

Bureaucrats in Congress: Strategic Information Sharing in Policymaking

Pamela Ban*

Ju Yeon Park[†]

Hye Young You[‡]

Abstract

There exists a canonical power balance in policymaking between Congress and the bureaucracy. Information about policy implementation and its consequences has been theorized to be a determinant of who has a policymaking advantage: Congress or the bureaucracy. Given bureaucratic expertise and the critical role of information, what drives information sharing between bureaucrats and Congress? We argue that partisan alignment between the executive agencies and Congress drive the amount and type of information that bureaucrats choose to share with Congress. Using a new dataset that covers the federal agency affiliation, appointment type, and agency-level characteristics of each bureaucrat who testified in Congress from 1961-2018, as well as a new measure of informational content present in witness testimonies, we examine who from the bureaucracy testifies in hearings, the quality of information they provide, and the partisan determinants of this behavior. We find that the presence of divided government dominates as the main driver of the information exchange between bureaucrats and Congress, impacting not only oversight relations but how well-informed Congress is when producing legislation.

*Assistant Professor, Department of Political Science, University of California, San Diego. Email: pmban@ucsd.edu

[†]Assistant Professor, Department of Government, University of Essex. Email: jp20761@essex.ac.uk

[‡]Associate Professor, Wilf Family Department of Politics, New York University. Email: hyou@nyu.edu

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. The division of these responsibilities leads each side of this inter-branch relationship to gain different information and perspectives about policy-making. 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. [Clinton et al. 2012](#); [Gailmard and Patty 2012](#); [Ban, Park, and You 2022](#)) and the information asymmetries and theoretical incentives underlying information sharing between Congress and the bureaucracy ([Banks and Weingast, 1992](#); [Bendor, Taylor, and Gaalen, 1987](#)). One formal way through which Congress can request, receive, and publicly disseminate information from the bureaucracy is through bureaucrats' testimonies in committee hearings. While previous work has focused on hearings specific to oversight matters ([McGrath, 2013](#)), hearings can facilitate the exchange of information for legislative matters more broadly.

What drives this information sharing between bureaucrats and Congress? We argue that the partisan alignment between the two drive the amount and type of information that bureaucrats share with Congress in committee hearings. For one, the partisan relationship between Congress and an executive agency, 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 Congress based on the partisan distance between the two branches. 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. The decision of how much to help Congress with information, and the ability to do so, thus may depend on whether the bureaucrat faces partisan incentives that underlie their type of position.

We show how partisan incentives drive the amount and quality of information that bureaucrats share with Congress using a newly constructed dataset on bureaucratic witnesses from 1961-2018. We extend data in [Ban, Park, and You \(2022\)](#) by adding the federal agency affiliation and appointment type for each bureaucratic witness who testified in Congress during this six decade time span. What results is a dataset that, for the first time, provides the name of the agency of each bureaucrat who appeared in Congress, allowing the linkage of time-varying agency-level characteristics such as ideology. 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.

As not all information is equal, we combine this data with a crowd-sourced supervised learning method that captures a specific aspect of information conveyed in each bureaucrat's testimony. 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 method significantly improves previous dictionary-based measures of information (e.g. [Ban, Park, and You 2022](#); [Esterling 2011](#)) as it uses human judgement to measure the concept of interest, rather than being dependent upon a set of researcher-selected words that may be incomplete.¹ The new measurement strategy in this paper thus results in a more accurate, validated measure of information content specific to witness testimony in Congress.

¹Additional problems with previously used dictionary methods may arise because 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) the potential that homonyms can be used for a different meaning. Our approach in this paper solves these issues.

Using our data and measure of information, we find that under divided government, bureaucrats provide significantly less analytical information to Congress in both legislative hearings and oversight hearings. A placebo test with non-bureaucratic witnesses shows that this is not the case for other types of witnesses, suggesting that the presence of divided government has a distinct effect on bureaucrats that leads them to uniquely share less analytical information with Congress. Additionally, while previous work has found performance or quality differences between bureaucrats who are politically appointed and careerists (Lewis, 2007), our results show there is no significant difference between the level of analytical information shared with the committees by political appointees and careerists. While political appointees and careerists may face different political incentives given their position type, when it comes to their decision over information sharing with Congress, the presence of divided government between the two branches dominates as the main driver of how much and what kind of information bureaucrats provide to Congress.

Altogether, this article advances and tests a theory of how partisan incentives that bureaucrats face drive the information exchange between the executive and legislative branches. 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), there has been relatively less attention paid to the decisions that bureaucrats make when faced with the prospect of sharing information and expertise with Congress. Our findings fill a gap by revealing how the partisan alignment between Congress and the executive agencies can affect how much information bureaucrats provide to members of Congress during the legislative process.

2 Bureaucrats and Information Sharing with Congress

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, this work leaves unanswered the question of when and why

bureaucrats may be more likely to provide higher levels of information useful for policymaking to Congress.

The information advantage that bureaucrats have on program implementation is a crucial factor in the canonical power balance between Congress and the bureaucracy. While the traditional delegation models, such as in [Huber and Shipan \(2002\)](#), focus on how Congress can influence this power balance in policymaking by choosing the amount of delegation that 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, Congress or the bureaucracy, 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](#); [Miller and Moe, 1983](#)).

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 and develop expertise on the job. For instance, research has argued that politically-appointed bureaucrats bring high levels of human capital, responsiveness, and energy to the executive agencies ([Bok, 2003](#); [Moe, 1985](#); [Maranto, 2005](#)). Career bureaucrats, especially those who have advanced through the ranks, have been seen to possess subject area expertise and public management skills ([Cohen, 1998](#); [on the Public Service, 1989, 2003](#)), and research has shown that this translates to higher federal program performance ([Lewis, 2007](#)). Further, [Gailmard and Patty \(2007\)](#) emphasize how bureaucrats learn and acquire expertise on the job, going as far to say that “bureaucrats are not born with all the skills they need to expand bureaucratic capacity and expertise,” and that this expertise is gained through incentives in public service.

Regardless of where bureaucratic expertise comes from, either brought to the job or gained through the job, 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 that bureaucrats have an informational advantage, and that Congress can benefit from this information when producing policy, how, then, is information shared between the bureaucracy and Congress? One formal way that Congress can request and receive information from the bureaucracy is through congressional committee hearings. Hearings are a main way that Congress can both examine how much information bureaucrats have and request specific pieces of information from bureaucrats. Committees can call bureaucrats to testify at hearings and question them; they can do so armed with the power of subpoena if necessary (Heitshusen, 2017). Perhaps the most conspicuous way bureaucrats appear in hearings, though, is when congressional committees conduct oversight of the bureaucracy. Not surprisingly, scholars have followed by using the frequency of oversight hearings as a measure of the amount of oversight that committees conduct (e.g. Kriner and Schickler 2016; McGrath 2013).

Outside of the oversight context, 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 (2022) find that when committees hold legislative hearings, they invite lower rates of bureaucrats during periods of divided government and substitute these bureaucrats with witnesses from think tanks, universities, and witnesses from within Congress itself. 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 they are compelled to appear when invited by Congress to testify, bureaucrats can control how much, and what, information to actually share with Congress. We expand upon the existing literature above and explore when bureaucrats may be incentivized by the partisan alignment between the two branches to provide more (or less) information when requested by Congress.

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. Previous literature shows that the majority party in Congress strategically use hearings to control the executive branch and to 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 stark partisan incentive that Congress uses to their benefit at the expense of the president during investigative hearings. We expect that this partisan incentive also determines the behavior of *bureaucrats*, and in hearings more broadly, on legislative matters. 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, for instance when the executive branch is of the same party of Congress or when the ideological distance between the agency and Congress is low. When bureaucrats are misaligned with Congress, however, as when the executive branch is of the opposite party of Congress or when the ideological distance between the agency and Congress is high, bureaucrats are less likely to assist Congress by withholding expertise, since providing this expertise could be used by legislators to develop policy that may be against bureaucrats' preferences.

What do we mean by expertise? Bureaucrat 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 in each agency 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. [Ban, Park, and You \(2022\)](#), measuring the amount of falsifiable information present in witness testimonies, find that among all types of witnesses, bureaucrats are the type that provide the highest levels of falsifiable statements in their testimonies. 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. This is similar to the type of information measured in [Ban, Park, and You \(2022\)](#), though in this paper, we refine this measure to be specific to the style of language that bureaucrats use in their testimonies (more explanation is provided in Section 3.3). We choose to focus on this aspect of informational content in witness testimonies because previous studies have shown that legislators engage in searching for falsifiable or technical information when making laws, it can be systematically constructed and replicable unlike survey measures, and is widely applicable to information regardless of specific policy area.

Combining this with our argument about partisan alignment, we hypothesize that under divided government, bureaucrats will provide less analytical information to Congress in committee hearings. We also consider the ideological distance between the committee and the agency of a testifying bureaucrat and hypothesize that as this distance increases, the bureaucrat will also provide less analytical information to Congress in committee hearings.

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. Their positions may be subject to that president remaining in power or 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. 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. Following this, we hypothesize that bureaucrats who are political appointees provide lower amounts of analytical information to Congress in committee hearings than bureaucrats who are careerists.

3 Data and Descriptive Statistics

3.1 Data Construction Process

We construct a new dataset on bureaucratic witnesses in congressional hearings from 1961-2018 using ProQuest Congressional. Building on the data collection in [Ban, Park, and You \(2022\)](#) which identifies the types of witnesses, here, we focus on witnesses who are federal bureaucrats from the 15 executive departments and 55 independent agencies as defined by the Office of Personnel Management (OPM).

After identifying the full list of bureaucratic witnesses, we clean their affiliations in order to match their affiliation with the official name of a federal agency. This is necessary because while the hearing transcripts provide the affiliations for witnesses, for bureaucratic witnesses, these provided affiliations 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 the statistical branch of the US Department of Agriculture) or as an acronym (e.g., "AEC" for Atomic Energy Commission). Given that most of the agency-level variables are available at the parent agency level, we matched each bureaucratic affiliation to the parent agency. We use the various sources such as the OPM website to find the list of the federal government agencies and their parent organizations.² We used both an automated process and extensive manual cleaning to identify the parent agency of each bureaucrat witness' affiliation.

What results is the construction of a dataset that, for the first time, provides the official name

²OPM website: <https://www.opm.gov/about-us/open-government/Data/Apps/Agencies/>; USA.GOV website: <https://www.usa.gov/branches-of-government>.

of a parent agency for each bureaucrat appearing in a congressional committee hearing from 1961-2018. The existing research has only tracked the aggregate number of bureaucrat appearances in hearings, without examining which agency the bureaucrat is from. Thus, our dataset provides the first opportunity to connect a bureaucrat's appearance in a hearing to the agency that the bureaucrat belongs to.

