

## The Social Roots of Bureaucratic Decision-Making

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How do international organizations decide which issues to prioritize? Scholars argue that bureaucrats invest in different policy tasks according to incentives generated by political principals. We instead theorize a social process through which individual bureaucrats decide which issues to prioritize. When bureaucrats interact with colleagues who are attentive to a given issue, social pressures and career concerns lead them to reallocate effort toward that issue even when principals send conflicting signals about its importance. We develop this argument in the context of climate change. Using original data on professional networks within the International Monetary Fund, we show that intra-staff interactions increase the effort bureaucrats invest in climate relative to other policy areas. These effects are driven by exposure to climate-attuned senior colleagues, highlighting the role of hierarchical socialization and career incentives in shaping bureaucratic behavior. Our findings offer an intra-organizational explanation for bureaucratic decision-making and illuminate how institutions adapt to new policy challenges in the absence of clear principal direction. They further illustrate how, per the framework paper, individual bureaucrats navigate and trade off between competing structural demands within international organizations.

*Keywords:* climate change; bureaucracy; international organizations; IMF

*Word count:* 8,029

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The formal mandates of international organizations (IOs) typically concern specific co-operation problems (Keohane 1984). The International Monetary Fund (IMF) is mandated to support international financial stability; the World Trade Organization is mandated to facilitate global trade flows; the United Nations is mandated to promote global peace and stability. Yet IOs often broaden their focus to new policy challenges over time. International financial institutions, for instance, have “mainstreamed” issues of climate change and gender equity in recent years (Clark and Zucker 2024; Heinzel, Weaver, and Jorgensen 2024), despite neither issue being explicitly tied to their founding charters. Such processes of mission creep are often characterized by sharp debate within institutions over the proper allocation of resources as well as uncertainty about how new priorities will be evaluated and rewarded. One senior official at the IMF, for example, bemoaned the institution “getting so much into climate change [and] women in development … new issues that are very important but outside of the IMF’s mandate.”<sup>1</sup>

Political principals sometimes drive institutional reorientation to new issues (Nielson and Tierney 2003), but they often have divergent policy preferences (Copelovitch 2010a), including over which issues to prioritize. In practice, much of the day-to-day responsibility for distributing scarce resources across policy tasks lies with individual bureaucrats. Sociological institutionalists argue that policymaking slack enjoyed by bureaucrats produces separation between actual IO activities and their legal mandates (Barnett and Finnemore 1999, 2004). However, the process by which international bureaucrats decide how to distribute effort across priorities is less well understood. Research documents static determinants of bureaucrats’ policy preferences, such as educational background and nationality (Chwieroth 2015; Kaplan 2017; Nelson 2017; Clark and Dolan 2021), but these accounts are not suited to explain how the behavior of individual bureaucrats varies over time. Other work identifies how on-the-ground experiences of bureaucrats modify their awareness of

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<sup>1</sup>Interview with former director of the European Department at the IMF (June 2021).

different issues, but stops short of evaluating whether bureaucrats merely pay lip service to or invest meaningful effort in emergent issues (Clark and Zucker 2024). Amid debate among principals and internally on the proper direction of their institution, how do bureaucrats decide which policy tasks to prioritize?

We explore this question in reference to climate change, an issue that longstanding IOs have increasingly sought to address. We see climate as a novel and complex issue, making it an especially demanding test of how bureaucrats decide whether to invest effort in emergent policy domains. Indeed, climate has not historically been of interest to most IO bureaucrats, and it requires significant investment of effort in order to acquire requisite expertise.<sup>2</sup> This is especially true for the institution of empirical focus in this paper: the IMF. The Fund traditionally employs neoliberal macroeconomists without formal training in climate-related issues, and powerful member states have increasingly been in dispute on the value of incorporating climate into the Fund's activities (Clark and Zucker 2024). Indicative of a lack of preexisting climate expertise, the institution has sought to hire external climate specialists in recent years. Yet a scarcity of such experts and intense competition among well-resourced employers have limited this recruitment drive (Committeri et al. 2022; Singh, Thrall, and Zucker 2025), increasing the importance of internal processes of expertise development.

We propose a social, intra-bureaucratic account of how IO staff decide whether to shift resources away from issues of traditional interest to climate. Bureaucrats at the IMF and other IOs do not work in isolation; they frequently operate in teams alongside colleagues. Examples abound: the Fund assembles mission teams with staff drawn from across departments to assess member states' economies and issue policy recommendations; the World Bank organizes task teams to manage development projects and consult with local stakeholders.

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<sup>2</sup>Climate policymaking demands substantial inputs of specialized expertise (Stokes 2020; Sobel 2021; Gazmararian and Tingley 2023, 65).

holders; the World Health Organization dispatches emergency teams during disease outbreaks. Because much of this work is organized through small, cross-departmental teams, bureaucrats routinely observe the preferences and priorities of their colleagues as they collect and interpret information, apply institutional rules and procedures, and deliver services.

We theorize that the presence of climate-attuned bureaucrats on such teams — those attentive to climate issues — leads colleagues to subsequently invest greater effort in climate policymaking, even where political principals send ambivalent or contradictory signals on its importance. Such intra-staff interactions modify the perceived costs and benefits of reallocating effort across issue areas through two channels. First, operating alongside staff attentive to climate augments the perceived career benefits of prioritizing climate over other issues — particularly when such staff occupy senior positions within the organization. Second, these interactions socialize staff into placing greater non-material value on climate governance, inducing them to shift effort from other professional tasks out of a desire to fit in with colleagues or to emulate those they respect. This argument builds on recent work emphasizing that “bureaucrats’ attitudes [about climate policy] are influenced by the degree to which they perceive the wider environment to support and legitimize their ideas” (Dellmuth 2023, 1).

