the executive branch have statistically significant, negative effects. Non-bureaucratic witnesses share more analytical information when they are asked questions by members from the majority party and committee chair. Another interesting difference from the results on bureaucratic witnesses is that the coefficient on the *Grandstanding Score* is negative for non-bureaucratic witnesses, although the coefficients are still small.<sup>29</sup>

Overall, this placebo test suggests that the inter-branch relationship has a unique effect on *bureaucratic* witnesses’ incentives to share analytical information with committee members.

## 5 Conclusion

In democracies, the people who make the laws are not those who implement the laws. This division of labor results in a difference of knowledge and expertise. Information about policy implementation and its costs and consequences is gained through on-the-ground experience by the latter, while

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<sup>26</sup>We exclude congressional staff, congressmembers, or affiliates of congressional organizations since these witnesses could be influenced by inter-branch relationships.

<sup>27</sup>With non-bureaucratic witnesses, we include witness type FEs (16 different types, such as corporations, nonprofits, and think tanks and academics) instead of agency FEs.

<sup>28</sup>A full regression result is in Appendix Table A6.

<sup>29</sup>Appendix Figure A5 shows the distribution of grandstanding scores in members’ questions to bureaucratic and non-bureaucratic witnesses; the difference between the two is small.

Table 3: Non-Bureaucratic Witnesses' Provision of Analytical Information

	Legislative			Oversight		
	(1)	(2)	(3)	(4)	(5)	(6)
Divided Government	-0.223 (0.162)			-0.181 (0.235)		
President Out-Partisan	-0.110 (0.119)	-0.0231 (0.170)	0.0142 (0.252)	-0.299 (0.185)	-0.0755 (0.252)	-0.0658 (0.351)
Majority	0.902*** (0.134)	0.674*** (0.186)	0.804** (0.284)	0.554** (0.192)	0.199 (0.253)	0.434 (0.368)
Committee Chair	5.248*** (0.174)	5.718*** (0.238)	5.502*** (0.341)	5.784*** (0.253)	6.465*** (0.324)	5.766*** (0.461)
Ranking Member	0.391 (0.241)	0.613 (0.337)	-0.180 (0.514)	0.982** (0.302)	1.539*** (0.425)	1.199 (0.623)
Grandstanding Score	-0.0473*** (0.00448)	-0.0198** (0.00647)	-0.0469*** (0.0100)	-0.0446*** (0.00689)	-0.0181* (0.00859)	-0.0461*** (0.0132)
Witness Type FE	✓			✓		
Issue FE	✓			✓		
Committee FE	✓			✓		
President FE	✓			✓		
Witness FE		✓	✓		✓	✓
Bureaucrat in Hearing			✓			✓
Mean Outcome Measure	35.3	35.3	33.9	33.5	33.5	35.9
<i>N</i>	51136	51136	26872	27492	27492	13958
adj. <i>R</i> <sup>2</sup>	0.103	0.242	0.245	0.117	0.259	0.264

Notes: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Standard errors are clustered at the hearing-level.

legislators must rely on searching and acquiring that information. In the U.S., bureaucrats are relatively closer to policy implementation than members of Congress, and so gain more expertise and specialized information. This informational advantage of bureaucrats has been theorized about and documented by scholars, but the question of what affects the information sharing between bureaucrats and Congress has been left unanswered, especially empirically.

Using a new dataset that, for the first time, provides the federal agency affiliation, appointment type, and agency-level characteristics for each bureaucrat who testified in Congress during the span of decades of congressional history, we find that the partisan alignment between the bureaucracy and Congress has a significant effect on information sharing between bureaucrats and Congress. Under divided government, bureaucrats provide significantly less analytical information in their

testimonies during committee hearings—a behavior that persists in both legislative and oversight hearings. Further, when examining pair-level interactions between bureaucrats and members of Congress, a given bureaucrat provides less analytical information when answering questions from presidential out-partisans compared to facing questions from the presidential co-partisans, even when controlling for features of the questions asked. We also find that political appointees share significantly less analytical information when they face president out-partisans in oversight hearings. Altogether, our findings suggest that bureaucrats are strategic actors themselves, and choose to share less analytical information that would be useful for policymaking with a legislative branch controlled by the opposite party.

Our research and new data provide a refreshed foundation for continued work on the inter-branch relationship between bureaucrats and Congress. Much of the existing literature on this inter-branch relationship focuses on the frequency oversight activities of Congress concerning the executive branch (e.g. [Kriner and Schickler 2016](#)). As we show, the partisan alignment between Congress and bureaucrats holds important implications for the information that members of Congress receive through hearings. Even though the majority party in Congress holds more oversight hearings under divided government to monitor the executive branch, the quality and quantity of information that members of Congress could receive from bureaucratic witnesses may be lower than under unified government.

Congress largely relies on information provided by the executive branch to make policy decisions with far-reaching consequences—especially in complex scientific issues that face society today, such as climate change or pandemic response. Thus, understanding what affects information sharing within government—between bureaucrats, one of Congress’s best sources of policy information, and Congress—is paramount. Future research should examine how strategic bureaucratic behavior in terms of sharing information with some members of Congress could affect politicians’ other choice of acquiring information from the executive branch. For example, Congress has statutory power to request a variety of reports from the executive branch, ranging from descriptive reports that document agency activity to studies and evaluations for emerging issues such as arti-

ficial intelligence (Egar 2020). Although these reports from the executive branch could help the legislative branch become better informed, excessive requests from Congress could be a burden on bureaucrats and reduce their capacity for other responsibilities (Fahrenthold 2014). Examining different legislative tools that Congress has at its disposal to access executive branch information, and how the partisan alignment between the two branches of the government affects the choice of tool or channel, would be a fruitful extension of this study.

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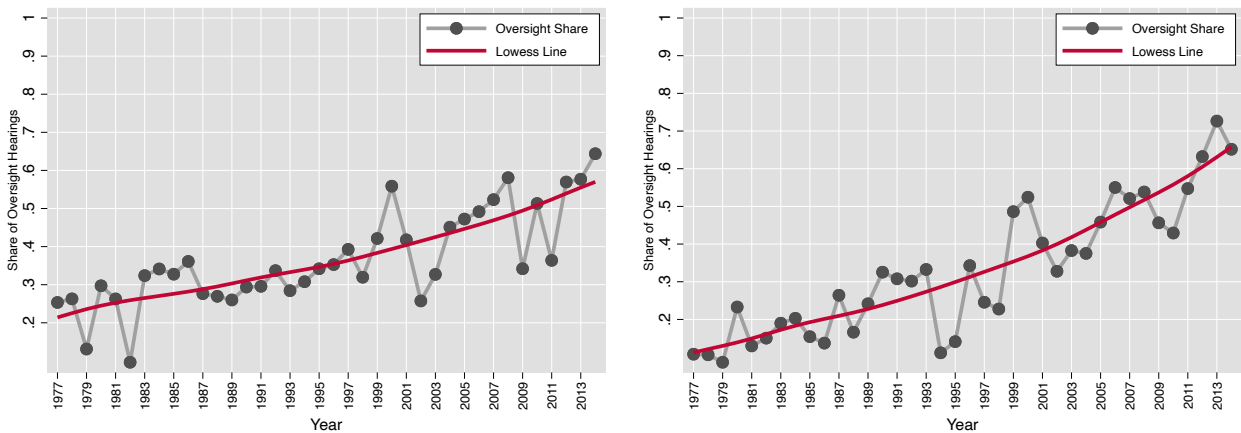
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# Supporting Information for