Next, we use the OPM data to identify whether a bureaucratic witness is a political appointee or a career bureaucrat. In May of 2017, BuzzFeed News completed a successful Freedom of Information Act request for the personnel records of the federal government. This data included a quarterly snapshot of the entire executive branch from 1977 to 2014. In addition to who drew a federal paycheck, the data also included which pay plan they were on, their appointment authority, age, length of service, and several other descriptions of the job.³ We note that one limitation of this OPM data is that it omits some agencies or individuals. For example, bureaucrats in the agencies directly related to national security are not included in the OPM data (e.g., Department of Defense). There are other agencies not directly related to national security concerns but are also omitted such as the Tennessee Valley Authority.⁴

The main characteristic of bureaucrats we are interested in for our first hypothesis on information sharing is whether the bureaucrat is a political appointee or a careerist. Following [Spenkuch, Teso, and Xu \(2021\)](#), we identify political appointees if the appointment type variable in the OPM's data are 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).⁵ After identifying political appointees, we extract them from the OPM data and merge with the witness data. In the OPM data, we have a unique identifier for each bureaucrat (`pseudo_id`) but there is no unique identifier across the files. Hence, we use a bureau-

³<https://www.buzzfeed.com/tag/opm>

⁴For a full set of the agencies that are not included in the OPM data, see [Spenkuch, Teso, and Xu \(2021\)](#)'s Appendix F.1.

⁵OPM webpage (<https://dw.opm.gov/datastandards/referenceData/1585/current?index=T>) provides 18 different types of appointments for federal bureaucrats. Among them, the codes 36 and 46 are PAS; the codes 55, 60, 65 are PA; and the code 44 is schedule C appointment. We consider the remaining types as career bureaucrats.

crat's last name, first name, agency name, and year to identify political appointees in the witness data. Given that we do not merge the universe of bureaucrats in the OPM data with the bureaucratic witness data but only use the political appointees from the OPM data, the merge does not generate many duplicates to deal with.⁶ One caveat is that for the agencies that are not included in the OPM data, we do not have information about individual bureaucrat's appointment type. Given the OPM data coverage, our main analysis is limited to years from 1977 to 2014.

Next, we merge the agency-level variables. First, we merge the agency ideology measure from [Chen and Johnson \(2014\)](#) who use bureaucrats' campaign contributions to estimate the agency-level ideology. Given that our witness data covers several decades, we need time-varying ideology measures but other existing measures of agency ideology such as [Richardson, Clinton, and Lewis \(2018\)](#) are time-invariant. [Chen and Johnson \(2014\)](#) provides time-varying agency ideology measures for the period from the start of Clinton's first term (1993) to the end of Obama's first term (2012). Agency ideology does not vary within a president's term but at least this measure provides the time-varying agency ideology across different presidents. Another benefit of using [Chen and Johnson \(2014\)](#) is that the measure allows us to calculate the ideological distance between politicians and the agency since both measured on a common-scale. Other scholarly work on intergovernmental relations (e.g., [Lowande \(2018\)](#)) also use [Chen and Johnson \(2014\)](#)'s ideology measure to calculate the difference in ideology between politicians and federal agencies.

We also include the hearing-level information. At the hearing-level, we have information on committees that hold hearings, a type of hearing (legislative, oversight, and confirmation), attached bill(s) for referral hearings, and the major issue that hearings address. For committee member-level information, we include committee chair's and the median members' DW-NOMINATE score and the number of committee members. At the witness-level, we include the total number of witnesses invited, number of witnesses in each type (e.g., Corporations, State & Local Government etc.).

⁶There are a few cases where last name, agency, and year were matched but not the first name. For those cases, we went through the cases manually and checked whether the way first names are recorded in the witness data and the OPM data prevented merging (e.g., Chris Johnson vs. C. Johnson). We found 3,475 of those cases and manually checked if a bureaucrat in the witness data and a bureaucrat in the OPM data are the same person.

3.2 A Descriptive View of Bureaucrats Who Testify in Congress

Our main dataset includes 100,230 bureaucrats from 15 executive departments and 55 independent agencies. This spans bureaucrats who testified in Congress from 1977 to 2014 (95th through 113th Congress). This range of coverage is determined by the availability of the OPM data. We have 38,717 hearings (65.2% in the House and 34.8% in the Senate) in our data. We classified hearings into two types: legislative or oversight/investigative.⁷ For the classification, we follow [McGrath \(2013\)](#) to identify oversight/investigative hearings based on key words in the description of hearings.⁸ We classify hearings that are not oversight or investigative as legislative hearings.⁹ Using this procedure, among the hearings that have at least one bureaucrat appearing, 74% are legislative hearings and 26% are oversight hearings.

Figure 1 shows the share of oversight hearings among all hearings that featured at least one bureaucrat for the period 1977-2014. 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 of Congress.¹⁰ Among the legislative hearings, the top five issues were Defense, Domestic Commerce, International Affairs, Government Operations, and Health. For oversight hearings, the top five issues were

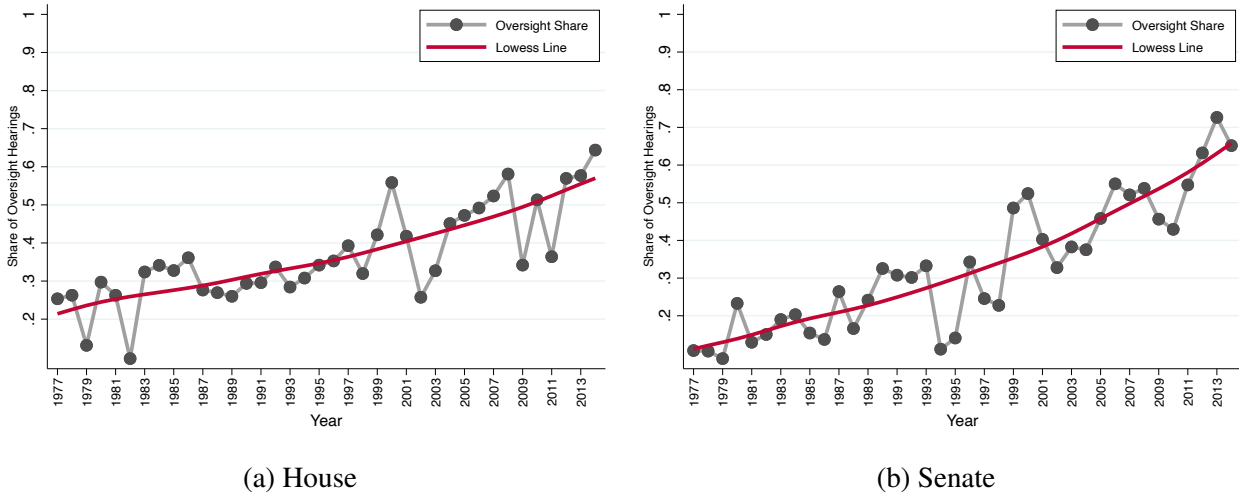
⁷We drop nomination hearings in the Senate from the dataset.

⁸Specifically, [McGrath \(2013\)](#) uses Policy Agenda Project's description of that hearing contain one or more of the following words to identify oversight/investigative hearings: "oversight," "review," "report," "budget request," "control," "impact," "information," "investigation," "request," "explanation," "president," "administration," "contract," "consultation," "examination."

⁹Classifying hearings into legislative vs. oversight is not straightforward since there is no formal code assigned by the committees about the type of hearings. Other scholars take a different approach to identify oversight hearings. For example, [MacDonald \(2022\)](#) defines oversight hearings that are "inclusive of all hearings in which legislation is not considered" (p.9) and this approach takes a much broader definition of oversight hearings than ours.

¹⁰Figures A1 in the Appendix shows that a similar trend of an increasing share of oversight hearings is observed when we examine all hearings, regardless of the presence of bureaucratic witnesses over longer time span. When we define oversight hearings more broadly as hearings with no bill attached, we see a similar pattern of increasing share of oversight hearings over time, as Figure A2 shows. [MacDonald \(2022\)](#) argues that even though oversight hearings have increased over time, the share of oversight hearings that invited bureaucrats have declined which implies the less attention to bureaucrats' performance by Congress. [MacDonald \(2022\)](#) supports his argument by examining the hearings held by the House Committee on Energy and Commerce for the period 1969-2018. We replicate his analysis for the entire oversight hearings in the House and Figure A3 shows that the share of oversight hearings without a presence of a federal bureaucrat has increased since 1980s. Figure A4 presents the results by the House Committee. Although there is variation across committees, overall, the share of oversight hearings without featuring a federal bureaucrat has increased in the most House committees.

Figure 1: Share of Oversight Hearings among Hearings that Featured Bureaucrats



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 the nomination hearings for the Senate.

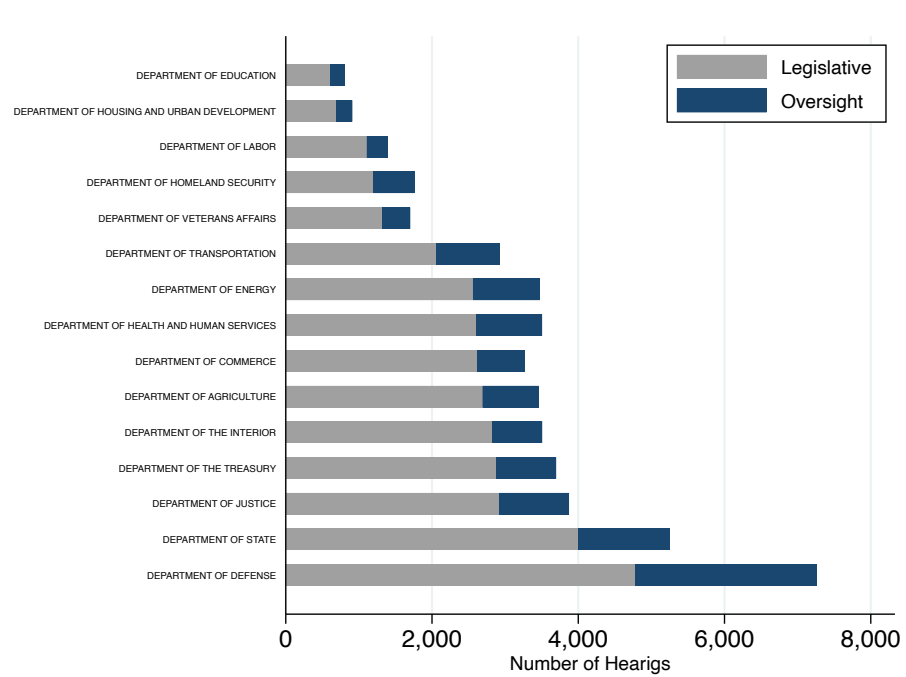
Defense, Government Operations, Domestic Commerce, International Affairs, and Transportation.