This account takes seriously the hierarchical structure of bureaucracies. Influential accounts of bureaucratic politics adopt bipartite models of bureaucracies, where an undifferentiated body of staff acts as the agent of political principals (e.g., Huber and Shipan 2002; Copelovitch 2010*b*). Other approaches focus on bureaucrats of different ranks in isolation (Heinzel, Weaver, and Jorgensen 2024). One influential account of bureaucratic management of multiple policy tasks explicitly “neglect[s] the internal organization of different policymaking institutions” (Alesina and Tabellini 2008, 427). These approaches are analytically valuable, but they do not focus on how interactions across ranks affect bureaucratic behavior, particularly in contexts where mandates are contested and the professional

returns to engaging with new issues are unclear.

We theorize that the effects of intra-staff interactions are asymmetric across ranks. In particular, we propose that bureaucrats are most influenced by colleagues senior to them. While bureaucrats may be socialized by junior colleagues and staff of equal rank, they should become especially confident in both the career-related benefits and the appropriateness of expending effort on climate upon engagement with climate-attuned senior colleagues. They wield greater influence over promotions and assignments, shaping the perceived career returns to reallocating effort, and they also serve as respected reference points for appropriate professional conduct. As a result, both career-related incentives and socialization pressures should be strongest when bureaucrats work alongside climate-attuned senior colleagues, leading expertise and issue prioritization to flow down the bureaucratic ranks.

To test this theory, we compile original data on the professional interactions of thousands of individual IMF bureaucrats, as well as the content of over 11,000 policy recommendations issued by the IMF to member states between 2010–2019. To measure how bureaucrats allocate effort across issues, we compare the linguistic complexity of recommendations issued in different policy domains. We show that the detail and sophistication of recommendations increases with linguistic complexity, supporting its use as a proxy for the amount of effort invested by staff.

We find robust evidence in support of our hypotheses. To measure how individual staff allocate effort, we compare the complexity of climate-related policy recommendations issued by a given bureaucrat to the contemporaneous complexity of non-climate recommendations issued by that same bureaucrat. Analyses show that staff produce significantly more complex climate recommendations in the years after working alongside climate-attuned colleagues. This is particularly so when those colleagues are senior to them, consistent with the idea that vertical cues are especially salient when bureaucrats evaluate the career

implications of reallocating effort. Bureaucrats who lack such climate-attuned professional networks issue climate policy recommendations that are substantially less sophisticated than the recommendations they render in non-climate policy domains.

This paper makes several contributions. First, it illustrates how bureaucrats navigate contexts of multiple and conflicting structural demands (Weaver, Morrison, and Heinzel 2025). Bureaucrats receive inconsistent signals from political principals on the importance of climate, as well as variation in colleagues' embrace of the issue. The limited amount of effort individual bureaucrats can afford to invest in their work forces them to make trade-offs between climate and issues of longstanding interest to their institution; in other words, bureaucrats must decide which demands to "conform" to and which to deprioritize. How they choose to make this tradeoff is consequential. In technocratic settings, individuals face incentives to both exhibit high degrees of technical precision across policy tasks and signal attentiveness to relevant issues; perceptions of misallocated effort or misplaced priorities impose substantial costs on bureaucrats' career trajectories. Our account illustrates how bureaucratic hierarchies guide individuals' decision-making under these conditions. Individual staff are responsive to the climate attitudes of senior bureaucrats, but unresponsive to those of equal-rank and junior colleagues who have less sway over career trajectories and exert weaker socialization pressures.

The paper moreover offers a reconceptualization of bureaucratic decision-making that centers the role of internal staff interactions. Scholars of bureaucracy often focus on time-invariant determinants of bureaucratic behavior, including elite educational backgrounds (Weaver 2008; Chwieroth 2015; Kaplan 2017) and other biographical characteristics such as prior work experience (see Krcmaric, Nelson, and Roberts 2020 for a review). This paper considers how bureaucrats' allocation of effort across tasks varies over time as a function of interpersonal interactions, rather than being fixed by background characteristics or initial training. Further, work on domestic and international bureaucracies typically focus on

how staff interact with counterparts *external* to their institution, such as legislators (Huber and Shipan 2002), interest groups (Thrall 2023), foreign officials (Malis 2021), and staff at other international institutions (Sommerer and Tallberg 2019). Less attention has been paid to how intra-bureaucratic networks shape staff behavior and performance. Recent work focuses on individual staff learn in isolation, such as from their personal experiences while on assignment overseas (Kentikelenis, Lang, and Wellner 2024; Clark and Zucker 2024). This paper illuminates how bureaucratic preferences diffuse across an institution via intra-staff engagement.

In doing so, this paper builds on a growing body of work that emphasizes preference heterogeneity within international (Heinzel, Weaver, and Jorgensen 2024; Kentikelenis, Lang, and Wellner 2024) and domestic bureaucracies (Schub 2022; Jost 2023; Carcelli 2024). While this literature has identified how such heterogeneity can initially emerge, it has less to say about how it evolves: whether bureaucracies remain divided attitudinally, converge to common understandings of given issues, or resolve to some other distribution of preferences. This paper sheds light on this process, suggesting that regular interactions between staff — in particular, the administrative practice of assigning bureaucrats to work on small teams — serve as conveyor belts for disseminating attitudes and competencies across large, hierarchical bureaucracies. These claims align with theories depicting political institutions as social environments that modify actors' preferences (Katzenstein 1996; Gheciu 2005; Adler 2008; Johnston 2008). We extend this work by illustrating the social process by which bureaucrats allocate effort to emergent and controversial issues.