## *Bureaucrats in Congress: Strategic Information Sharing in Policymaking*

### A Additional Figures and Tables

Figure A1: Share of Oversight Hearings among Hearings that Featured Bureaucrats

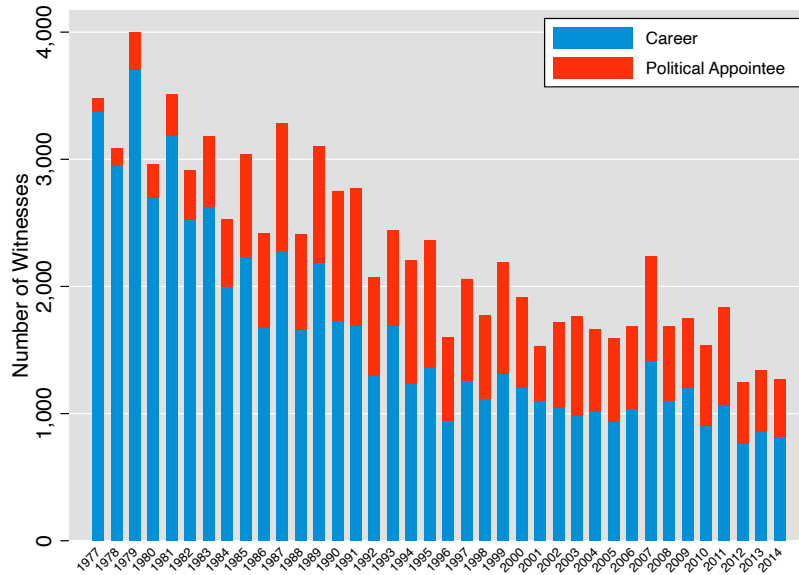


(a) House

(b) Senate

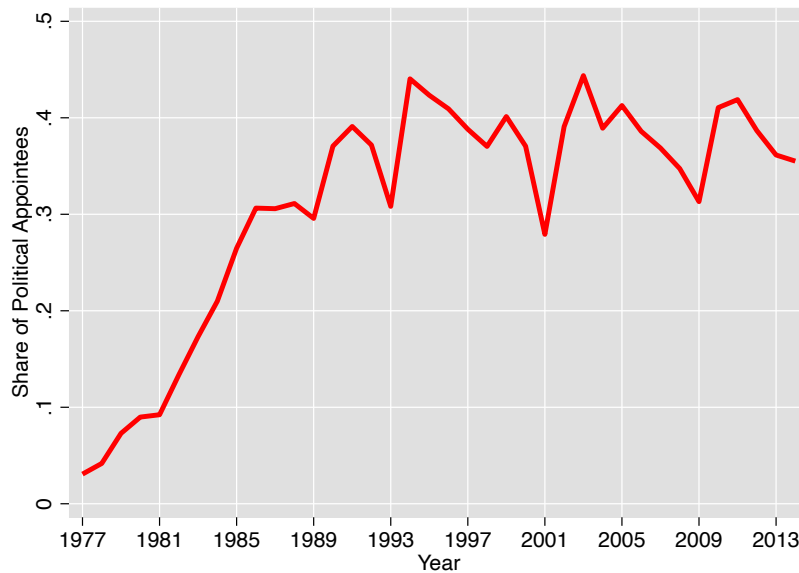
*Notes:* This figure shows the share of oversight hearings among the hearings that featured at least one bureaucrat in each year in the House (left) and the Senate (right) from 1977 to 2014. The other type of hearing is legislative hearings and we exclude nomination hearings for the Senate.

Figure A2: Types of Bureaucratic Witnesses Over Time



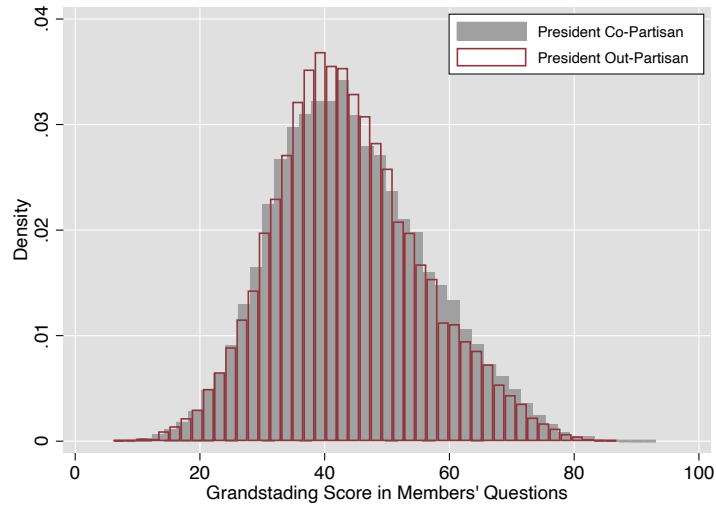
Notes: The figure shows the number of career vs. political appointees among bureaucratic witnesses for the period 1977-2014 in the House and Senate. We combine the executive departments and independent agencies.

Figure A3: Share of Political Appointees Over Time



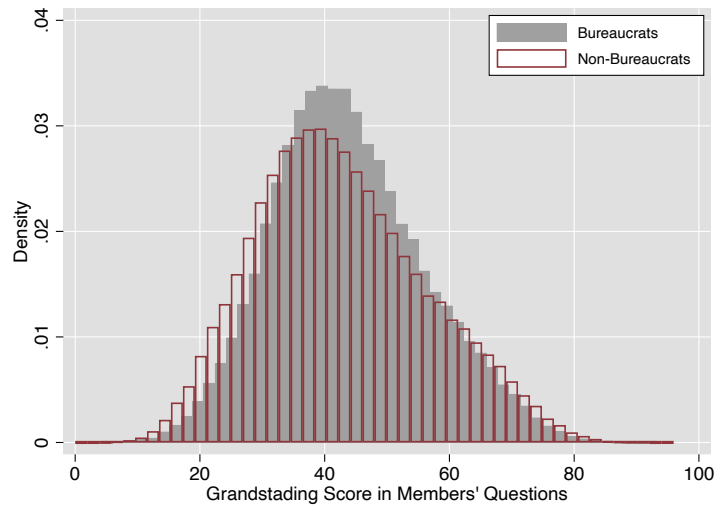
Notes: The figure shows the share of political appointees among bureaucratic witnesses for the period 1977-2014 in the House and Senate. We combine the executive departments and independent agencies.