Figure 2 shows the number of legislative and oversight hearings that bureaucrats testified in, by the executive department of the bureaucrat. There is significant variation in terms of how frequently bureaucrats from a particular department were invited to congressional hearings. The Department of Defense was the most frequent executive department from which bureaucrats were invited to testify, followed by the Departments of State, Justice, and Treasury. Among the independent agencies, bureaucrats from the Environmental Protection Agency (EPA) testified the most in hearings, followed by the Federal Reserve, Office of the Trade Representative (USTR), US Agency for International Development (USAID), Small Business Administration, and the National Aeronautics and Space Administration (NASA). At the agency level, as the number of hearings they testified in increased, the share of oversight hearings also increased.¹¹

We also explore trends in the types of bureaucrats who appeared in congressional hearings based on their appointment mode. Figure 3 shows the number of career bureaucrats and political

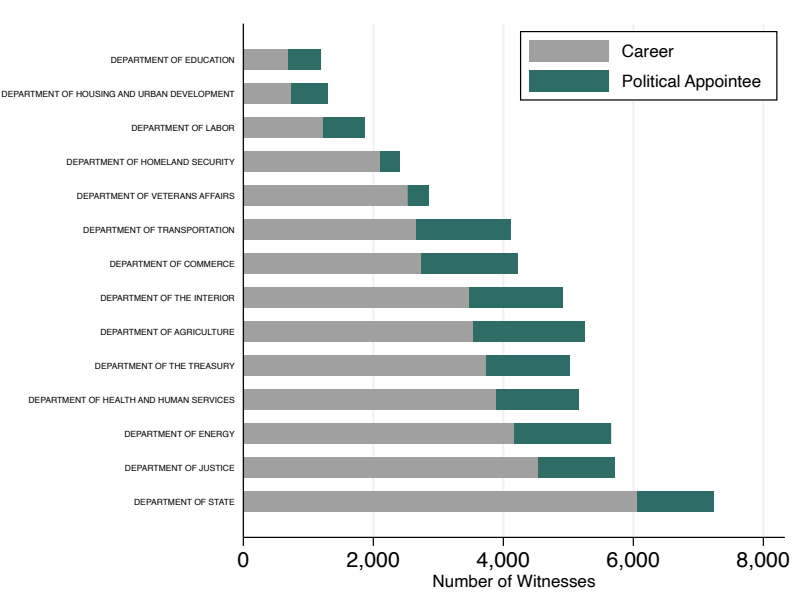
¹¹Figure A5 shows the number of legislative and oversight hearings by independent agencies. Figures A6 and A7 show the total number of bureaucratic witnesses from executive departments and independent agencies, respectively. Number of bureaucratic witnesses from each agency closely follow the number of hearings that involved each agency as presented in Figure A2.

Figure 2: Types of Hearing at the Agency-Level, 1977-2014: Executive Departments



Notes: The figure shows the number of legislative and oversight hearing by the executive department based on the appearance of bureaucrats from each department for 1977-2014. The figure combines hearing both in the House and the Senate.

Figure 3: Career vs. Political Appointees among Bureaucratic Witnesses: Executive Departments



Notes: The figure presents the total number of career bureaucrats and political appointees appeared in hearings from the executive departments. Department of Defense (DOD) is excluded from the figure since the OPM data does not include bureaucrats from the DOD and we do not have readily available information for bureaucrats’ appointment type.

appointees testifying in hearings, by executive department.¹² The share of testifying bureaucrats who are political appointees is similar when looking across departments, with the exception of the Departments of Homeland Security and Veterans Affairs. In these two latter departments, the share of bureaucrats testifying who are political appointees is lower compared to the other departments.

Table 1 shows summary statistics at the hearing level. For each chamber, we present separate statistics for legislative and oversight hearings. There is no significant difference in terms of the number of total witnesses, number of agencies invited, or number of bureaucrats testifying across different types of hearings. Among the hearings that featured at least one bureaucrat, a committee invites, on average, 1.6 agencies and 2.3 bureaucrats. At the hearing level, a quarter of invited bureaucrats are political appointees and around 40% of hearings featured at least one political appointee as a witness.

¹²The Department of Defense (DOD) is omitted because the OPM data does not include the information of the DOD bureaucrats so we do not have information for the DOD bureaucrats’ appointment mode. Figure A8 in the Appendix presents the types of bureaucrats by independent agencies.

Table 1: Summary Statistics on Bureaucratic Witnesses at Hearing-Level

Variable	House		Senate	
	Legislative	Oversight	Legislative	Oversight
Number of Witness	10.3	9.7	10.2	8.1
Number of Agency	1.6	1.6	1.6	1.7
Number of Bureaucrat	2.3	3.2	2.3	3.3
Share of Political Appointee	0.23	0.26	0.26	0.30
Share of Hearings with Political Appointee	0.34	0.40	0.37	0.44
Total Number of Hearings	18,372	6,858	10,408	3,079

3.3 Bureaucrats’ Provision of Analytical Information

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 bureaucrats’ testimonies. To make this usable for future research on other types of witnesses, we measure this concept for all witness testimonies, not just bureaucratic witnesses.

Witnesses can provide various types of information, such as an analytical, scientific analysis of a 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 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 (Bradley 1980; 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 (Ban, Park, and You 2022; Burgat and Hunt 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 the

105th to 115th Congresses¹³ and a crowd-sourced supervised learning method that follows previously established practices (Carlson and Montgomery, 2017; Park, 2021).¹⁴ First, we define a testimony as analytical if it is 1) fact-based, 2) verifiable through research or a data-driven analysis, or 3) objective, the set of concepts largely consistent with the definition of “falsifiable” information presented in Esterling (2004).¹⁵ Second, 3,929 sample statements were coded by online workers at the Amazon Mechanical Turk (MTurk).¹⁶ Specifically, we presented a randomly selected pairs of two statements to the online workers and asked them to choose the one that is more analytical. Using their responses to 43,000 of these pairwise comparisons and fitting the Bradley-Terry model described in Carlson and Montgomery (2017), each sample statement received a score ranging from -2.7 to 2.8. The graph on left-hand side of Figure 4 presents the distribution of this human-coded scores for the sample paragraphs. Third, we randomly selected 3,500 sample statements to be use as a training set, set 426 statements aside as a validation set, and ran eight machine learning models.¹⁷ Fourth, we constructed the final model using the ensemble Bayesian model

¹³The data were collected from the Government Publishing Office website: <http://www.govinfo.gov>

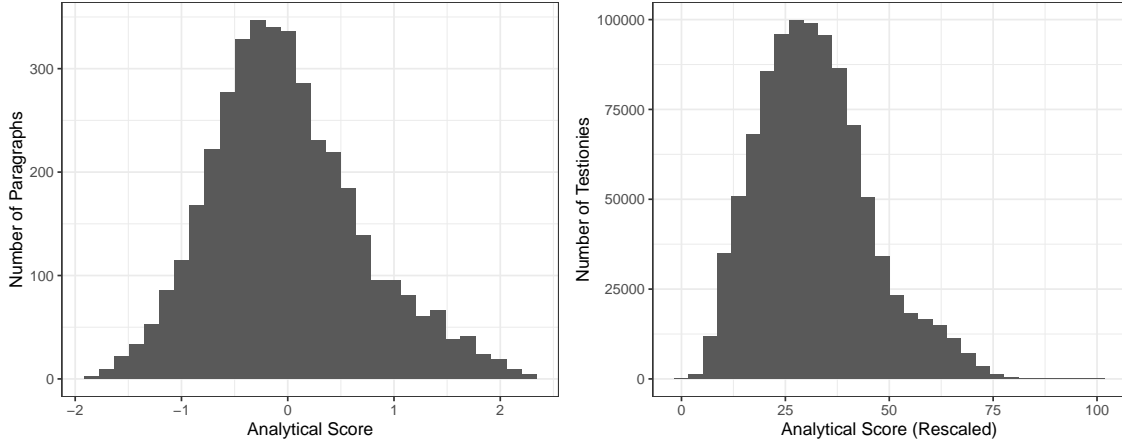
¹⁴A supervised learning method is preferred than unsupervised learning models when a researcher has a preset idea on how to classify texts. It performs much better than a dictionary-based approach because it relies on human judgment which more holistically capture the concept of interest and can manage to improve loopholes of the dictionary method by, for example, weighing each word differently and using context that a word is used through a construction of n-grams or word-embeddings.

¹⁵To help clearer understanding of 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) everything else not containing the analytical information as defined above. Also, note that Esterling (2011) considers a falsifiable statement as a broader category which is composed of two sub-categories: an “evidence-based” statement referring to a claim that has been already researched and an “analytical” statement if the statement has not been researched yet but can be empirically refutable. However, when he compares his coding scheme to the classification of arguments proposed by Habermas (1984), he confirms that all these four concepts (i.e., analytical, falsifiable, evidence-based, objective) constitute one of the three mutually exclusive and exhaustive types in Habermas’s work. The other two types are “normative” and “experiential” arguments respectively (See p.193 in Esterling (2011)). Therefore, our coding scheme is consistent with these previous studies.

¹⁶The coding was fielded in two stages. In the first stage, we randomly sampled 3,300 paragraphs from witness testimonies. Due to the lack of variation in the concept of analytical information in this sample, however, machine learning models did not perform well in predicting human-coded labels. Thus, we decided to conduct a random block sampling to over-sample paragraphs containing more analytical keywords as defined in Ban, Park, and You (2022) (See Park and Montgomery (2022) for more discussion on the importance of sampling and how to manage sampling and measuring a latent trait with a skewed distribution using a supervised learning method.) Thus, we added 626 more paragraphs to the training set. More detailed explanation about the selection process and the instructions used to train the online workers are in section B.1 and B.2 of the SI.

¹⁷We constructed two document-level matrices: a term-document frequency matrix and a doc2vec matrix. For each matrix, we fitted four learning models: support vector machine, Kernlab’s support vector machine, LASSO, and Gradient Boosting Machine. The choice of these models and tuning parameters are explained in section B.3 of the SI.

Figure 4: Distribution of the Analytical Information

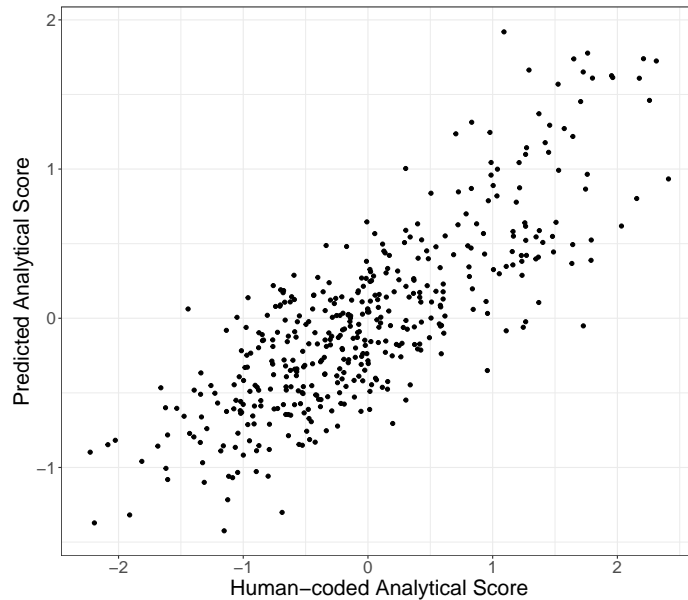


averaging technique that assigns weights to each model in order to achieve the optimal prediction performance (Montgomery, Hollenbach, and Ward 2012). Using the final model, we predicted the score for the entire corpus of witness testimonies and rescaled the measurement to range between 0 and 100. For the rest of the paper, we will refer to the predicted score as “analytical score.” The graph on right-hand side of Figure 4 shows the distribution of the 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, the statements that were not used to fit machine learning models. The Pearson correlation coefficient between the human-coded labels and the model predictions is 0.81, and the Root Mean Squared Errors (RMSE) is the 0.53. Figure 5 presents this correlation. Compared to other prediction practices (Park 2022; Park and Montgomery 2022) that used similar measurement processes, this indicates highly satisfactory performance of our model, suggesting that it effectively captured the aspects of the latent trait we aimed to measure statistically. We provide further statistical and substantive validation of the score in section B.4 of the Supplementary Information (SI).