Our findings further speak to debates around institutional adaptability. Important scholarship portrays institutions as rigid and resistant to change, typically attributing transformations to infrequent, exogenous shocks (Riker 1980; Krasner 1976; Wallander 2000; Colgan, Keohane, and Van de Graaf 2012).<sup>3</sup> Contributing to institutional inflexibility is homogene-

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<sup>3</sup>Though incremental reforms can be pursued absent such shocks (Blyth 2002; Lipsky 2015; Carnegie and

ity in bureaucratic preferences. When the staff of institutions share similar worldviews, there is little space for new ideas to take hold (Weaver 2008). Institutions reinforce this homogeneity by hiring staffers with shared educational and demographic characteristics (Chwieroth 2015; Nelson 2017) and by strictly monitoring bureaucrat behavior (Honig 2018, 2019). These literatures thus present change as rare, limited, and inhibited by individuals within the institution. In contrast, we identify an underappreciated, endogenous source of institutional evolution: socialization among bureaucrats, facilitated by anodyne personnel management practices that structure who works with whom and whose priorities are most visible. This process underscores the capacity of institutions to adapt internally.

Climate change serves as our empirical focus, but we expect similar processes to operate in other issue areas that require bureaucrats to reallocate effort away from established tasks. Issues such as artificial intelligence, cybersecurity, and digital finance are of growing interest to long-standing political institutions, yet are distant from many organizations' traditional mandates and day-to-day activities. As for climate, institutions often lack deep in-house capacity in these domains, and surging demand for specialists has complicated efforts to rely on hiring of external specialists.<sup>4</sup> We highlight a generalizable intra-bureaucratic mechanism through which staff shift attention toward novel policy challenges even in the absence of unified principal directives or large-scale organizational restructuring.

## **SOCIAL THEORY OF BUREAUCRATIC DECISION-MAKING**

Bureaucrats perform policymaking and implementation tasks that often span multiple issue areas (Barnett and Finnemore 1999; Jupille, Mattli, and Snidal 2013; Clark and Zucker 2024). At development and aid organizations, staff manage portfolios that include poverty alleviation, corruption, and gender equity. At institutions of financial governance, bureau-

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Clark 2023).

<sup>4</sup>See, e.g., U.S. Government Accountability Office 2025 [[perma.cc/FL3L-NCZ7](https://perma.cc/FL3L-NCZ7)].

crats evaluate diverse factors affecting macroeconomic stability, including sovereign debt, exchange rate regimes, trade exposure, and labor market dynamics. In such settings, no single bureaucrat can devote full attention to all relevant issues.

Bureaucrats must therefore make consequential choices about how to allocate their limited effort across these multidimensional portfolios. Given the limited amount of effort they can expend on their work, which policy tasks should they prioritize?

Investing effort in a given issue area empowers bureaucrats to do better work in that space. It permits more precise policy analysis, more appropriate and credible recommendations for member states, and more efficient policy implementation. The tradeoff, however, is that effort shifted to one issue diminishes the quality of work elsewhere. This tradeoff is especially acute when bureaucrats confront novel issues that require breaking from existing modes of analysis or acquiring unfamiliar forms of knowledge. In this sense, multitasking bureaucrats are forced to embrace “one set of structur[al demands] and weaken another” (Weaver, Morrison, and Heinzel 2025, 11).

Existing work often explains how bureaucrats navigate this tradeoff through the lens of delegation and incentive alignment. In these accounts, international bureaucrats allocate effort in response to signals and material incentives issued by political principals (Holmstrom and Milgrom 1991; Alesina and Tabellini 2008), adjusting their behavior to match institutions’ formal mandates and principals’ priorities (Pollack 1997; Nielson and Tierney 2003). Such models are powerful, but they presume that principals issue relatively clear and consistent signals about which tasks will be evaluated and rewarded (cf. Copelovitch 2010*a*).

In practice, bureaucrats frequently operate under conditions of uncertainty. Principals may disagree about organizational priorities, particularly when institutions expand into new policy domains like climate change (Clark and Zucker 2024). Formal mandates may lag behind evolving expectations — a product of institutional rigidity and path dependence

(Page 2006; Kaya 2015) — leaving bureaucrats unsure about the professional returns to reallocating effort to new areas. Under these conditions, bureaucrats must infer which issues are safe, appropriate, and advantageous to prioritize.

A long tradition in international relations conceives of IOs not merely as instruments of powerful principals, but as social environments in which knowledge, norms, and professional priorities are produced and diffused. Research on epistemic communities highlights how shared causal beliefs and professional standards shape how policymakers interpret problems and evaluate solutions (Haas 1992). Sociological approaches similarly emphasize how repeated interaction within institutions generates convergence in preferences, identities, and understandings of appropriate conduct (Katzenstein 1996; Finnemore and Sikkink 1998). From this perspective, bureaucrats’ decisions about where to invest effort are shaped not only by formal mandates, but also by their position in professional communities of practice (Adler and Pouliot 2011). This logic is central to work on socialization within international institutions, which demonstrates how sustained professional interaction drives acceptance of norms and ideas (Gheciu 2005; Adler 2008; Johnston 2008). More recent research applies similar insights within IO bureaucracies themselves, documenting “contagion effects” through which attention to emergent issues, such as gender, diffuses across staff (Meier and McCrea 2022; Heinzel, Weaver, and Jorgensen 2024).<sup>5</sup>

We build on these literatures by theorizing how peer interaction helps bureaucrats resolve uncertainty about effort allocation across issue areas. Rather than treating expertise or attention as fixed attributes, we emphasize micro-level processes through which bureaucrats update beliefs about which issues are valued, legitimate, and professionally consequential. In doing so, we link macro-level claims about epistemic authority and norm diffusion to the

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<sup>5</sup>Experimental work similarly shows that group settings shape how policymakers evaluate information and navigate uncertainty, in part by revealing colleagues’ preferences and exerting social pressure to conform (Wayne et al. 2024). Research in educational psychology likewise highlights the benefits of cooperative learning in small groups (Slavin 2013).

everyday team-based interactions through which international organizations govern global issues — building on theories of bureaucratic decision-making that abstract away from the internal organizational structures of political institutions (e.g., Alesina and Tabellini 2008).

### *Peer Interaction and Effort Allocation*

We theorize that interactions between a bureaucrat and climate-attuned colleagues — those who see climate as of interest and relevance to the institution — increase the effort subsequently invested by that bureaucrat in climate-related issues. We identify two complementary mechanisms.