Figure A4: Distribution of Grandstanding Scores in Members' Questions



*Notes:* The figure shows the distributions of grandstanding scores in members' questions to bureaucrats by president co-partisans vs. president out-partisans.

Figure A5: Distribution of Grandstanding Scores in Members' Questions to Bureaucrats vs. Non-Bureaucrats



*Notes:* The figure shows the distributions of grandstanding scores in members' questions to bureaucrats and non-bureaucrats.

Table A1: Distribution of Major Issue Areas that Featured Bureaucrats

Rank	Legislative		Oversight	
	Issue	Percent	Issue	Percent
1	Defense	8.92	Defense	15.60
2	Domestic Commerce	8.90	Government Operations	11.92
3	International Affairs	8.64	Domestic Commerce	8.33
4	Government Operations	7.78	International Affairs	7.36
5	Health	7.32	Transportation	6.40
6	Environment	7.17	Public Lands	6.03
7	Public Lands	6.95	Health	5.97
8	Energy	6.21	Environment	5.30
9	Transportation	5.42	Law and Crime	5.27
10	Law and Crime	5.13	Energy	5.07
11	Technology	4.23	Technology	4.83
12	Agriculture	3.89	Agriculture	3.94
13	Foreign Trade	3.53	Macroeconomics	3.54
14	Macroeconomics	3.15	Housing	1.94
15	Labor	2.96	Foreign Trade	1.92
16	Housing	2.32	Civil Rights	1.63
17	Education	2.15	Labor	1.60
18	Civil Rights	2.07	Social Welfare	1.28
19	Social Welfare	2.06	Education	1.13
20	Immigration	1.18	Immigration	0.95
Total Hearings		28,158	9,777	

*Notes:* We combine hearings in the House and Senate to present the statistics on major issues for hearing topics. Unit of observation is at hearing-level.

Table A2: Data Coverage

Variables	Years Covered	Number of Agencies Covered	Note
Hearing Data	1961-2018	70	
Political Appointee	1977-2014	65	No OPM information for a subset of agencies (e.g. FED)
Analytical Score	1997-2018	68	Only House hearings
Agency Ideology	1993-2012	53	Time-varying across presidents

Table A3: Summary Statistics of the Variables: Bureaucrat-Member Level

Variables	N	Mean	SD	Min	Max
<b>Panel A: Bureaucratic Witness</b>					
Analytical Score	64168	33.41	9.34	12.96	64.61
Divided Government	64168	0.61	0.49	0.00	1.00
President Out-partisan	61865	0.53	0.50	0.00	1.00
Political Appointee	57662	0.35	0.47	0.00	1.00
Majority Party	61823	0.60	0.48	0.00	1.00
Committee Chair	63293	0.16	0.36	0.00	1.00
Ranking Member	63293	0.06	0.24	0.00	1.00
IDW-NOMINATE - 0	61814	0.36	0.14	0.00	1.00
Grandstanding Score	61031	43.95	12.00	6.12	93.11
LES	61823	1.20	1.63	0.00	18.69
Executive Department	64168	0.77	0.42	0.00	1.00
Subcommittee	64168	0.63	0.48	0.00	1.00
Referral Hearing	64168	0.10	0.30	0.00	1.00
Number of Witness	64168	5.62	4.46	1.00	76.00
(ln) Number of Word	64168	8.14	0.69	2.83	10.06
Ideological Difference	55462	0.93	0.66	0.00	2.65
<b>Panel B: Non-Bureaucratic Witness</b>					
Analytical Score	88886	35	11.04	11.80	67.59
Divided Government	88886	1	0.49	0.00	1.00
President Out-partisan	88886	1	0.50	0.00	1.00
Majority	88772	1	0.48	0.00	1.00
Committee Chair	88886	0	0.44	0.00	1.00
Ranking Member	88886	0	0.24	0.00	1.00
IDW-NOMINATE - 0	88750	0	0.14	0.00	1.00
Grandstanding Score	86919	42	13.51	3.05	94.08
LES	88772	1	1.90	0.00	18.69
Subcommittee	88886	1	0.45	0.00	1.00
Referral Hearing	88886	0	0.39	0.00	1.00
Number of Witness	88886	8	9.39	1.00	127.00
(ln) Number of Word	88886	8	0.51	2.48	10.45

*Notes:* Unit of observation is bureaucrat-politician pair in a given hearing conditional on at least one interaction. The data covers the hearings in the House of Representatives for the period of the 105th-113th Congresses.

Table A4: Bureaucrat's Provision of Analytical Information: Divided vs. Unified Government

	<b>Divided</b>	<b>Unified</b>
	(1)	(2)
President Out-Partisan	-1.281*** (0.249)	-1.369*** (0.347)
President Out-Partisan × Political Appointee	-1.295*** (0.331)	-0.937 (0.505)
Committee Chair	4.396*** (0.288)	4.144*** (0.427)
Ranking Member	1.920*** (0.319)	0.224 (1.002)
IDW-NOMINATE - 01	-3.821*** (0.607)	0.907 (0.909)
Grandstanding Score	0.0816*** (0.00877)	0.0600*** (0.0128)
LES	-0.00505 (0.0561)	0.0350 (0.116)
Witness FE	✓	✓
Mean Outcome Measure	33.3	33.5
<i>N</i>	16134	7754
adj. <i>R</i> <sup>2</sup>	0.267	0.218

*Notes:* The sample is oversight hearings in the House. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Standard errors are clustered at the hearing-level.