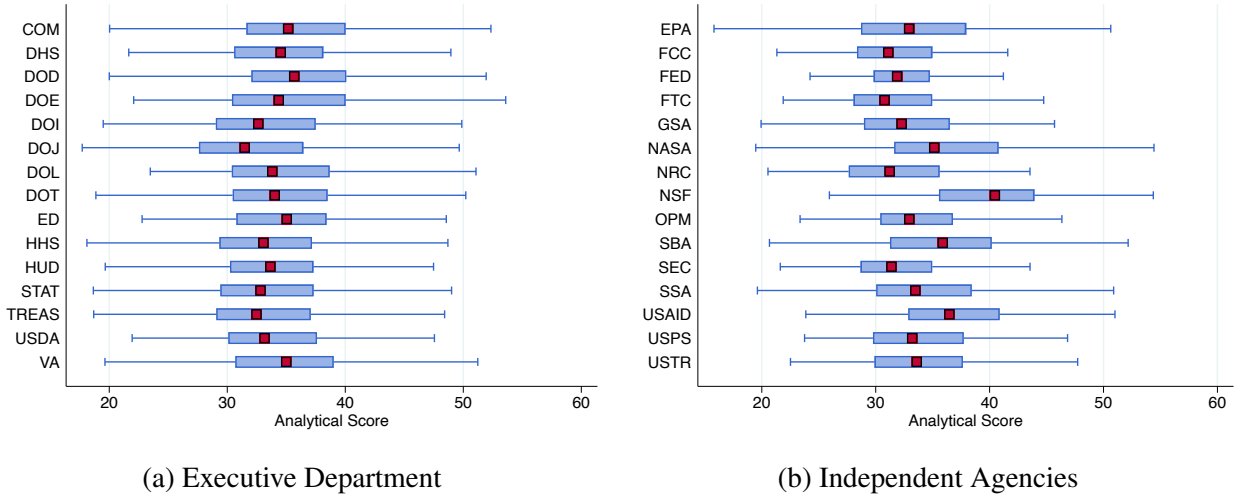
Then, to conduct a witness-level analysis, we aggregated the analytical score by witness and hearing, and merged the observations to our witness data. We identified 13,220 witnesses from bureaucratic agencies with this score available. Ban, Park, and You (2022) show that bureaucratic

Figure 5: Validation of the Final Ensemble Model



witnesses tend to give testimonies with the highest proportion of analytical information compared to other types of witnesses. When we limit the focus only to bureaucratic witnesses, we observe a significant variation in the degree of analytical information even among bureaucratic witnesses. Figure 6 presents the distribution of the analytical score at the agency-level. A square mark indicates the median value of the agency score at the agency. Figure (a) shows the distribution of the analytical score by executive department. There is little variation across agencies here, and instead, there is more within-department variation. Figure (b) presents the distribution of the analytical information score at the independent agencies. Since the number of independent agencies in our sample is 55, for illustrative purposes, we present the top 15 independent agencies with the most number of bureaucrats who testified in hearings. Agencies such as the National Science Foundation (NSF) and the National Aeronautics and Space Administration (NASA) show a higher mean value than other agencies. This pattern provides substantive validation of our measurement to some extent. We can see that there is more variation across agencies here than across executive departments. However, similar to the executive departments, the amount of within-agency variation is still larger than across-agency variation for independent agencies.

Figure 6: Distribution of the Analytical Score By Agencies



Notes: Figures present the distribution of analytical scores by the executive departments (a) and independent agencies (b). For the independent agencies, we select top 15 agencies in terms of the number of hearings. The bars' range indicates the minimum and maximum values and the boxed area indicates the interquartile range, with the median value of the analytical score by agency is marked by the red square.

4 Political Incentives and Information Sharing

In this section, we empirically test our hypotheses for how partisan incentives underlying the partisan alignment between Congress and the agency and the type of bureaucrat drive the amount of analytical information that bureaucrats share. Following our hypotheses, we focus on two types of independent variables: bureaucratic characteristics, such as whether the bureaucrat is a political appointee or a careerist, and the inter-branch partisan relationship, such as the presence of divided government and the ideological difference between the committee and agency of the testifying bureaucrat.

We run the following regression:

$$Y_{b\text{hict}} = \beta_1 \text{Political Appointee}_b + \beta_2 \text{Divided Government}_t + \beta_3 \text{Ideology Distance}_{bc} + \Gamma X_{\text{hict}} + \alpha_i + \alpha_c + \alpha_p + \varepsilon_{\text{hict}} \quad (1)$$

where the subscripts indicate bureaucrat b , hearing h , issue i , committee c , congress t , and president p . The unit of observation is bureaucrat by hearing. The Political Appointee takes the value of 1 if a bureaucrat is a political appointee (PAS, PA, SES in the OPM’s appointment code). The *Divided Government* equals 1 when the majority party in the House is different from the party of the president and equals 0 otherwise. The *Ideology Distance* indicates the absolute difference between the committee chair’s DW-NOMINATE score and the ideology of bureaucrat’s affiliated agency, measured by [Chen and Johnson \(2014\)](#) at the hearing-level. Other committee-level and hearing-level control variables (i.e. the number of witnesses in a hearing, the type of a bureaucrat’s appointment, the committee chair’s grandstanding score ([Park 2021](#))) are included as controls. We also include the variable *Democratic Majority*, which equals 1 when the Democratic Party is in majority of the House and equals 0 otherwise (when the Republican Party is in the majority), as a control. Both *Divided Government* and *Democratic Majority* are at the congress-level; in order to estimate the effects of these variables that vary by congress and to control for time-trend, we include president fixed effects (α_p). We also include issue fixed effects (α_i) and committee fixed effects (α_c). In some specifications, we replace the committee fixed effects with agency fixed effects. The outcome variable Y_{bhict} will measure the three characteristics from bureaucrats’ testimonies: (1) number of speaking instance (*No.Speech*), (2) number of words (*No.Word*), and (3) the analytical score (*Analytical Score*).¹⁸

Given that we need to merge different datasets and some variables only cover a limited time period or a subset of agencies, the number of observations significantly varies depending on our empirical specifications. [Table 2](#) presents the coverage of different datasets used in our analysis. The most significant limitation comes from the measurements of bureaucrats’ testimonies, such as the analytical score, which are available for bureaucratic witnesses who appeared in the House hearings from 1997 to 2014 and time-varying ideology measure for agencies which covers the period 1993-2012. Given the data coverages, most of our results are based on hearings between 1997 and 2012, which covers the second term of Bill Clinton administration (1997-2000), two terms of

¹⁸Table [A1](#) in the Appendix presents the summary statistics on the variables are included in the regression analysis.

the George W. Bush administration (2001-2008), and the first term of the Obama administration (2009-2012).

Table 2: Data Coverage

Variables	Years Covered	Number of Agencies Covered	Observations	Note
OPM data	1977-2014	70	100,703	
Political Appointee	1977-2014	64	77,913	No OPM information for a subset of agencies (e.g. DOD)
No.Speech	1997-2014	68	13,220	Only House hearings
No.Word	1997-2014	68	13,220	Only House hearings
Analytical Score	1997-2014	68	13,220	Only House hearings
Agency Ideology	1993-2012	53	20,404	Time-varying across presidents

First, Table 3 presents the results for all legislative hearings. We present the results from the empirical specification that includes the ideological difference between the committee chair and the agency as well as a bureaucrat’s appointment type. This significantly reduces the number of observations from the original dataset because there is a limited data availability for these two variables. In Table A2 in the Appendix, we present the results that only include the ideology measure or/and the type of appointment not to exclude particular agencies or periods. The results are similar to the results presented in Table 3. We find that, under the divided government, bureaucrats have more speaking instances but bureaucrats’ hearing testimonies include less analytical information. Given that the mean value of the analytical score is 34.5, a divided government is associated with 3.1% decrease in the analytical score (based on the result under the Column (3)). The negative effect of divided government on the analytical score survives when we include the agency fixed effects instead of committee fixed effects (Column 4).¹⁹ The absolute difference in the ideology between the committee chair and the agency has a similar effect on bureaucrats’ testimonies. A larger ideological distance is associated with more speaking instances but less sharing of analytical information, although the results on the analytical score is not robust.

¹⁹We also run a specification both with the committee fixed effects and agency fixed effects on top of the president- and issue-fixed effects. This implies that we exploit a very small variation for the identification but the *Divided Government* result is robust.

Table 3: Bureaucrat's Provision of Analytical Information: Legislative Hearings

	Outcome Measures			
	(1) No.Speech	(2) No.Word	(3) Analytical Score	(4) Analytical Score
Divided Government	0.169** (0.0622)	0.0567 (0.0466)	-1.086*** (0.262)	-0.852** (0.393)
Chair DW-Agency Ideology	0.236** (0.0954)	0.114 (0.0708)	-1.072 (0.935)	-1.796** (0.825)
Political Appointee	0.239*** (0.0253)	0.225*** (0.0243)	0.361 (0.271)	0.212 (0.294)
Democratic Majority	-0.0529 (0.0448)	-0.0195 (0.0361)	-0.162 (0.377)	-0.0492 (0.459)
Chair Grandstanding Score	-0.00440*** (0.00141)	0.00311*** (0.000915)	0.0219 (0.0247)	0.0466* (0.0237)
Executive Department	0.0559 (0.0617)	0.0999** (0.0432)	0.921* (0.441)	(.) (.)
Subcommittee	-0.169*** (0.0574)	-0.104** (0.0425)	0.898* (0.490)	0.319 (0.458)
Bill	-0.0343 (0.0591)	-0.0749 (0.0458)	-0.759** (0.327)	-1.047** (0.363)
Issue Polarization	0.311** (0.114)	0.0758 (0.0653)	-1.661 (1.330)	-1.038 (1.551)
Number of Witness	-0.0407*** (0.00427)	-0.0342*** (0.00407)	0.0400 (0.0277)	0.0179 (0.0338)
No.Word			-3.308*** (0.302)	-3.403*** (0.311)
President FE	✓	✓	✓	✓
Issue FE	✓	✓	✓	✓
Committee FE	✓	✓	✓	
Agency FE				✓
Mean Outcome Measure	2.7	7.7	34.5	34.5
<i>N</i>	2218	2218	2218	2218
adj. <i>R</i> ²	0.154	0.188	0.159	0.152

* $p < 0.10$ ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at the committee level.

Recent work on the US federal bureaucrats show that Democrats make up the majority of career civil servants. [Spenkuch, Teso, and Xu \(2021\)](#) merge the OPM data with voter files and show that the over-representation of Democrats among civil servants are observed in nearly every department and the share of Democrats increases among bureaucrats with senior ranks. For example, among General Schedule top level bureaucrats, 55% are Democrats and 25% are Republicans. Among bureaucrats with the Senior Executive appointments, almost 65% are Democrats and only 20% are Republicans. This suggests that the effect of divided government on bureaucrats' incentive to share analytical information may be stronger under Republican majority in Congress.