First, interactions with climate-attuned colleagues provide information about the professional returns to climate work. Bureaucrats are constrained in the total amount of effort that they can devote to their work. Investing effort in a novel issue requires diverting attention from established tasks, which may carry career risks when organizational priorities are unsettled (i.e., when principals express uneven preferences). Exposure to colleagues who visibly engage with climate reveals information about the distribution of attitudes within the institution and the extent to which climate work is tolerated or rewarded. Such interactions can reduce perceived risk by signaling that climate engagement is professionally viable. Indeed, individuals often underestimate the extent to which others support climate action (Mildenberger and Tingley 2019). Updated beliefs about the extent of pro-climate attitudes in one's institution, and level of climate knowledge among colleagues, may also exacerbate the perceived risk of *not* attending to climate — especially in meritocratic settings where lagging behind peers can have reputational consequences (Zhou 2005; Sauder, Lynn, and Podolny 2012).<sup>6</sup>

Second, peer interaction can socialize bureaucrats into valuing climate work. En-

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<sup>6</sup>Also see Simmons and Elkins 2004 and Shipan and Volden 2008 on policy diffusion at the country and city levels, with similar mechanisms applied.

trepreneurial bureaucrats may actively persuade colleagues of the relevance of climate to their institution's mission, leading staff to shift effort from other issue areas to climate. Such a "rational learning" model implies bureaucrats treat their peers as sources of information and adapt based on perceived policy effectiveness or technical merit (Meseguer 2006; Gilardi 2010). Subtler socialization dynamics may also emerge. Johnston (2008) documents attempts by individuals at international organizations to "fit in" with colleagues by changing their behavior. Johnston identifies patterns of mimicry, where an actor "sees others anticipating benefits [from some action] and assume that it too can hope to gain." While the motive here may be material, Johnston notes that mimicry is also appealing insofar as it helps individuals avoid being "viewed by others as out of fashion, behind the times, and thus missing out on a status-enhancing experience" (46). In this sense, socialization does not merely transmit information; it shapes perceptions of appropriateness and professional identity.

Together, these mechanisms imply:

**Hypothesis 1.** *Bureaucrats who work alongside climate-attuned colleagues should subsequently invest greater effort in climate.*

#### *Hierarchy and Asymmetric Socialization*

Importantly, bureaucratic organizations are hierarchical. Hierarchy conditions how social cues are interpreted and how uncertainty is resolved. Senior colleagues differ from peers and junior staff in two crucial respects: they wield evaluative authority over career trajectories, and they occupy positions of symbolic status within the organization.

As a result, staff should be especially responsive to interactions with climate-attuned *senior* colleagues. From a career perspective, senior colleagues exert influence over promotions, assignments, and reputational standing. Their own interest in climate, and belief

of its relevance to the broader institution, should suggest that they would reward staff for investing some effort in climate. While superiors within the bureaucracy will not necessarily provide more or better information about climate than colleagues of equal or lower rank, their engagement with climate signals that reallocating effort toward the issue is professionally sanctioned and potentially rewarded, alleviating uncertainty about the returns to such investment.

From a socialization perspective, senior colleagues serve as respected reference points for appropriate professional conduct. Organizational research suggests that individuals are particularly likely to emulate behaviors modeled by successful or authoritative figures, especially under conditions of ambiguity (Finnemore and Sikkink 1998; Dobbin, Simmons, and Garrett 2007). Observing senior colleagues prioritizing climate thus provides a powerful cue about how the institution defines valued work.

While social influence may also operate horizontally among peers, and occasionally upward from junior staff, we expect career-motivated bureaucrats to look upward when evaluating which issues merit sustained attention. Hierarchy therefore amplifies both informational and socialization mechanisms, producing asymmetric effects across ranks.

This leads to our second hypothesis:

**Hypothesis 2.** *Bureaucrats should respond more to climate-attuned senior colleagues than those of equal or lower rank.*

## DATA AND MEASUREMENT

We test this theory with original data on the career paths and professional networks of individual IMF bureaucrats, as well as the sophistication of IMF policy recommendations, which we assume increases with the effort expended by contributing bureaucrats. Our source for these data are Article IV reports, which are the products of semi-annual surveil-

lance missions undertaken by IMF staff teams to individual member states. These reports, authored by small groups of IMF staff, detail the state of countries' economies, identify macroeconomic risks, and offer policy advice to host country governments. They exemplify the IMF's role as a provider of detailed and influential economic policy advice (Breen and Doak 2021; Cormier and Manger 2022). Article IV teams consist of staff recruited from both functional departments (e.g., Monetary and Capital Markets) and area departments (e.g., Asia and Pacific) with the team's collective expertise tailored to the presumed macroeconomic needs of the country.<sup>7</sup>

We collected data on 581 Article IV reports issued between 2010–2019, a period during which IMF attention to climate grew dramatically. Based on the listed authors of these reports, we identify 879 IMF personnel — resident representatives, mission chiefs, and rank-and-file mission team members<sup>8</sup> — who contributed to multiple reports during these years. Using the reports that each staff member contributed to, we record the countries that each individual worked in, when they worked there, and, critically, the other IMF personnel on the mission teams they were assigned to. We linked bureaucrats across reports on the basis of author lists included on report cover pages, allowing for small differences in name spelling across reports (see Appendix A for matching procedure details). Our data include 2,239 unique bureaucrat-mission observations.