Table A5: Bureaucrat’s Provision of Analytical Information - Including Ideology Difference

	Legislative		Oversight	
	(1)	(2)	(3)	(4)
Divided Government	-0.952*** (0.191)	-0.958*** (0.191)	-0.927*** (0.219)	-0.942*** (0.219)
Ideology Difference <sup>a</sup>	-0.170 (0.231)	-0.170 (0.231)	-0.561* (0.264)	-0.566* (0.263)
President Out-Partisan	-1.519*** (0.130)	-1.417*** (0.155)	-1.794*** (0.158)	-1.396*** (0.189)
Political Appointee	0.216 (0.185)	0.364 (0.221)	-0.0554 (0.198)	0.474* (0.242)
President Out-Partisan × Political Appointee		-0.285 (0.242)		-0.972*** (0.259)
Majority Party	-0.236 (0.139)	-0.240 (0.139)	-0.0453 (0.156)	-0.0362 (0.155)
Committee Chair	4.262*** (0.189)	4.264*** (0.189)	4.756*** (0.224)	4.753*** (0.224)
Ranking Member	1.203*** (0.282)	1.212*** (0.282)	1.737*** (0.280)	1.781*** (0.280)
IDW-NOMINATE - 0	-2.024*** (0.452)	-2.036*** (0.452)	-3.358*** (0.480)	-3.386*** (0.479)
Grandstanding Score	0.0309*** (0.00593)	0.0308*** (0.00593)	0.0575*** (0.00652)	0.0571*** (0.00651)
LES	0.00839 (0.0445)	0.00778 (0.0445)	-0.0197 (0.0492)	-0.0204 (0.0491)
Subcommittee	1.091*** (0.205)	1.091*** (0.205)	1.992*** (0.235)	1.992*** (0.235)
Referral Hearing	-0.186 (0.227)	-0.185 (0.227)	-0.592 (0.388)	-0.588 (0.388)
Number of Witnesses	0.0417 (0.0219)	0.0416 (0.0219)	0.0660** (0.0232)	0.0658** (0.0232)
(ln) Number of Words	-0.498** (0.152)	-0.498** (0.152)	0.160 (0.148)	0.159 (0.148)
Agency FE	✓	✓	✓	✓
Committee FE	✓	✓	✓	✓
Issue FE	✓	✓	✓	✓
President FE	✓	✓	✓	✓
Mean Outcome Measure	33.3	33.3	33.5	33.5
N	26758	26758	22215	22215
adj. R <sup>2</sup>	0.083	0.083	0.116	0.117

Notes: **a.** the absolute difference between the committee chair’s DW-NOMINATE score and the ideology of the testifying bureaucrat’s affiliated agency, as measured by [Chen and Johnson \(2014\)](#). \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Standard errors are clustered at the hearing-level.

## B Heterogeneous Effects

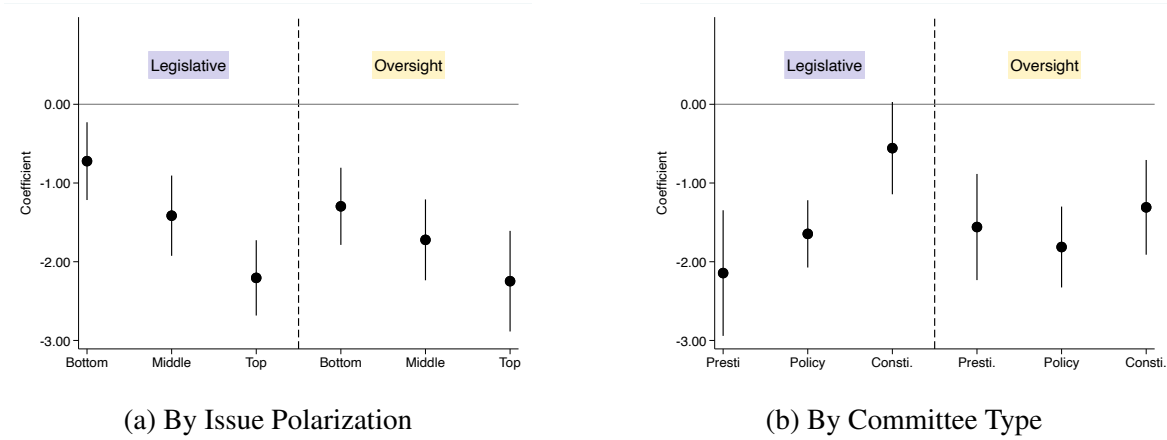
We examine whether the effect of partisan alignment on bureaucrats' provision of analytical information varies by issue polarization, types of committees, and the presidents' issue priorities. First, for issue polarization, we create a vote-based measure of issue polarization for 20 major issue areas, defined by the Comparative Agenda Project (Baumgartner and Jones 2015). Within each issue area, for each passage or amendment roll-call vote, we calculate the percentage of each party voting yea for these roll call votes and then calculate the absolute difference between these percentages. We take the mean of these absolute differences across all roll-call votes in that issue area in a given Congress to generate the issue polarization score by issue and Congress.

Then, for each Congress, we divide the issues into three groups (Bottom, Middle, and Top) based on the degree of polarization between Democrats and Republicans. We merge the Congress-specific issue polarization score to our hearing data based on the major issue code for each hearing. Then, we run separate regressions of equation (3) with witness FEs for three different groups based on the issue polarization categories. Panel (a) of Figure A6 shows that the regression coefficients of the variable *President Out-Partisan* and bureaucrats provide significantly less analytical information when they appear in hearings that address highly polarized issues and this pattern is more salient in legislative hearings.

We also examine whether the effect of the partisan alignment varies by the types of committees. Deering and Smith (1997) divide committees into three types: (1) prestigious (Appropriations, Budget, Rules, and Ways and Means); (2) policy (Financial Services, Education and Labor, Energy and Commerce, Foreign Affairs, Judiciary, Government Oversight); and (3) constituency service (Agriculture, Armed Services, Natural Resources, Science, Small Business, and Veterans Affairs). Panel (b) of Figure A6 shows the coefficients of the *President Out-Partisan* variable on bureaucrat's provision of analytical information across different types of committees. The negative effect of partisan misalignment is larger in prestigious and policy committees than constituent service committees and this pattern is more salient in legislative hearings.

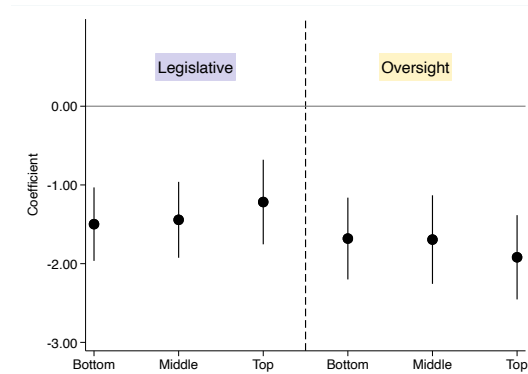
In addition, we examine if bureaucrats' provision of analytical information varies by the presidents' issue priorities. We count the total mention of issues by the President in the State of the Union Speeches provided by the Comparative Agenda Project and use this measure to decide whether a hearing was about the issue prioritized by the president (Krause and O'Connell 2016). We divide the major issue topics into three groups and run a regression in each group. Panel (c) in Figure A6 presents the results. Across all terciles, the coefficients are negative and statistically significant and we do not see a statistically significant difference between high vs. low priority issues.