To examine the potential asymmetry depending on the majority party in the House, we split the sample by the congressional majority party. [Table 4](#) presents the results for legislative hearings by majority party. For the brevity, we only present the results on divided government and ideological distance. We observe more robust and larger negative effect of divided government on bureaucrat's sharing of analytical information under the Republican majority than under the Democratic majority. For the ideological difference, we see consistent negative coefficients under both Democrats and Republicans but the ideological distance's negative effect on analytical score is only statistically significant under the Democratic majority when we include agency fixed effects ([Column 4](#) in [Panel B](#)). Overall, we find the robust negative effect of divided government on bureaucrats' sharing of analytical information in their testimonies in legislative hearings but the effect of ideological distance is noisy.

Do we observe a similar result of divided government on bureaucrats' incentive to share analytical information in oversight hearings? Most of the existing work on oversight or investigative hearings focus on the frequency of oversight hearings. Given that committees can use hearings as a tool to exercise control over the executive branch, [Kriner and Schickler \(2016\)](#) document that divided government is positively associated with committees' use of investigative hearings on the executive branch's conduct. Using the number of days for oversight hearings as an outcome measure, [McGrath \(2013\)](#) shows that the divided government and a larger difference between the committee median's ideology and the ideology of the president are associated with more oversight

Table 4: Bureaucrat's Provision of Analytical Information: Legislative Hearings by Majority Party

	Outcome Measures			
	(1) No.Speech	(2) No.Word	(3) Analytical Score	(4) Analytical Score
Panel A: Republican Majority				
Divided Government	0.269** (0.101)	0.0305 (0.0545)	-1.814*** (0.511)	-1.450** (0.531)
Chair DW-Agency Ideology	0.178* (0.0964)	0.0900 (0.0672)	-0.246 (0.919)	-0.529 (0.905)
Controls	✓	✓	✓	✓
President FE	✓	✓	✓	✓
Issue FE	✓	✓	✓	✓
Committee FE	✓	✓	✓	
Agency FE				✓
Mean Outcome Measure	2.7	7.7	34.4	34.4
N	1496	1496	1496	1496
adj. R ²	0.167	0.176	0.147	0.142
Panel B: Democratic Majority				
Divided Government	0.0971 (0.108)	0.0970 (0.0697)	-0.940 (0.607)	-1.233** (0.423)
Chair DW-Agency Ideology	0.761* (0.409)	0.531* (0.274)	-5.439 (3.986)	-6.143** (2.571)
Controls	✓	✓	✓	✓
President FE	✓	✓	✓	✓
Issue FE	✓	✓	✓	✓
Committee FE	✓	✓	✓	
Agency FE				✓
Mean Outcome Measure	2.7	7.7	34.8	34.8
N	722	722	722	722
adj. R ²	0.156	0.202	0.201	0.234

* $p < 0.10$ ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at the committee level.

hearing days. MacDonald and McGrath (2016) go one step further and argue that a newly unified government also uses oversight hearings to undo existing policy made under a past opposition president. However, MacDonald and McGrath (2016)'s main focus is the frequency of oversight hearings, even though they take the purpose of oversight hearings seriously. In this paper, we uncover the dynamics of oversight hearings by examining the information flow from bureaucrats to politicians.

Table 5 presents the results for oversight hearings. As the results under legislative hearings, we see the negative effect of divided government on the analytical scores of bureaucrats' testimonies. The magnitude of the effect is larger than the coefficient under legislative hearings, although including agency fixed effects attenuates the statistical significance.²⁰ We split the sample to examine whether there is any asymmetric effect by the majority party in the House. Table 6 shows the results for oversight hearings by majority party. We see a large, and robust negative effect of divided government on bureaucrats' analytical scores under the Republican majority. Depending on the specification, the reduction of analytical information ranges from 7% (column 4) to 9.4% (column 3) from the mean value of the outcome measure. Under the Democratic majority, we also observe a negative effect of divided government on analytical information but the results are less robust and the magnitudes are smaller. We do not see a consistent result for the effect of ideological difference on bureaucrats' sharing of analytical information in oversight hearings.

Do we observe similar effects of divided government on the provision of analytical information in other types of witnesses? If there is something unique about the nature of the "divided government" *per se*, we might observe the negative effect of divided government in other types of witnesses. If not, the results would suggest that inter-branch relationship between legislative and executive branch under divided government has a unique impact on bureaucratic witnesses' testimonies and their incentives to share analytical information.

²⁰Including the ideology measure and the type of a bureaucrat's appointment significantly reduces the number of observations. Therefore, we also run empirical specifications by excluding both the ideology and appointment type variables as well as just excluding the appoint type variable. The results are presented in Table A3 in the Appendix. The results show that the negative effect of divided government is robust to different specifications and statistically significant at 5% level when we utilize the large number of observations.

Table 5: Bureaucrat's Provision of Analytical Information: Oversight Hearings

	Outcome Measures			
	(1) No.Speech	(2) No.Word	(3) Analytical Score	(4) Analytical Score
Divided Government	0.156 (0.0896)	-0.0199 (0.0800)	-1.780** (0.647)	-1.434* (0.781)
Chair DW-Agency Ideology	-0.133 (0.217)	-0.0406 (0.171)	2.046** (0.829)	0.214 (1.663)
Political Appointee	0.270*** (0.0638)	0.232*** (0.0374)	0.245 (0.414)	0.135 (0.432)
Democratic Majority	-0.0200 (0.0717)	0.00578 (0.0595)	0.755 (0.563)	0.513 (0.456)
Chair Grandstanding Score	-0.00187 (0.00307)	0.000732 (0.00203)	-0.0296 (0.0387)	-0.0270 (0.0484)
Executive Department	-0.113** (0.0409)	-0.0794** (0.0366)	0.207 (0.472)	(.) (.)
Subcommittee	-0.347*** (0.0752)	-0.229*** (0.0514)	1.381*** (0.353)	0.769 (0.507)
Bill	0.0334 (0.120)	-0.0247 (0.0637)	-1.298 (1.207)	-1.611 (1.330)
Issue Polarization	0.362 (0.246)	0.262 (0.158)	-0.391 (1.977)	-0.303 (1.978)
Number of Witness	-0.0426*** (0.00622)	-0.0338*** (0.00523)	-0.00278 (0.0560)	-0.0114 (0.0434)
No.Word			-2.815*** (0.477)	-2.748*** (0.393)
President FE	✓	✓	✓	✓
Issue FE	✓	✓	✓	✓
Committee FE	✓	✓	✓	
Agency FE				✓
Mean Outcome Measure	2.7	7.7	34.9	34.9
<i>N</i>	1087	1087	1087	1087
adj. <i>R</i> ²	0.232	0.264	0.197	0.154

* $p < 0.10$ ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at the committee level.

Table 6: Bureaucrat's Provision of Analytical Information: Oversight Hearings by Majority Party

	Outcome Measures			
	(1) No.Speech	(2) No.Word	(3) Analytical Score	(4) Analytical Score
Panel A: Republican Majority				
Divided Government	0.263 (0.185)	-0.0416 (0.102)	-3.309*** (0.688)	-2.443** (1.014)
Chair DW-Agency Ideology	-0.237 (0.440)	-0.0468 (0.374)	4.083*** (1.203)	2.109 (2.698)
President FE	✓	✓	✓	✓
Issue FE	✓	✓	✓	✓
Committee FE	✓	✓	✓	
Agency FE				✓
Mean Outcome Measure	2.7	7.7	35.0	35.0
<i>N</i>	639	639	639	639
adj. <i>R</i> ²	0.229	0.260	0.199	0.160
Panel B: Democratic Majority				
Divided Government	0.221*** (0.0497)	0.0929 (0.0751)	-1.742** (0.775)	-1.142 (1.054)
Chair DW-Agency Ideology	-0.597 (0.345)	-0.524* (0.256)	0.711 (3.073)	-5.508 (4.263)
President FE	✓	✓	✓	✓
Issue FE	✓	✓	✓	✓
Committee FE	✓	✓	✓	
Agency FE				✓
Mean Outcome Measure	2.8	7.7	34.9	34.9
<i>N</i>	448	448	448	448
adj. <i>R</i> ²	0.263	0.298	0.192	0.194

* $p < 0.10$ ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at the committee level.

Using the analytical score we measure for all types of witnesses, we run the same empirical specification as in equation (1) for non-bureaucratic witnesses. Since we do not have a systematically available ideology measure for all types of non-bureaucratic witnesses, we include the absolute distance of a chair's DW-NOMINATE score from zero, which measures a chair's ideological extremism. Table 7 presents the results. For brevity, we only present the coefficients for divided government and the chair's ideological extremism. The same control variables are included as in the regressions for the bureaucratic witnesses. Panel A and B present the results for legislative and oversight hearings, respectively. Non-bureaucratic witnesses tend to have more speaking instances under divided government, both in the legislative and oversight hearings. Although the effect of divided government on the provision of analytical information is negative for non-bureaucratic witnesses, it is not statistically significant at the conventional level and the magnitude of the effect is rather small. This 'placebo' test result suggests that the inter-branch relationship has a unique effect on bureaucratic witnesses' incentives to share analytical information with committee members.

Table 7: Non-Bureaucratic Witnesses' Provision of Analytical Information

	Outcome Measures		
	(1) No.Speech	(2) No.Word	(3) Analytical Score
<i>Panel A: Legislative Hearings</i>			
Divided Government	0.0531*** (0.0129)	-0.00254 (0.0132)	-0.373 (0.269)
Chair DW - 0	0.238** (0.0851)	0.00314 (0.0542)	-1.651 (0.980)
Controls	✓	✓	✓
President FE	✓	✓	✓
Issue FE	✓	✓	✓
Committee FE	✓	✓	✓
Witness Type FE	✓	✓	✓
Mean Outcome Measure	2.1	7.3	37.9
<i>N</i>	20420	20420	20420
adj. <i>R</i> ²	0.122	0.129	0.088
<i>Panel B: Oversight Hearings</i>			
Divided Government	0.125*** (0.0203)	0.0545* (0.0259)	-0.542* (0.280)
Chair DW - 0	0.136 (0.0981)	-0.0989 (0.0780)	-2.526*** (0.855)
Controls	✓	✓	✓
President FE	✓	✓	✓
Issue FE	✓	✓	✓
Committee FE	✓	✓	✓
Witness Type FE	✓	✓	✓
Mean Outcome Measure	1.9	7.3	38.3
<i>N</i>	11049	11049	11049
adj. <i>R</i> ²	0.148	0.156	0.115

* $p < 0.10$ ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at the committee level.

5 Conclusion

In democracies, those 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 legislators have to 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.

We investigate how political incentives bureaucrats facing influence the information that they share with Congress through committee hearings, a formal channel for information exchange. In order to do so, we contribute 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 six decades of congressional history. To measure the amount of information they share with Congress, we use a crowd-sourced supervised learning method that captures the level of analytical information conveyed in each bureaucrat’s testimony. This approach improves upon previous measures in the literature that had relied on strict dictionary-based measurement.

Building upon previous research that has observed differences in skill and competency across agencies and in performance in management between political appointees and careerists, we investigate what kinds of bureaucrats are more likely to provide higher levels of analytical information. Contrary to the differences found by other scholars in other outcomes such as performance ratings or competencies (e.g. [Lewis 2007](#); [Richardson, Clinton, and Lewis 2018](#)), we do not find significant differences in the amount of analytical information that political appointees and careerists share with committees in hearings. When looking across agencies and executive departments, there seems to be more variation in the amount of analytical information shared by bureaucrats

when looking within-agency compared to that across-agency.