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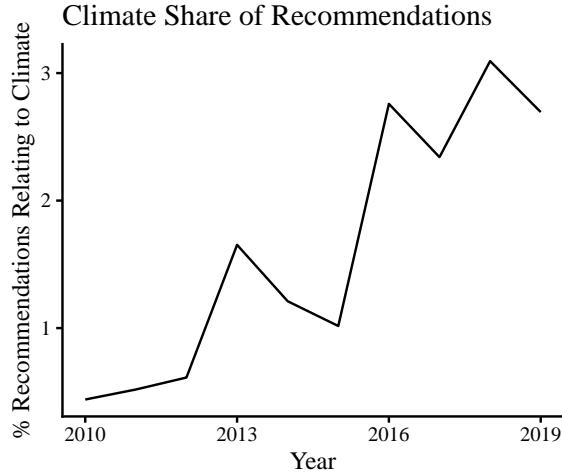
<sup>7</sup>Countries are surveyed every one and a half years on average in our data set. Political instability can lead to delays (IMF, 2018, [bit.ly/37gy302]). Field agents are often rotated across countries and regions — for instance, resident representatives have a median length of stay in a given country of two years in our data, consistent with figures in IMF documentation (IMF, 1973, [bit.ly/3oQrYPZ]).

<sup>8</sup>Resident representatives are IMF staff who are stationed in an assigned member state for a period of a couple of years at a time. Mission chiefs are typically drawn from IMF area departments (e.g., the Asia and Pacific Department) and lead the surveillance trips to member states, which typically last for less than a month. Rank-and-file staff are drawn from area departments and functional departments (e.g., the Monetary and Capital Markets Department). Mission teams generally include one resident representative, one mission chief, and five-to-ten rank-and-file staff.

### *Policy Recommendations*

To evaluate bureaucrats' investment of effort in climate-related policy tasks, we introduce new data on individual policy recommendations issued by the IMF to member states. Research team members manually extracted 11,608 unique policy recommendations from these 581 Article IV reports. These policy recommendations were primarily delivered in the narrative section of the reports, with short passages describing economic challenges and advising on proper policy directions. To identify climate-related recommendations, we conducted keyword searches on this extracted text based on a dictionary of climate- and decarbonization-related terms, which we then verified using an automated large language model (LLM)-based classification of all recommendations. We identify 234 recommendations that explicitly concern climate change or decarbonization, spread across 24% of all sampled reports; 87% of these were likewise coded as climate-relevant via the LLM-based approach. Appendices B and C detail the recommendation extraction and keyword search approaches; Appendix D discusses the LLM validation process. We find that the share of climate-related recommendations has significantly grown over time. As illustrated in Figure 1, climate accounted for just 0.4% of all recommendations in 2010; by 2019, this share had increased nearly sevenfold to 2.7%.

We first describe the content of climate policy recommendations. Of interest is how the Fund balances attention to adaptation (policies intended to bolster economic resilience to physical climate disruptions) and mitigation (efforts to reduce carbon emissions). We estimate a keyword-assisted topic model (keyATM) to do so. Proposed by Eshima, Imai, and Sasaki (2024), keyATM is a semisupervised approach to quantitative text analysis that permits more precise and guided extraction of themes from a text corpus than traditional automated topic models. To differentiate climate policy recommendations, we prepare and feed into keyATM sets of terms that tend to appear in either adaptation- or mitigation-focused



**Figure 1:** Share of policy recommendations each year that concern climate change.

recommendations. Estimation of the keyATM indicates that a majority of climate policy recommendations concern adaptation. Averaging across parameterizations, adaptation-related recommendations exceed mitigation-related recommendations in frequency by 33 percentage points.<sup>9</sup> Appendix E details the keyATM procedure and results.

IMF staff may place greater emphasis on climate adaptation than on mitigation because adaptation policies directly address the near-term macroeconomic and fiscal risks posed by climate change. Extreme weather events and climate volatility generate balance-of-payments pressures, disrupt growth, and erode tax revenue and governments' ability to service debt, all of which are core concerns of the Fund's surveillance mandate. Adaptation measures that reduce vulnerability to climate shocks therefore align closely with IMF staff's existing analytical frameworks and policy responsibilities.

We further characterize the types of policies that staff emphasize in discussing climate. To do so, we instruct the OpenAI GPT 4o large language model to categorize the policies in each recommendations into a series of categories: natural disaster management (including

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<sup>9</sup>keyATM allows researchers to instruct the model to generate a set number of “no-keyword topics” that identify themes distinct from the keyword-set topics. Following Eshima, Imai, and Sasaki 2024, we fit the model with zero, five, ten, and fifteen no-keyword topics to assess robustness.

general adaptation policies), fiscal policy (including policies concerning debt management, deficits, and fiscal buffers), public sector employment and bureaucracies, insurance, tax policy (including carbon prices), labor policy, infrastructure investments, ease of doing business, monetary policy, welfare policies, financial sector risk, and other mitigation and decarbonization policies.<sup>10</sup> Appendix F provides further detail on this coding procedure.

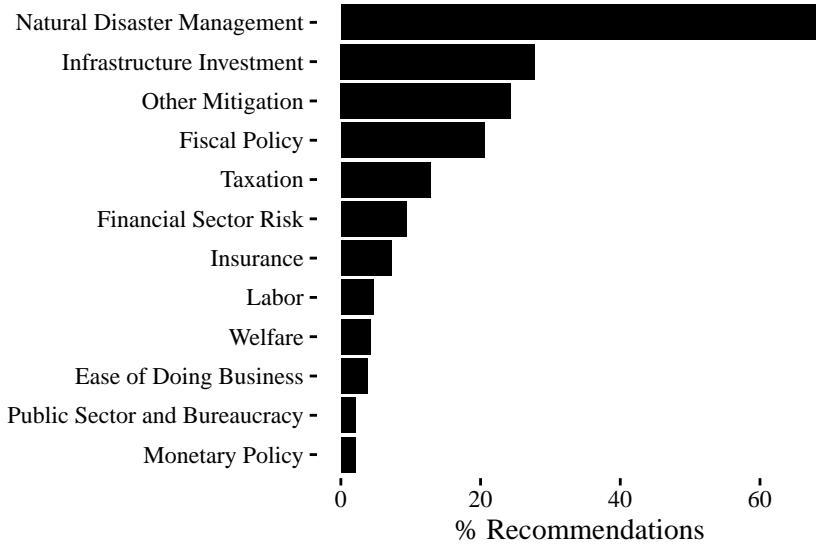
Figure 2 depicts the categorization of policy tools discussed in climate-related recommendations, as well as the volume of overlap across different pairs of policy categories. Mirroring the aforementioned emphasis on adaptation, the majority of recommendations concern policies focused natural disaster management and other forms of adaptation. Many of these disaster-focused recommendations include discussions of infrastructure investment (the second most frequent policy category discussed), typically to harden infrastructure against climate shocks, and fiscal policy, often with an eye to building “fiscal buffers” to absorb the costs of climate disruptions. In 2018, for example, staff advised that the Solomon Islands target “an overall deficit of 1.5 percent of GDP, which would balance containing debt levels with addressing infrastructure needs and consistent with building a fiscal buffer for natural disasters.” To manage “rising temperatures and sea level[s]” in Tuvalu, staff recommended in 2016 that the country’s macroeconomic framework adopt “a forward-looking, multi-pillar approach: (i) risk assessment and risk reduction, (ii) sustaining fiscal buffers, and (iii) international risk sharing.”