Figure A6: Heterogeneous Effects of “President Out-Partisan” on Analytical Information



(a) By Issue Polarization

(b) By Committee Type



(c) By President’s Issue Priority

Notes: Figures present the regression coefficient of the variable “president out-partisan” on the provision of analytical information by bureaucrats. Panel (a) shows the results by the polarization score of the major topic of the hearing. Panel (b) shows the results by three different types of committees (prestigious, policy, and constituency) defined by Deering and Smith (1997). Panel (c) shows the results by the presidents’ issue priorities.

Table A6: Non-Bureaucratic Witnesses' Provision of Analytical Information

	Legislative			Oversight		
	(1)	(2)	(3)	(4)	(5)	(6)
Divided Government	-0.223 (0.162)			-0.181 (0.235)		
President Out-Partisan	-0.110 (0.119)	-0.0231 (0.170)	0.0142 (0.252)	-0.299 (0.185)	-0.0755 (0.252)	-0.0658 (0.351)
Majority	0.902*** (0.134)	0.674*** (0.186)	0.804** (0.284)	0.554** (0.192)	0.199 (0.253)	0.434 (0.368)
Committee Chair	5.248*** (0.174)	5.718*** (0.238)	5.502*** (0.341)	5.784*** (0.253)	6.465*** (0.324)	5.766*** (0.461)
Ranking Member	0.391 (0.241)	0.613 (0.337)	-0.180 (0.514)	0.982** (0.302)	1.539*** (0.425)	1.199 (0.623)
Grandstanding Score	-0.0473*** (0.00448)	-0.0198** (0.00647)	-0.0469*** (0.0100)	-0.0446*** (0.00689)	-0.0181* (0.00859)	-0.0461*** (0.0132)
IDW-NOMINATE - 0	-2.588*** (0.455)	-2.285*** (0.628)	-2.019* (0.941)	-1.235* (0.611)	-1.481 (0.812)	-1.048 (1.287)
LES	0.134** (0.0453)	0.0835 (0.0651)	-0.00208 (0.0987)	0.165** (0.0587)	0.0859 (0.0762)	-0.0101 (0.112)
Subcommittee	0.999*** (0.184)			1.606*** (0.240)		
Referral Hearing	0.103 (0.172)			0.383 (0.297)		
Number of Witnesses	0.0548** (0.0205)			0.0411*** (0.0106)		
(ln) Number of Words	-0.203 (0.154)			-0.365 (0.223)		
Witness Type FE	✓			✓		
Issue FE	✓			✓		
Committee FE	✓			✓		
President FE	✓			✓		
Witness FE		✓	✓		✓	✓
Bureaucrat in Hearing			✓			✓
Mean Outcome Measure	35.3	35.3	33.9	33.5	33.5	35.9
<i>N</i>	51136	51136	26872	27492	27492	13958
adj. <i>R</i> <sup>2</sup>	0.103	0.242	0.245	0.117	0.259	0.264

Notes: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Standard errors are clustered at the hearing-level.

## C Measuring Analytical Information

### C.1 Coding Instructions for MTurk Workers

This task involves reading two statement excerpts made by witnesses invited to testify at congressional committee hearings held from 1997 to 2018. Researchers will use your responses to better understand the “tone” of each statement.

**Your job is to read both statements and select the one that is relatively more analytical.**

To give you some background knowledge, congressional committees hold hearings to collect policy-relevant information from external experts, bureaucrats, citizens or any groups that can be affected by policies that committees consider (e.g. trade associations, farmers, veterans, etc.).

In a typical hearing, witnesses give an opening statement and then answer questions that committee members ask during the Q and A session. Witness testimonies transmit various types of information to committee members (e.g. analytical information, political information on preferences of certain group of people, etc.). Our study specifically focuses on identifying and measuring analytical information that witnesses provide. To do so, you will help us by comparing two randomly selected excerpts from witness testimonies and choosing the one that sounds relatively more analytical.

We define a testimony as analytical if it contains statements that are fact-based, objective or research/data driven. In contrast, a non-analytical testimony tends to contain statements that are based on personal experience or opinion (which scholars call “ordinary knowledge” as opposed to “expert knowledge”), subjective, or normative.

**Your performance will be monitored as you complete these HITs. We will reject all work done by workers who provide poor quality answers.**

Do not allow your own political opinion to influence your decision. Your goal is to select the statement that other workers would also recognize as more analytical.

A statement is analytical if it is ...

- 1) Fact-based
- 2) Verifiable (Based on research or data driven analysis)
- 3) Objective

(Example) Fact-based statement:

“I have over 27 years of experience in the field of community and economic development. The authority I represent has approximately 1,300 public housing units. We administer 4,600 housing choice vouchers. We manage market-rate units and two office buildings. In 2010, we opened our housing choice voucher waiting list for only 5 days and received over 6,000 applications. Our public housing waiting lists are currently at 130 percent of our total units.”

(Example) Verifiable (Based on research or data driven analysis):

“The available evidence indicates that the response of individuals to increasing amounts of THC is much more variable than it is for alcohol, so with alcohol, we have a considerable body of evidence that can place risk odds at increasing levels of blood alcohol content. For example,

.08 blood alcohol content is associated with about four times the crash risk of a sober person. The average arrest is .15 THC. That's associated with about 15 times the crash risk. Beyond a—some broad confirmation that higher levels of THC are generally associated with higher levels of impairment, a more precise association of various THC levels and degrees of impairment are not yet available.”

“There are several options in some of the background in the literature, everything from taking a budget level and determining what different levels of performance you can get for that same budget amount versus different levels of performance for different budget level amounts versus cost agency or even intraagency tradeoffs among requirements and budget responsibilities. So, what we need to do from a piloting standpoint is look at these and say how can we test those theories in various ways.”

(Example) Objective:

“When projects are authorized, when there is a Chief's Report and the Congress authorizes a project, the economic analysis that is done on that calculates a benefit to cost ratio. And that benefit to cost ratio is based on a 3.125 discount rate.”

A statement is non-analytical if it is . . .

- 1) Opinion-based/Normative
- 2) Anecdotal or experiential (Based on personal experience)
- 3) Subjective or preferential (Revealing preferences of certain groups)
- 4) Procedural statements
- 5) All the statements that do not contain analytical information as defined earlier

(Example) Opinion-based/normative:

“We should do it this year. But we should adjust the system so that we get ready for 2017 when more money is going out than coming in, and we can do it.”

(Example) Anecdotal or experiential (Based on personal experience):

“When Michael came home that night and I confronted him and was talking to him, he had eye contact like we do now. But when he was sitting on the sofa and nobody was confronting him, he was comatose. He was in the ozone. He was sitting with his mouth hanging open, staring at the door. I knew that there was something wrong with him that night. I could tell that he had taken something.”

“I guess we mistakenly believed that it was a secret location, and the only people who knew about it were the EOD staff from both SFPD, the FBI and the Sheriff's Office. Unbeknownst to us, this particular individual, and I won't say too much, but was a plumber in that area and apparently had seen the officers going into that area and perhaps followed them in.”