What does drive information sharing between bureaucrats and Congress, though, is the partisan alignment between the bureaucracy and Congress. We find that as the absolute distance between the committee chair's ideology and the agency's ideology grows, a bureaucrat from that agency will provide less analytical information when testifying in a legislative hearing held by that committee chair. Further, the sharpest divide in partisan alignment between bureaucracy and Congress occurs during divided government. Under divided government, bureaucrats are faced with the most conspicuous difference in political incentives: they are from an executive branch that is controlled by a different party than the majority party in Congress. We find that during divided government, bureaucrats provide significantly less analytical information in their testimonies during committee hearings – a behavior that persists in both legislative and oversight hearings. This suggests that bureaucrats strategically 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 provides 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 oversight activities of Congress over the executive branch, but outside of oversight, information is a crucial currency and input to *legislative* decisions and outcomes as well. As this paper shows, the partisan alignment between Congress and bureaucrats holds important implications for the information that members of Congress receive during the legislative process. As the quality of information can shape policy decisions with far-reaching consequences, especially in complex scientific issues that face society today such as climate change or pandemic response, understanding what affects information sharing within government—between Congress and bureaucrats, one of Congress' best sources of policy information—is paramount.

References

- Ban, Pamela, Ju Yeon Park, and Hye Young You. 2022. "How Are Politicians Informed? Witnesses and Information Provision in Congress." *American Political Science Review* (Forthcoming).
- Banks, Jeffrey S., and Barry R. Weingast. 1992. "The Political Control of Bureaucracies under Asymmetric Information." *American Journal of Political Science* 36 (2): 509-524.
- Bellodi, Luca. 2022. "'Listen to me': Ideological Agreement and Bureaucratic Influence in the Legislative Arena." *Working Paper* (http://lucabellodi.com/bur_influence.pdf).
- Bendor, Jonathan, Serge Taylor, and Roland Van Gaalen. 1987. "Politicians, Bureaucrats, and Asymmetric Information." *American Journal of Political Science* 31 (4): 796-828.
- Blom-Hansen, Jens, Martin Baekgaard, and Soren Serritzlew. 2020. "How Bureaucrats Shape Political Decisions: The Role of Policy Information." *Public Administration* 1 (1-20).
- Bok, Derek. 2003. "Government Personnel Policy in Comparative Perspective." In *For the People: Can We Fix Public Service?*, ed. John D. Donahue and Joseph S. Nye Jr. Brookings.
- Bradley, Robert. 1980. "Motivations in Legislative Information Use." *Legislative Studies Quarterly* 5 (3): 393-405.
- Burgat, Casey, and Charles Hunt. 2020. "How Committee Staffers Clear the Runway for Legislative Action in Congress." In *Congress Overwhelmed: The Decline in Congressional Capacity and Prospects for Reform*, ed. Timothy LaPira, Lee Drutman, and Kevin Kosar. University of Chicago Press.
- Carlson, David, and Jacob M. Montgomery. 2017. "A Pairwise Comparison Framework for Fast, Flexible, and Reliable Human Coding of Political Texts." *American Political Science Review* 111 (4): 835-843.
- Chen, Jowei, and Timothy Johnson. 2014. "Federal Employee Unionization and Presidential Control of the Bureaucracy: Estimating and Explaining Ideological Change in Executive Agencies." *Journal of Theoretical Politics* 101 (4): 657-676.
- Clinton, Joshua, Anthony Bertelli, Christian Grose, David Lewis, and David Nixon. 2012. "Separated Powers in the United States: The Ideology of Agencies, Presidents, and Congress." *American Journal of Political Science* 56 (2): 341-354.
- Cohen, David M. 1998. "Amateur Government." *Journal of Public Administration Research and Theory* 8: 450-497.
- Eldes, Ayse, Christian Fong, and Kenneth Lowande. 2022. "Information and Confrontation in Legislative Oversight." *Working Paper* (<https://lowande.polisci.lsa.umich.edu/file-qualities.pdf>).
- Esterling, Kevin. 2004. *The Political Economy of Expertise: Information and Efficiency*. Ann Arbor: The University of Michigan Press.

- Esterling, Kevin. 2009. "Does the Federal Government Learn from the States? Medicaid and the Limits of Expertise in the Intergovernmental Lobby." *Publius: The Journal of Federalism* 39 (1): 1-21.
- Esterling, Kevin M. 2011. "'Deliberative Disagreement' in U.S. Health Policy Committee Hearings." *Legislative Studies Quarterly* 36 (2): 169-198.
- Gailmard, Sean, and John Patty. 2007. "Slackers and Zealots: Civil Service, Policy Discretion, and Bureaucratic Expertise." *American Journal of Political Science* 51 (4): 873-889.
- Gailmard, Sean, and John Patty. 2012. *Learning While Governing: Expertise and Accountability in the Executive Branch*. University of Chicago Press.
- Habermas, Jürgen. 1984. *The Theory of Communicative Action, Volume One: Reason and the Rationalization of Society*. Boston, MA: Beacon Press.
- Heitshusen, Valerie. 2017. "Senate Committee Hearings: Arranging Witnesses." *Congressional Research Service*.
- Huber, John D., and Charles R. Shipan. 2002. *Deliberate Discretion? The Institutional Foundations of Bureaucratic Autonomy*. Cambridge University Press.
- Krehbiel, Keith. 1991. *Information and Legislative Organization*. University of Michigan Press.
- Kriner, Douglas, and Eric Schickler. 2016. *Investigating the President*. Princeton University Press.
- Lewallen, Jonathan. 2020. *Committees and the Decline of Lawmaking in Congress*. Ann Arbor: The University of Michigan Press.
- Lewis, David E. 2007. "Testing Pendleton's Premise: Do Political Appointees Make Worse Bureaucrats?" *Journal of Politics* 69 (4): 1073-1088.
- Lowande, Kenneth. 2018. "Who Polices the Administrative State?" *American Political Science Review* 112 (4): 874-890.
- MacDonald, Jason. 2022. "The Rise and Fall of Bureaucratic Oversight: The U.S. House Committee on Energy and Commerce, 1969-2018." *Working Paper*.
- MacDonald, Jason, and Robert McGrath. 2016. "Retrospective Congressional Oversight and the Dynamics of Legislative Influence over the Bureaucracy." *Legislative Studies Quarterly* 41 (4): 899-934.
- Maranto, Robert. 2005. *Beyond a Government of Strangers*. Lexington Books.
- May, Peter J., Chris Koski, and Nicholas Stramp. 2016. "Issue Expertise in Policymaking." *Journal of Public Policy* 36 (2): 195-218.
- McGrath, Robert J. 2013. "Congressional Oversight Hearings and Policy Control." *Legislative Studies Quarterly* 38 (3): 349-376.

- Miller, Gary J., and Terry M. Moe. 1983. "Bureaucrats, Legislators, and the Size of Government." *American Political Science Review* 77 (2): 297-322.
- Moe, Terry M. 1985. "The Politicized Presidency." In *The New Direction in American Politics*, ed. J.E. Chubb and P.E. Peterson. Brookings.
- Montgomery, Jacob M., Florian Hollenbach, and Michael D. Ward. 2012. "Improving Predictions Using Ensemble Bayesian Model Averaging." *Political Analysis* 20 (3): 271-291.
- on the Public Service, National Commission. 1989. *Leadership for American: Rebuilding the Public Service*. Brookings.
- on the Public Service, National Commission. 2003. *Urgent Business for America: Revitalizing the Federal Government for the 21st Century*. Brookings.
- Park, Ju Yeon. 2021. "When Do Politicians Grandstand? Measuring Message Politics in Committee Hearings." *Journal of Politics* 83 (1): 214-228.
- Park, Ju Yeon. 2022. "Electoral Rewards for Political Grandstanding: Evidence from Congressional Committee Hearings." *Working Paper* (https://drive.google.com/file/d/1JhV16vJr_iUxZPC7bd9pJ-gNq6zw_zHp/view?usp=sharing).
- Park, Ju Yeon, and Jacob M. Montgomery. 2022. "Validating the Text-to-measure Pipeline: A Procedure-based Approach to Creating Measures of Latent Concepts with Supervised Machine Learning." *Working Paper* (https://drive.google.com/file/d/1W7tfqkURz1Wu6xFGH1BEnfec4Tyn7F5_/view?usp=sharing).
- Richardson, Mark, Joshua Clinton, and David Lewis. 2018. "Elite Perceptions of Agency Ideology and Workforce Skill." *Journal of Politics* 80 (1): 303-308.
- Spenkuch, Jorg, Edoardo Teso, and Guo Xu. 2021. "Ideology and Performance in Public Organizations." *NBER Working Paper* 28673 (<https://www.nber.org/papers/w28673>).

Supporting Information for

*Bureaucrats in Congress:
Strategic Information Sharing in Policymaking*

A Additional Tables and Figures

Table A1: Summary Statistics of the Variables

Variables	Obs	Mean	Std. Dev.	Min	Max
No.Speech	12527	2.76	0.81	1.10	4.80
No.Word	12527	7.72	0.62	6.00	9.29
Analytical Score	12527	34.76	6.28	22.31	61.15
Divded Government	12527	0.57	0.50	0.00	1.00
Democratic Majority	12527	0.34	0.48	0.00	1.00
Chair DW-Agency Ideology	4914	0.38	0.20	0.00	1.03
Political Appointee	9872	0.34	0.47	0.00	1.00
Executive Department	12527	0.78	0.41	0.00	1.00
Legislative Hearing	12527	0.59	0.49	0.00	1.00
Subcommittee	12527	0.78	0.41	0.00	1.00
Referral Hearing	12527	0.12	0.32	0.00	1.00
Issue Polarization Score	11729	0.29	0.16	0.00	0.90
Number of Witness	12527	6.48	4.32	1.00	75.00
Chair's Grandstanding Score	11048	39.79	6.51	19.18	81.03

Table A2: Bureaucrat's Provision of Analytical Information: Legislative Hearings with Different Empirical Specifications

	Outcome Measures			
	(1) No.Speech	(2) No.Word	(3) Analytical Score	(4) Analytical Score
Panel A: Only Divided Government				
Divided Government	0.131*** (0.0410)	-0.00612 (0.0290)	-1.194*** (0.346)	-1.201*** (0.406)
Controls	✓	✓	✓	✓
President FE	✓	✓	✓	✓
Issue FE	✓	✓	✓	✓
Committee FE	✓	✓	✓	
Agency FE				✓
Mean Outcome Measure	2.7	7.6	34.5	34.5
<i>N</i>	6077	6077	6077	6077
adj. <i>R</i> ²	0.130	0.135	0.146	0.132
Panel B: Divided Government + Ideology				
Divided Government	0.153** (0.0587)	0.0466 (0.0466)	-1.045*** (0.230)	-0.784** (0.329)
Chair DW-Agency Ideology	0.266** (0.0952)	0.164** (0.0706)	-0.721 (0.898)	-2.166*** (0.732)
Controls	✓	✓	✓	✓
President FE	✓	✓	✓	✓
Issue FE	✓	✓	✓	✓
Committee FE	✓	✓	✓	
Agency FE				✓
Mean Outcome Measure	2.7	7.6	34.5	34.5
<i>N</i>	2716	2716	2716	2716
adj. <i>R</i> ²	0.147	0.163	0.151	0.138

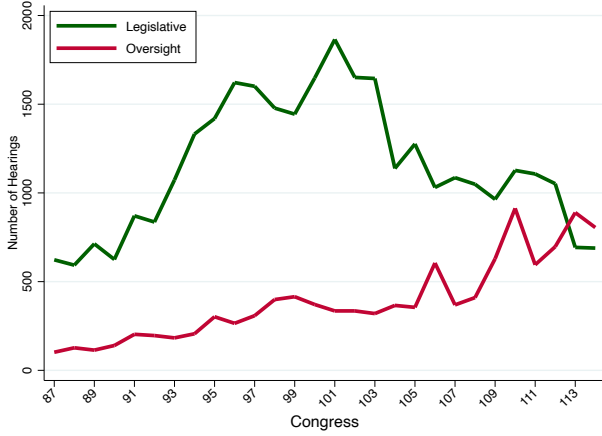
Notes: * $p < 0.10$ ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at the committee level. **Panel A** presents the results when we include the *Divided Government* variable but do not include the ideological difference between the committee chair and the agency as well as a bureaucrat's appointment type. **Panel B** presents the results when we include the *Divided Government* and |Chair DW-Agency Ideology| but not include the type of a bureaucrat's appointment.