Recommendations concerning climate change mitigation often involve discussions of carbon prices, including carbon taxes, as well as renewable energy. In 2018, for instance, staff recommended that Vietnam “lower the intensity of dirty fossil fuels by raising the contribution of renewables and gas; provide stronger incentives for green growth, including full carbon pricing of fossil fuels while investing in infrastructure more resilient to

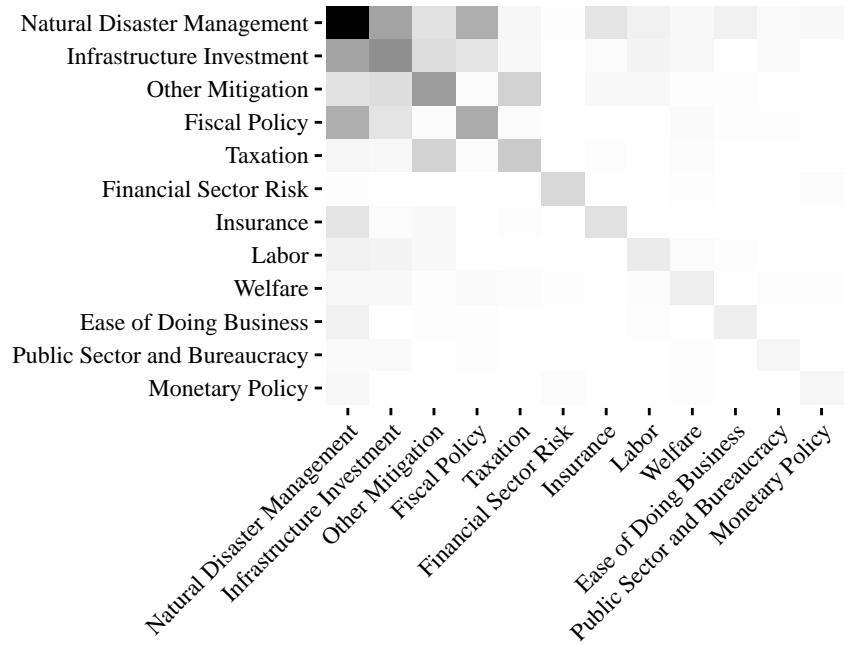
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<sup>10</sup>These categories were chosen based on a manual review of a sample of climate-related policy recommendations.

(a) Policy focus of climate-related recommendations



(b) Policy category overlap



**Figure 2:** Panel (a) depicts the proportion of climate-related recommendations concerning each of twelve policy categories, as reported by the GPT 4o large language model. Note that individual recommendations may be sorted into multiple categories. Panel (b) depicts a matrix of policy categories, shaded by the count of recommendations categorized into each policy pair. Cells along the diagonal indicate recommendations sorted into a single policy category.

natural disasters; and introduce an arms-length regulatory framework to prevent and manage environmental risk.” To China in 2016, staff advised that “substantially raising taxes on fossil fuel and pollution (e.g., a carbon or coal tax) would help curtail emissions, improve energy efficiency, raise revenue and prevent almost 4 million premature deaths by 2030.”

### *Measurement of Effort*

Measuring the issue-specific and time-variant effort of individual bureaucrats is challenging since we unable to directly observe bureaucratic behavior. Here, we leverage the text of individual policy recommendations to estimate the effort invested by contributing authors. Our approach assumes that bureaucrats who invest greater effort in a given issue area will write more *complex* policy advice in that area: recommendations with greater detail and specificity to a given country context.

To measure the complexity of policy advice, we calculate the diversity of word choice in recommendation text. We do so by computing the lexical richness of the text of each recommendation: “the number of different terms used in a text and the diversity of the vocabulary” (Torruella and Capsada 2013, 448). Lexical richness is computed via Carroll’s corrected type-token ratio, defined as  $V/\sqrt{2N}$ , where  $V$  is the number of “types” (unique words) present in a string and  $N$  is the count of words in that string.

Table 1 lists example recommendations at low, medium, and high levels of complexity. As the examples suggest, low-complexity recommendations are often brief and involve fairly non-specific advice. More complex recommendations tend to be longer, exhibit deeper engagement with local conditions in a given country, and offer more specific and actionable policy advice. These characteristics, in our view, suggest a higher level of effort invested by contributing authors.