(Example) Subjective or preferential (Revealing preferences of certain groups):

“—that we try to organize that under FEHB because there has been a concern from the employees of not moving away from FEHB. From our perspective, we're okay to wait, as long as we get the savings. The savings are what's key to us. If I could put a chart up here.”

(Example) Procedural statements:

“Thank you very much, Mr. Souder, and your staff for helping to deal me in today. I found out about this yesterday morning, and I’m pleased to be here. I am a former college administrator and teacher. My name is Dean, but I was one once.”

In summary, consider that all statements can be placed on a continuum ranging from 0 to 100, where 0 is the most extreme non-analytical statement and 100 is the most extreme analytical statement. Some statements can be a mixture of analytical and non-analytical statements; some may be moderately analytical. Consider that these instances can be placed between the two extreme ends of the continuum.

For each HIT, you will receive two speech extracts. Your task is to read both and select which of the two statements is more analytical in the following manner:

If statement A is...	If statement B is...	Then, choose
Analytical	Non-analytical	Statement A
Analytical	Analytical	The one that is more explicitly factual/verifiable/objective
Non-analytical	Non-analytical	The one that is more explicitly opinion-based/experiential/subjective

Please read each statement carefully and judge each by the standards listed above and the information in the text. DO NOT make your judgments on your own knowledge of a person or a policy in question or on definitions of analytical and non-analytical statements different from those listed above.

Your performance will be monitored as you complete these HITs. We will reject all work done by workers who provide poor quality answers.

**This training module has two parts.**

In Part 1, we will provide **5 practice HITs** followed by instructions about how the statements need to be coded.

In Part 2, we will give you **5 test HITs** to complete. To receive qualification for the **Compare Witness Testimony task 2022**, you must complete **4 out of 5 of these test HITs correctly**.

## C.2 Labeling Process

The sampling of the training paragraphs was a two-stage process. First, we originally planned sampling 3,300 paragraphs from the corpus of witness testimonies. To do this, we randomly selected 3,300 hearings and took only the witness testimonies. To facilitate online workers’ comparison of paired paragraphs, the length of paragraphs to constitute the training set was controlled through the following process: 1) For the statements containing multiple paragraphs and more than 150 words, we divided each statement into paragraphs, but we skipped the paragraphs containing less than 50 words to keep them together with the following paragraph so it was long enough; 2) then, the paragraphs containing less than 50 words or more than 150 words were removed. From the remaining paragraphs, we randomly selected 3,300 paragraphs. Each paragraph appeared 20 times in the pair-wise comparisons generating 33,000 comparison tasks or HITs. Using the online workers’ binary choices on these tasks and the `labelR` software (Carlson and Montgomery, 2017), we fit a Bradley-Terry model to generate a continuous, human-coded score or label for the 3,300 paragraphs.

However, our machine learning models fit on the random sample of the 3,000 paragraphs could not predict the rest of the 300 paragraphs well. We suspected that this is because the training set did not contain enough variation in the analytical information. Indeed, when we measure this concept using the dictionary of analytical information used in [Ban, Park, and You \(2023\)](#), the measurement has a highly skewed distribution with few statements scoring high. To solve this issue, we decided to repeat the labeling procedure by over-sampling the statements containing the words in their dictionary.

In the second stage, we used random-block sampling to select 1,000 paragraphs to be labeled. For the pre-processed paragraphs from the 3,300 hearings, we computed the proportion of analytical words in the dictionary. Then, we partitioned the paragraphs into four blocks based on this preliminary measurement with three cut-points: 0.05, 0.1 and 0.15. The number of blocks and the cut-points were selected to ensure that we had a high enough number of statements in the block with the highest proportion of analytical words when the equal number of statements are selected for each block. Then, we randomly selected 250 statements for each of the four blocks.

In doing so, we included statements that were labeled in the first stage so they could be used as a bridge to help the Bradley-Terry model learn the relative strength of the analytical information for the paragraphs that were labeled only in the first stage and those labeled only in the second stage. As the paragraphs labeled in the first stage were mostly populated in the blocks featuring low proportions of analytical words, we sampled 150 paragraphs of them for each of the first and second blocks. This renders 100 new paragraphs to be randomly selected for these two blocks. For the third block, we included all 66 paragraphs from those labeled in the first stage and selected 184 new paragraphs. For the fourth block with the proportion of analytical words to be greater than or equal to 0.15, all five paragraphs from those labeled in the first stage and 245 new paragraphs were included. In summary, 371 paragraphs from the first labeling process and 629 new paragraphs were labeled in the second phase.

Then, we fit a Bradley-Terry model on the combination of all the 43,000 HITs collected from the first and second phases to generate our human-coded score of the analytical information for the 3,929 paragraphs.

### **C.3 Learning and Predicting the Analytical Information**

First, we pre-processed the corpus by lowercasing, removing stop words, and stemming. However, we decided to keep numbers as they can be an important feature of analytical information. Also, we included both unigrams and bigrams as we confirmed that the prediction performance of the model improved by including bigrams in addition to unigrams. For this test, Kernlab’s support vector machine was used as it quickly fits and has relatively high prediction performance.

Second, we constructed document-level matrices using two approaches: term-document frequency (TDF) and doc2vec. For the TDF matrix, we included only the most frequent 2,000 terms due to the large size of our corpus.

Third, we randomly selected 3,500 paragraphs as a training set and held out 429 paragraphs to validate the final model. Using the paragraphs in the training set, we fit the four best performing machine learning models out of the six used in [Park \(2021\)](#) as our data and her data are from the same source: House hearing transcripts. The four models are support vector machine (SVM), Kernlab’s support vector machine (KSVM), LASSO, and Gradient Boosting Machine (GBM). These models were fit on each of the two document matrices totaling eight models. The tuning



parameters for each of the eight models were chosen through a grid search. For this, Kernlab’s support vector machine was used.

Fourth, we used the `EBMAforecast` R package (Montgomery, Hollenbach, and Ward, 2012) to conduct ensemble Bayesian model averaging to reach a final model that basically aggregates all eight models by assigning weights to them to optimize the model prediction. Montgomery, Hollenbach, and Ward (2012) reports that this method achieves better model prediction than any single best machine learning model. Six models received non-zero weights. Table A7 presents the tuning parameters and weights assigned for each of the eight models.

Table A7: Machine Learning Models

Document Matrix	Model	Parameters	Weight
TDF	SVM	cost = 2	0.132
TDF	KSVM	epsilon = 0.1	0.164
TDF	LASSO	nlambda = 200	0.172
TDF	GBM	shrinkage = 0.1	0.061
Doc2vec	SVM	cost = 2	0
Doc2vec	KSVM	epsilon = 0.1	0.291
Doc2vec	LASSO	nlambda = 200	0
Doc2vec	GBM	shrinkage = 0.1	0.181

Using the final model, we predicted the score for the entire corpus and rescaled the score to range from 0 to 100.