Table A3: Bureaucrat's Provision of Analytical Information: Oversight Hearings with Different Empirical Specifications

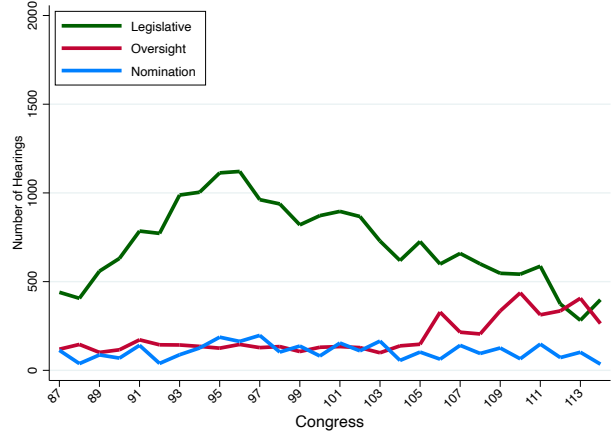
	Outcome Measures			
	(1) No.Speech	(2) No.Word	(3) Analytical Score	(4) Analytical Score
Panel A: Only Divided Government				
Divided Government	0.131** (0.0511)	-0.0339 (0.0318)	-1.573** (0.649)	-1.364** (0.563)
Controls	✓	✓	✓	✓
President FE	✓	✓	✓	✓
Issue FE	✓	✓	✓	✓
Committee FE	✓	✓	✓	
Agency FE				✓
Mean Outcome Measure	2.7	7.7	34.9	34.9
<i>N</i>	4220	4220	4220	4220
adj. <i>R</i> ²	0.237	0.221	0.179	0.149
Panel B: Divided Government + Ideology				
Divided Government	0.151** (0.0708)	0.00651 (0.0599)	-1.428** (0.517)	-1.309* (0.706)
Chair DW-Agency Ideology	-0.147 (0.231)	-0.0878 (0.150)	1.050 (0.724)	-1.209 (1.347)
Controls	✓	✓	✓	✓
President FE	✓	✓	✓	✓
Issue FE	✓	✓	✓	✓
Committee FE	✓	✓	✓	
Agency FE				✓
Mean Outcome Measure	2.7	7.7	34.9	34.59
<i>N</i>	1419	1419	1419	1419
adj. <i>R</i> ²	0.232	0.237	0.176	0.142

Notes: * $p < 0.10$ ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at the committee level. **Panel A** presents the results when we include the *Divided Government* variable but do not include the ideological difference between the committee chair and the agency as well as a bureaucrat's appointment type. **Panel B** presents the results when we include the *Divided Government* and *|Chair DW-Agency Ideology|* but not include the type of a bureaucrat's appointment.

Figure A1: Share of Oversight Hearings in All Hearings

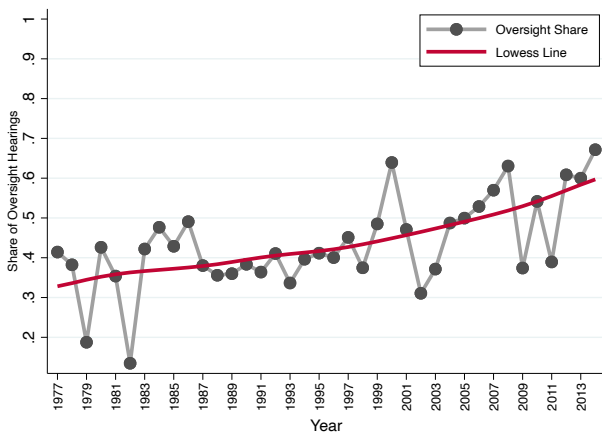


(a) House

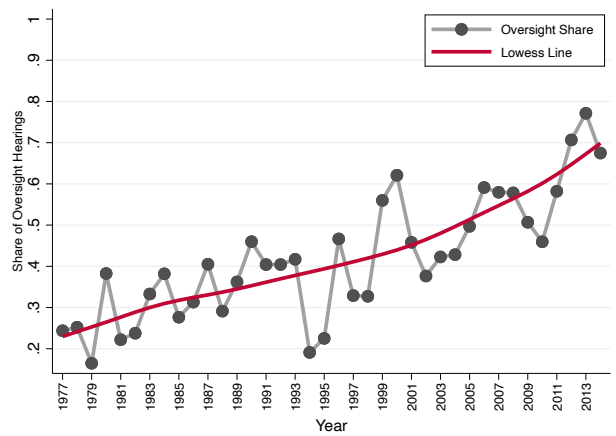


(b) Senate

Figure A2: Share of Oversight Hearings among Hearings that Featured Bureaucrats: Using Different Definitions for Oversight Hearings (MacDonald 2022)