Recommendation	z-score
In light of the authorities' priority investment needs in infrastructure and electricity, as well as climate change mitigation and adaptation investments over the long term, the share of capital spending should increase in the medium to long term. Keeping a firm grip on current spending will be essential.	-0.9
Given Aruba's natural resources, developing a capital- and technology-intensive renewable energy sector offers a right long-term path for economic diversification. However, skilled-labor shortages may pose a challenge to the success of this initiative. Given their likely upfront investment needs, these projects should be financed through FDI, as much as possible.	0.3
The Bahamas has traditionally absorbed frequent natural disaster shocks ex post through the public balance sheet. An increased reliance on ex ante mitigation policies would help reduce and smooth the economic and fiscal impact of natural disasters. To this end, staff recommended integrating a well-designed natural disasters savings arrangement into the fiscal framework, insuring public assets through private natural disaster insurance and incentivizing the population to use these instruments more widely, including through targeted subsidies to improve affordability for low-income households - and making sure that building regulation, land use, and zoning guidelines are adequate and are reviewed and updated frequently.	1.6

**Table 1:** Sample of IMF policy recommendations, in ascending order by complexity (z-scores of Carroll's corrected type-token ratios).

## ALLOCATION OF BUREAUCRATIC EFFORT

We now test, per our first hypothesis, whether bureaucrats who interact with climate-attuned colleagues subsequently invest greater effort in climate policy recommendations.

To do so, we estimate the following model by ordinary least squares:

$$\text{complexity}_{ict} = \beta \left[ \mathbb{I}(\text{climate}_r = 1) \times \text{prior coworker attention}_{i(t-1)} \right] + \gamma \mathbf{Z}_{ict} + \delta_i + \zeta_t + \eta_{ct} + \varepsilon_{ict}$$

This regresses the mean complexity of policy recommendations coauthored by bureaucrat  $i$  in a report for country  $c$  in year  $t$  on the climate relevance of that recommendation,<sup>11</sup> interacted with the climate attentiveness of colleagues with whom the bureaucrat worked on

<sup>11</sup>Results are consistent when redefining this as median and maximum complexity within reports.

previous missions. We calculate colleagues' climate attentiveness as the count of climate-related policy recommendations they issued *prior* to working alongside bureaucrat  $i$  on an Article IV mission; for each bureaucrat  $i$ , we then take a rolling sum of colleagues' climate attentiveness through year  $t - 1$  (log transformed). We control for the number of years that bureaucrat  $i$  has been in the sample to avoid conflating coworker attention with any linear time trends. We choose a count measure of exposure to climate-attuned colleagues because we do not conceive of this as a one-time shock; exposure to climate-attuned colleagues should have an additive effect on subsequent investments of effort in climate, and should compound when those colleagues previously worked on climate to a greater extent. Thirty-seven percent of bureaucrats in our sample had at least one interaction with a climate-attuned colleague by any given year.

Additional covariates include the count of climate disasters experienced in country  $c$ , as well as the proportion of other current mission team members who previously issued climate-related policy recommendations. Both of these controls account for contemporaneous drivers of climate attention (see, e.g., Clark and Zucker 2024). Bureaucrat, year, and report (country-year) fixed effects absorb unobserved heterogeneities across individuals, time periods, and mission teams.<sup>12</sup> We cluster standard errors by bureaucrat. Our primary estimand of interest is  $\beta$ , the effect of prior coworker attentiveness to climate on the complexity of climate-relevant recommendations, relative to non-climate recommendations.

### *Inference*

This model represents a difference-in-differences (DiD) design with continuous treatment. This approach is useful for at least two reasons. First, it allows us to account for level differences in the typical lexical richness of recommendations that concern climate versus

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<sup>12</sup>To measure climate disasters, we aggregate climatological and meteorological disasters recorded in the EM-DAT database.

other issues. Due to the unique vocabulary of climate change, for example, discussions of the issue may be recorded as more complex than discussions of another issue where, for unobserved reasons, the language used tends to be less diverse (less lexically rich). This DiD approach captures changes in the complexity gap between climate and non-climate recommendations, which we assume to owe to changes in the allocation of bureaucratic effort between climate and other issues.

Second, this design addresses the possibility that the total effort devoted by bureaucrats varies by report. For unobserved reasons, bureaucrats may invest more effort in certain reports, increasing the complexity of all recommendations included therein. Examining climate-related recommendations in isolation would mistake this increase in complexity for a reallocation of effort to climate, rather than an increase in effort across issue areas. The DiD approach, by capturing the complexity of climate discussions relative to other issues, better reflects our interest in how bureaucrats redistribute effort across tasks.

The identifying assumption behind these tests is that staff exposure to climate-attuned colleagues is as-if random with respect to their attitudes towards climate change. Readers may be concerned that staff do not randomly vary in their exposure to climate-attuned colleagues. It is plausible that managers who themselves are interested in climate may, for example, deliberately assemble teams of climate-attuned staff and encourage them to devote special attention to climate-related policy recommendations. This would confound the relationship between colleagues' climate attentiveness and the contemporaneous complexity of climate outputs. Here we reiterate that our analyses focus on how team assignments affect *future* expressions of climate expertise; in other words, how staff behave after being rotated off a given team. If bureaucrats are solely responsive to managerial directives, we should not expect engagement with climate-attuned colleagues in one period to be associated with increased climate expertise in a future period.

Another possible concern is that exposure to climate-attuned colleagues in one period

predicts exposure to climate-attuned colleagues in subsequent periods. This is plausible if managers repeatedly seek to group climate-attentive bureaucrats together. Here we note that our control set includes the proportion of colleagues on a given mission team who themselves are attentive to climate (i.e., previously issued a climate-related policy recommendation). Holding constant the composition of a bureaucrat's current team, as well as other time-variant factors via year fixed effects, change in a bureaucrat's expertise between two team assignments should be attributable to conditions on that first team.

### *Results*

Estimation results in Table 2 support our theory. At baseline, climate-relevant recommendations tend to include more complex language than those concerning other topics. This gap widens significantly for bureaucrats who previously worked alongside more climate-attuned staff. Results of Model 3 indicate that doubling the climate attentiveness of past coworkers (i.e., doubling the number of climate recommendations those coworkers previously issued) would increase the complexity of future climate recommendations by 7% relative to non-climate recommendations. The magnitude and significance of this result is consistent across covariate and fixed effect specifications; it is robust to respecifying the outcome as median and maximum recommendation complexity (Appendix G).