## C.4 Validation of the Measurement

This section validates the measurement statistically and substantively. First, to validate the human-coded labels substantively, below we present the five most analytical and least analytical paragraphs from the human-coded set.

### C.4.1 The most analytical paragraphs (in descending order)

[1] “I can probably take that, sir. For MIDRP, there is about \$430,000. For the specific on wound infections, there is \$895,000. U.S. Navy wound infection research also gets money. I don’t have the exact number right here. USUHS has a little over \$4 million. For congressional special interest projects on wound infection, there is almost \$12 million. SBIR project is about \$3.7 million. Dr. Smith spoke about the Defense health programs and then war supplemental intermural projects, there is about another \$2.5 million, sir.”

[2] “I’m not sure I have those numbers for seven years. I can tell you that during the last two years, that number is in the range of \$147 million of State money. That includes a Clean Water Management Trust Fund. We put about 6.5 percent of remaining funds after the budget is complete into a fund and that’s anywhere from \$40 to \$50, \$55 million a year. And, in addition to that, we just, of course, passed the Clean Water Responsibility Act. We’ve significantly increased our ag share program, working with the farmers on BMPs and so forth; so, \$147 million if you total that.”

[3] “Early data for cyber Monday 2017 by Adobe Analytics indicate that, collectively, shoppers spent almost \$3.4 billion on online purchases, a 17 percent increase over last year. Looking at

the underlying data, over 50 percent of the virtual store visits and 40 percent of the revenue were made from tablets or smartphones, an increase of 20 percent and 41 percent respectively over last year. This could indicate that the online shopping experience is becoming more frictionless and shoppers are feeling more secure with online transactions.”

[4] “The official service cost position for production is \$39.8 billion. As I explained, sir, while you were out, we put together what’s called an, we used the Air Force cost analysis group to develop the service cost position. The group, in doing their analysis and developing an official cost estimate for this program, estimated the cost at \$40.8 billion, which included \$1 billion of risk in the out years, of risk that was unidentified. Without that \$1 billion for risk, the estimate is \$39.8 billion.”

[5] “Mr. Taylor, I believe I have an answer to your question. In 2004, the two polar icebreakers cost over \$3 million in fuel costs, \$3,039,000. In 2005, both the Polar Star and Krasin together cost \$1,720,000 for fuel. Breaking that down, the Polar Star which had limited service during that campaign, the fuel cost was \$1,057,000, and the cost of the fuel for the Krasin was \$662,739.”

#### **C.4.2 The least analytical paragraphs (in ascending order)**

[1] “OK. I will wrap it up there. With that, I just want to thank you. And I appreciate the opportunity to be here today. This is something I am very passionate about, and I have a lot more I want to share, but a lot of it is in my written testimony. So I appreciate the opportunity, Mr. Chairman, thank you.”

[2] “I do have a problem here and I do share my colleagues’ concerns with this situation in the VA. And what is the consequence for those staff that are not reporting or are not taking their duty as they should, they are not properly carrying out that responsibility, what is the consequence for them directly?”

[3] “I would say yes and amen to that. There are other things that need to happen in addition to that. I think not just middle class people are concerned about crime. All people are concerned about crime. Poor people are concerned about crime as well. I think the way Jolice Wilson talks about it is—”

[4] “No, it is not my view of that sort at all. And I would be happy that they would be very well paid. My only perspective is that, in terms of the constitutional purpose, our focus should be on the production of output. Now, obviously, a well-compensated artist and musician class is probably important for long-run copyright output of creative works—”

[5] “I hadn’t heard that we had that problem before. You mentioned earlier the comment about the dike. I wish I could say more, and I would like to get back to the Committee on that point. Just so that I don’t give you an impression that it’s all OK or it’s all bad, I’d rather go back and talk to my—”

The paragraphs that received the highest scores tend to present verifiable information frequently referring to numeric figures whereas those scored the lowest points tend to be procedural statements, normative statements presenting their perspectives, or statements expressing uncertainty about a policy situation. Therefore, these two sets of paragraphs provide us with confidence that the human-coding process was conducted by closely capturing the concept that we intended to measure as described in the coding instructions.

Following the suggestions from [Park and Montgomery \(2022\)](#), we took an additional step to validate the human-coded scores by constructing our own coding on a 5-point scale on a random subset of 120 paragraphs that were labeled by online-workers. Then, we compared the crowd-sourced score to our 5-point scale coding to double-check if the online workers coded paragraphs in a way consistent with our conceptualization of analytical information. The Pearson correlation coefficient between the two measurements is 0.906, which provides both statistical and substantive validation of our human-coding process.

Second, we validated the analytical score predicted for the entire corpus. Below we present the ten most and least analytical statements, respectively. As some of the most analytical statements are extremely long, here, we report only those with 150 words or less.

#### **C.4.3 The most analytical statements (in descending order)**

[1] “For the joint NBC defense program, which is the program that I manage, in the area of very basic research—this is laboratory-level research for chem-bio—about \$33.2 million for fiscal year 2001; in the area of applied research, \$73.6 million; for advanced development programs, \$46.6 million; for what we call demonstration validation of the technologies, \$83.8 million; for engineering management development, which is actually putting the technologies into the widgets and doing the final operational and developmental testing, \$100.8 million; and for overall management of the program, publication of doctrine, training requirements and the training base for chem-bio defense, about \$23.9 million, for a total of \$361.9 million for research and development. But probably more importantly, we are going to be spending \$473.9 million to physically procure new equipment and putting it into the hands of the warfighters in all of those areas I discussed—detection, identification, early warning.”

[2] “Congressman, Gosar, thank you. The total energy-related revenues to the Nation are nearly 100 percent. They are—well over 90 percent of the general revenue funds come from royalties, taxes, right-of-way fees, projects related to that. And Navajo Oil and Gas themselves contribute to 10 to 15 percent or more of that total revenue. The other comes from other energy companies, and our rate is rapidly increasing. I may also comment that relative to the energy delays, our very first Navajo Nation issues—what are called operating agreements, not standard BIA leases—the first operating agreement that the Council approved took over 400 days for BIA approval. The more recent one was still approximately nine months. These type of days, when the company paid out in excess of \$4 million to the Nation’s general fund for the rights to explore this land, are just economic—huge economic hurdles that we have to overcome.”