(a) House



(b) Senate

Figure A3: Share of Oversight Hearings Featuring Bureaucrats: House

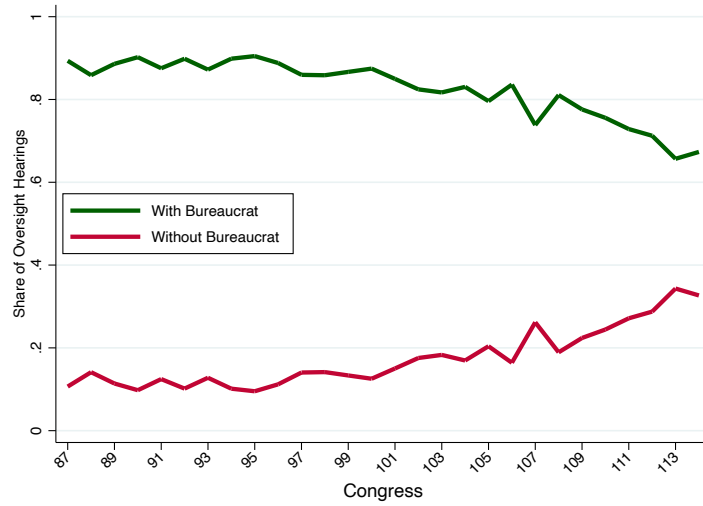


Figure A4: Share of Oversight Hearings Featuring Bureaucrats by Committee: House

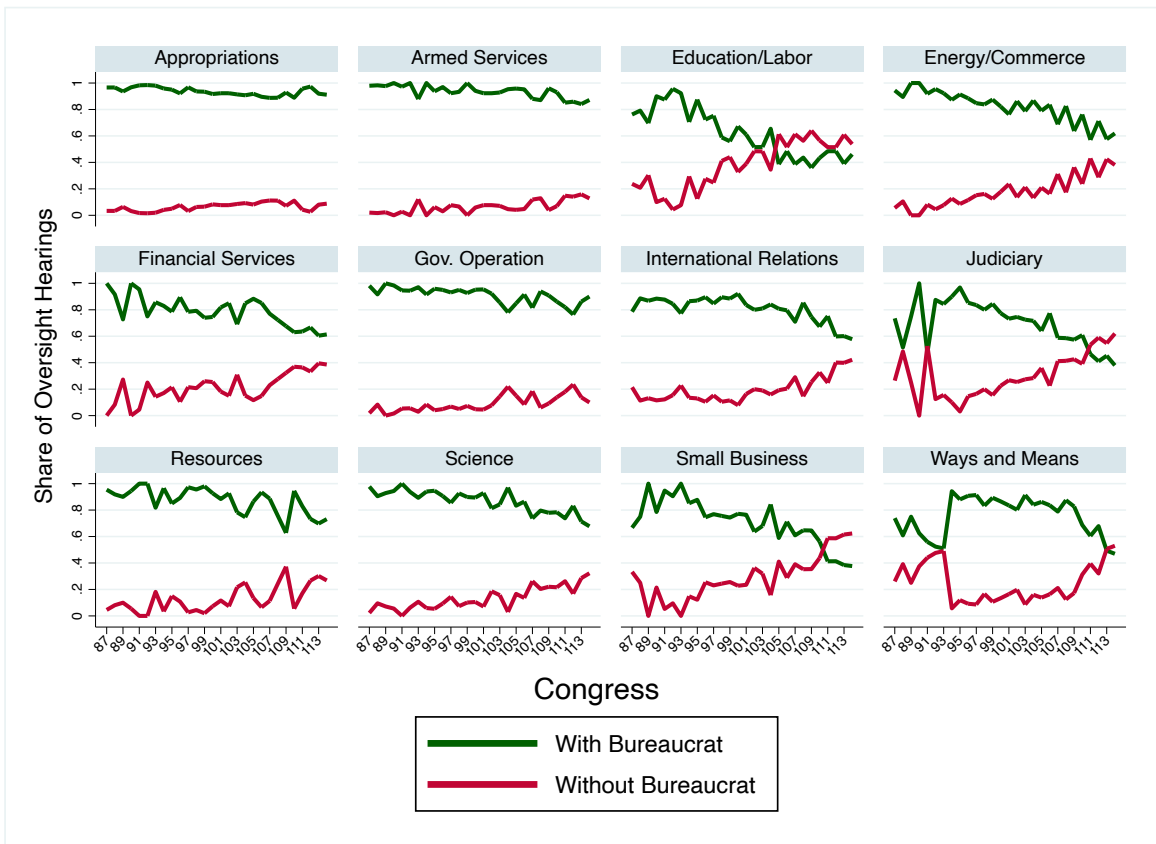


Figure A5: Types of Hearing at the Agency-Level, 1977-2014: Independent Agencies

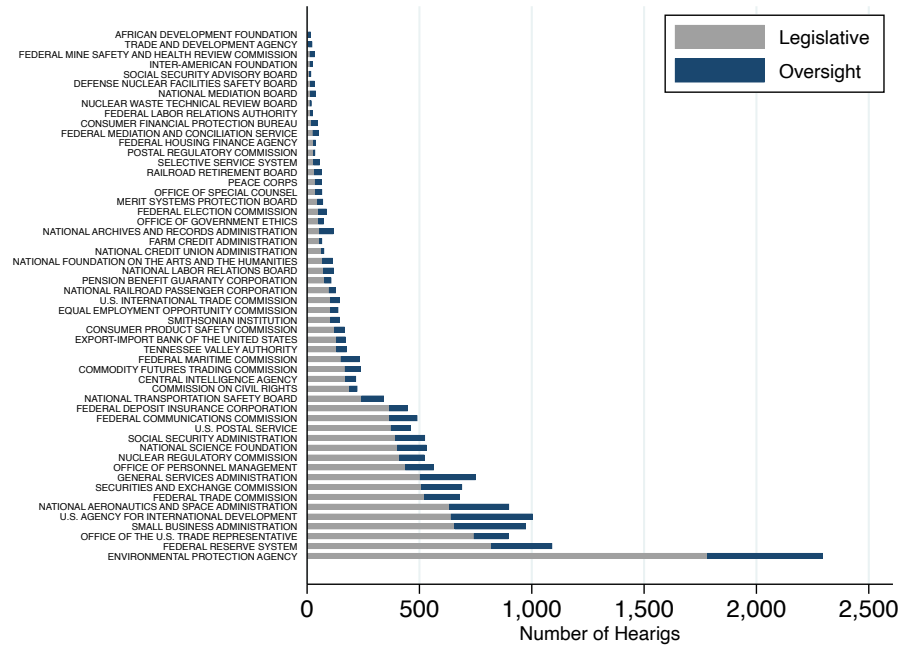


Figure A6: Number of Witnesses by Agency, 1977-2014: Executive Departments

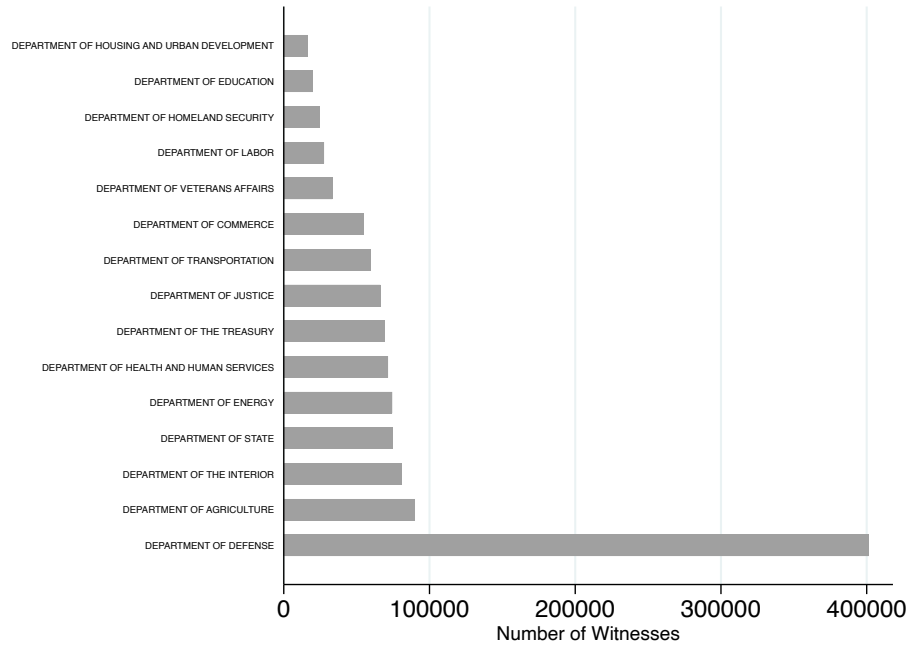


Figure A7: Number of Witnesses by Agency, 1977-2014: Independent Agencies

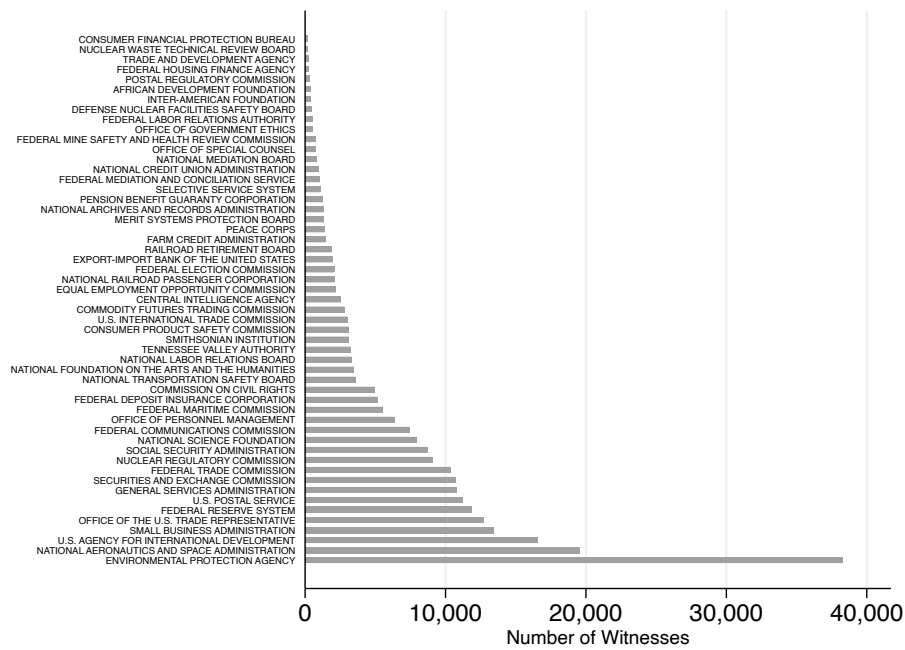
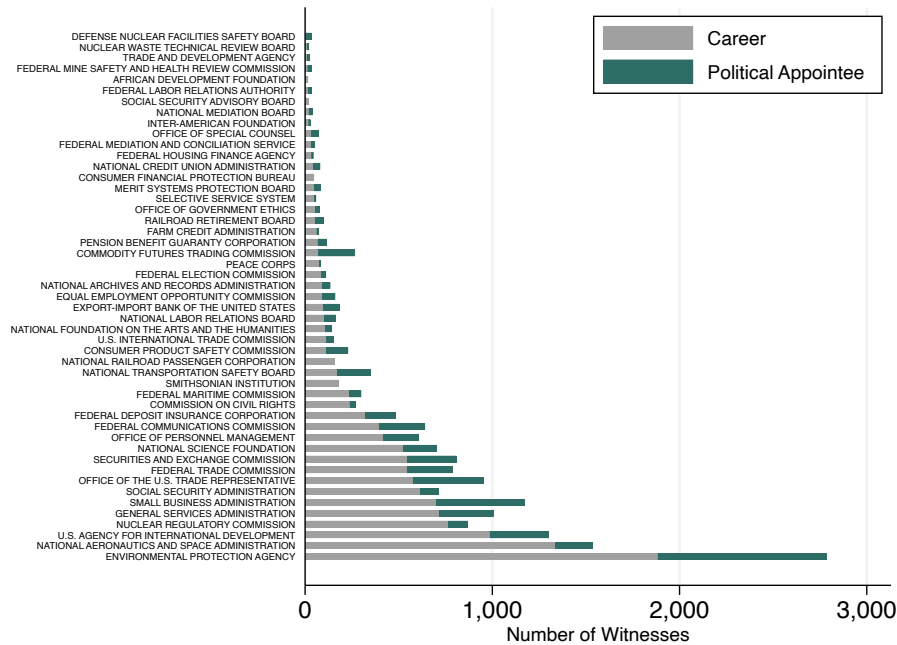


Figure A8: Career vs. Political Appointees among Bureaucratic Witnesses: Independent Agencies



Notes: Federal Reserve System, US Postal Service, Postal Regulatory Commission, Central Intelligence Agency, and Tennessee Valley Authority are omitted from the figure since the OPM data does not include these bureaus so we do not have information for the appointment type of bureaucrats from these bureaus.

B Measuring Analytical Information

B.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

E.g.) 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."

E.g.) 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."

E.g.) 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

E.g.) 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."

E.g.) 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."

E.g.) Subjective or preferential (Revealing preferences of certain groups):

"—that we try to organize that under FEHB because there was 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."

E.g.) 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 in 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 the qualification for the **Compare Witness Testimony task 2022**, you must complete **4 out of 5 of these test HITs correctly**.

B.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 is 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 to be 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 for 20 times in the pair-wise comparisons generating 33,000 comparison tasks or HITs. Using the on-line 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 \(2022\)](#), 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 the 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 the three cut-points: 0.05, 0.1 and 0.15. The number of blocks and the cut-points are selected to ensure that we have 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 that they can be used as a bridge to help the Bradley-Terry model to 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 are 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.

B.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 include both unigrams and bigrams as we confirmed that the prediction performance of the model improves 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 construct 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 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: the 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 use the `EBMAforecast` R package (Montgomery, Hollenbach, and Ward, 2012) to conduct ensemble Bayesian model averaging to reach a final model which 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 A4 present the tuning parameters and weights assigned for each of the eight models.

Table A4: 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 predict the score for the entire corpus and rescale the score to range from 0 to 100.

B.4 Validation of the Measurement

This section validates the measurement statistically and substantively. First, to validate the human-coded labels substantively, we examine five paragraphs with the highest and lowest scores, respectively. (We will conduct more validation analysis and add them to this section.)

B.4.1 The most analytical paragraphs (in descending order)

[1] “Well, the 40—again the rough numbers are that had the total assistance provided to General Motors was \$49.5 billion. The total assistance provided to Chrysler was \$12.5 billion, there was \$1.5 billion provided to Chrysler Financial, \$17.2 billion provided to General Motors Acceptance Corp., now called Ally Financial, and there is about \$4.1 billion between assistance provided to suppliers and to guarantee warranties. Not all of those funds were drawn down and so the amount of funds that were drawn down is about \$4 billion less than that, but that is roughly the total amounts that were at one point allocated to those companies.”

[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] “Eight percent growth. It goes from \$436 billion, which is the fiscal year 2001 numbers, to \$471 billion, a little over \$35 billion. That’s an 8 percent growth. That’s in both the mandatory and discretionary. The discretionary payments, which go from \$52.8 million to \$55.5 million is a 5.1 percent growth. That’s the discretionary. And the mandatory is where Medicare and Medicaid and SCHIP is. The discretionary is the other programs.”

[4] “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.”

[5] “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.”

B.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] “And to answer that question, right now I can’t say it’s that effective. But from our standpoint, if we don’t continue to speak about it, to stand up for what is real, I don’t know, then we basically are going to have to go someplace else. And we really don’t want to do that.”

[3] “Well, I think so, but I think it is hard, too. I think Mr. Rohrabacher summed it up. I do think there are frustrations with that. I think it is hard to say what containment would have done, and not doing anything. But I do think, as a Nation, that we can’t decouple our economic interests from our human rights and our values. So, on that, I agree with you on that.”

[4] “We have had some preliminary studies on that. I will confess to you I am not sure what the conclusions were. I will tell you that we would be more than happy to study that and come back to you and the other members of the committee and members of Congress with our conclusions.”

[5] “Well, that is one way of doing it. I would not want to say that this should be the only way of doing it. I think again, we have to wait and see. How well does it work? How expensive is it? How fast is it? Once we understand that and see that, I think many changes could be made.”

Now, to validate the analytical score predicted for the entire corpus, we present ten most and least analytical statements, respectively. As some statements are extremely long, for efficiency, we report only those with 150 words or less.

B.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 assistance 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."

B.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.”