[3] “This fiscal year we are increasing commodities to the Colombian police—aircraft parts, tools, avionics, field investigative equipment—from \$7.4 million to \$12.6 million. Training is at \$1.5 million. Aircraft operations and so on are doubling from \$4.1 million to \$8 million. Military assis-

tance would involve \$2.5 million in commodities, \$1 million in training and \$1.5 million in other programs. Judicial sector reform, we are now picking up support for this very important program of \$250,000, and we're providing aviation services. We will be providing aviation programs at \$14 million, and in addition, new equipment this year involving UH-1H helicopters valued at \$10.8 million, Bell 212 helicopters valued at \$9 million, and OV-10 Bronco aircraft valued at \$84 million. So actually that is a total of \$147.8 million."

[4] "Chairman Walberg, first of all, the intent of this regulation is to extend the most basic economic protections to this workforce—the minimum wage and overtime protections. Contrary to your opening statement, the department estimates that the average analyzed costs to employers to familiarize themselves with the regulation would total about \$4.7 million over 10 years; and that the increase or transfer of—of transfers to home—of wages to home health care workers in the form of increased minimum wage protections would be approximately \$16.1 million; the payment for time spent traveling between patients, approximately \$34.7 million; and the payment of overtime premium for hours worked over 40 hour—40 hours in a work week would range between \$0 and \$180 million per year, on average. So consequently, the impact of this regulation is not \$2.8 billion; it is actually rather modest—a modest proposal to extend significant economic protections to this workforce."

[5] "Yes, sir. So, you know, the Corps receives appropriations in different accounts: investigations, construction, and operations and maintenance. And so the numbers that you heard today are only one—they only reflect the Operations and Maintenance account. They don't reflect the Construction and the Investigations account. When you look at all appropriations across all the business lines in 2011, we had: \$72.8 million allocated and spent for flood risk management; \$15 million for navigation; \$61.4 million for hydropower; \$13.3 million for environmental stewardship; \$800,000 for water supply; \$21.6 million for recreation; and \$87 million for environmental restoration. So that was last year's budgeted and spent amount, sir."

[6] "That would be terrific. That would be great. The last program I would like to mention real quickly is the State Drinking Water Security Responsibility. Since the events of 2001 as well as the more recent events, hurricanes, wildfires and floods, states have taken on exceptional measures to meet the security and emergency response-related needs of the drinking water community. They provided assistance, training, information and financial support to their water systems and continually work toward integrating security considerations into all aspects of their programs. The appropriated level in fiscal year 2009 was about \$5 million or a little less than \$100,000 per state, and states have a tough time understanding why that level has been flat-funded since 2002. And so we respectfully request \$7 million in fiscal year 2010 for funding state drinking water security initiatives."

[7] "I'm not sure I have those numbers for seven years. I can tell you that during the last two years, that number is in the range of \$147 million of State money. That includes a Clean Water Management Trust Fund. We put about 6.5 percent of remaining funds after the budget is complete into a fund and that's anywhere from \$40 to \$50, \$55 million a year. And, in addition to that, we just, of course, passed the Clean Water Responsibility Act. We've significantly increased our ag share program, working with the farmers on BMPs and so forth; so, \$147 million if you total that."

[8] “Another initiative provides funding for ocean conservation. In the refuge program about \$400,000 will go to the Palmyra Atoll Research Consortium, and we would also put about \$500,000 into the Marine Debris Campaign to help clean up. It is a very serious issue in our coastal refuges. As part of the Department’s Safe Borderlands initiative, we have requested \$1 million to add six new law enforcement officers in refuges along the southwest border. This would take us from 26 to 32. Now I will turn to discussing our budget request for the Service’s programs. For the refuge system, the budget sustains the funding increase of \$35.9 million that Congress approved in 2008. And given the difference between the 2008 President’s request and the 2009 President’s request, I believe that your work last year made a significant impact on OMB to help us sustain that increase.”

[9] “The President’s budget mark for the CFTC was \$130 million. The House Agriculture Subcommittee for Appropriations recently gave us \$135 million. As a result of their efforts, we have asked on top of the \$130 for an additional \$27 million, \$21 million to increase our staffing levels by roughly 100 FTEs to get us up to historic levels of where we need to be. Second, the implementation of the farm bill requires us to regulate new markets, known as exempt commercial markets. This Committee helped enact this provision that will require additional staff as well. And, so we have asked for an additional \$6 million on top of the \$21 million for a total of \$27 million.”

[10] “Yes. I have the notes of who the entities are. You have got—Health and Human Services was \$811 million of the amount. Education was \$530 million. The USAID was \$169 million. Commerce was \$15 million. Energy, \$13 million. Labor, \$9 million. NASA, \$7 million. Then a bunch of other ones were the rest. Keep in mind, our analysis excluded things like Medicaid. It was only limited to certain grant systems, and we looked at the payment systems that were—these were payments made, so \$1.6 billion of payments made related to grant programs at those specific agencies.”

#### **C.4.4 The least analytical statements (in ascending order)**

[1] “I guess I don’t know what to think of it. I was surprised by it. I believe that they are friends and—but I don’t know.”

[2] “Well, there shouldn’t be any more. There shouldn’t be any more.”

[3] “Some of it was, some of it was not. Most of it was.”

[4] “Well, there are some that are. There are some that are not.”

[5] “Of which they do very, very well. They do it very, very well.”

[6] “I do, but I don’t have that with me. But we do.”

[7] “No, no, no. I won’t do that. No. That is for you all.”

[8] “But you have to do it, and we are doing it.”

[9] “I do. I don’t have it with me, but I do.”

[10] “We did not have that here. We did not have that here.”

These examples are consistent with the features characterizing the most and least analytical paragraphs that were labeled as shown above. This suggests that our machine learning models successfully predicted the analytical scores validating our prediction process.

The statements scoring high tend to contain falsifiable statements frequently involving statistical information and explanations of where revenue and funding for the issue at hand originates.<sup>1</sup>

One additional aspect found here is that highly analytical statements tend to be longer than non-analytical statements, which is not the case for labeled paragraphs because their length was controlled to facilitate human coding. The relationship between the length of statements and their scores is intuitive because the statements that are too short to convey any meaningful information are likely to be evaluated as less analytical.

Finally, we take a further step to validate our final, predicted measurement for analytical information. As we did for the human-coded set, we manually constructed a 5-point scale measurement on a random subset of 120 statements in the corpus that were not labeled by assigning the highest score to the most analytical statements. The correlation coefficient between our manual coding and the analytical scores is 0.876 suggesting that the analytical score captures the concept that we intended to measure very well.

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<sup>1</sup>One concern may be that words relating to money or financial matters may bias the measurement of the analytical score. While words relating to money or financial matters do correspond with higher analytical scores, this substantively reflects the type of information that we want to measure for the concept of analytical information—executive agencies are funded by Congress and a main source of discussion and technical information provision is on *how* agencies’ budgets are used and the financial cost and impact of their programs. As such, we do not view the correspondence between money- or financial-related words and high analytical information as a problem.