One concern is that reports that discuss climate change may be systematically distinct from those that do not. This is plausible if climate recommendations primarily target more climate-vulnerable countries, which tend to be poorer and feature lower state capacity. If economic governance challenges tend to be more acute in more climate-vulnerable countries — or if climate-vulnerable countries rely more on the IMF for policy advice than other countries — Fund staff may construct more detailed policy recommendations for those countries across issue areas. The inclusion of report (country-year) fixed effects in Model 4 helps account for this possibility. Estimation of this model indicates that within the same

Dependent variable: Mean complexity (standardized)

	(1)	(2)	(3)	(4)
Climate-relevant $\times$ past coworkers (ln)	0.086** (0.028)	0.085** (0.028)	0.104*** (0.030)	0.116*** (0.030)
Climate-relevant recommendation	0.180*** (0.032)	0.193*** (0.032)	0.211*** (0.035)	0.212*** (0.037)
Past coworkers' climate attentiveness (ln)	-0.028** (0.010)	-0.005 (0.014)	0.059+ (0.034)	-0.021** (0.008)
N	4367	4367	4367	4367
Control: climate disasters		✓	✓	
Control: years in sample		✓	✓	✓
Control: % coworkers climate attuned		✓	✓	
Fixed effect: year	✓	✓	✓	✓
Fixed effect: bureaucrat			✓	✓
Fixed effect: report				✓

+ p < 0.1, \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001

**Table 2:** Regressions of the mean complexity of policy recommendations coauthored by a bureaucrat in a given year on the climate relevance of those recommendations (binary), interacted with the climate attentiveness of past colleagues. Models estimated by OLS with standard errors clustered by bureaucrat.

report, the complexity gap between climate and non-climate recommendations significantly widens when a contributing bureaucrat previously worked alongside more climate-attuned colleagues.

These results collectively indicate that bureaucrats meaningfully learn from colleagues within the institution. While incentives imposed by principals within the IMF may additionally spur expertise acquisition, we find that at any point in time, bureaucrats with more climate-attuned colleagues render meaningfully more complex climate policy recommendations. The effects moreover appear to endure; years after interactions with climate-attuned colleagues, bureaucrats continue to exhibit higher levels of effort and attention paid to climate. Bureaucrats thus do not allocate effort across issues in isolation, but rather via

engagement with colleagues.

## LEARNING ACROSS RANKS

Article IV mission teams feature personnel across multiple ranks. This allows us to evaluate whether bureaucrats learn differently from colleagues at different levels of the organizational hierarchy, as we theorize in our second hypothesis. In the following tests, we disaggregate prior colleagues by rank: whether they interacted with a senior colleague (a mission chief or resident representative while a staffer), junior colleague (a staffer while a mission chief or resident representative), or colleague of equal rank (another junior staffer while oneself is a junior staffer, or a mission chief or resident representative while oneself is a mission chief or resident representative). We estimate models of the same form as in Table 2.

### *Results*

Estimation results in Table 3 indicate that staff are uniquely responsive to the climate attentiveness of superiors. Model 2 indicates that doubling the climate attentiveness of prior senior coworkers would increase the relative complexity of subsequent climate recommendations by 14% of a standard deviation. Importantly, we find that exposure to climate-attuned colleagues of equal rank, as well as climate-attuned junior coworkers, lacks any significant association with future recommendation complexity; the point estimates are also notably smaller than those for senior coworkers. These results are consistent when redefining the outcome as median and maximum recommendation complexity (Appendix H).

These results collectively suggest that senior bureaucrats play a disproportionate role in shaping the priorities and incentives of junior colleagues. On small mission teams, senior staff may influence both the flow of information and the salience of particular issues,

Dependent variable: Mean complexity (standardized)

	(1)	(2)	(3)
Climate-relevant $\times$ senior coworkers (ln)	0.176*** (0.047)	0.203*** (0.049)	0.224*** (0.045)
Climate-relevant $\times$ equal-rank coworkers (ln)	0.034 (0.036)	0.056 (0.037)	0.055 (0.037)
Climate-relevant $\times$ junior coworkers (ln)	0.044 (0.055)	0.034 (0.060)	0.072 (0.052)
Climate-relevant recommendation	0.182*** (0.032)	0.213*** (0.034)	0.214*** (0.036)
Past senior coworkers' climate attentiveness (ln)	0.022 (0.023)	0.002 (0.070)	-0.043*** (0.011)
Past equal-rank coworkers' climate attentiveness (ln)	-0.042*** (0.012)	0.082* (0.038)	-0.011 (0.009)
Past junior coworkers' climate attentiveness (ln)	-0.024+ (0.015)	-0.003 (0.040)	-0.014 (0.012)
N	4367	4367	4367
Control: climate disasters		✓	
Control: years in sample		✓	✓
Control: % coworkers climate attuned		✓	
Fixed effect: year	✓	✓	✓
Fixed effect: bureaucrat		✓	✓
Fixed effect: report			✓

+ p <0.1, \* p <0.05, \*\* p <0.01, \*\*\* p <0.001

**Table 3:** Regressions of the mean complexity of policy recommendations coauthored by a bureaucrat in a given year on the climate relevance of those recommendations (binary), interacted with the climate attentiveness of past coworkers (disaggregated hierarchically in relation to given bureaucrat). Models estimated by OLS with standard errors clustered by bureaucrat.

making climate more likely to be discussed and incorporated when it is of interest to the team lead. At the same time, the climate attitudes of senior colleagues plausibly affect junior staff's assessment of career incentives. Working under a climate-attuned mission chief may signal that reallocating effort toward climate is professionally valued and likely to be rewarded, given superiors' influence over evaluations and advancement. Finally, social-

ization pressures may reinforce these effects: junior staff are especially likely to emulate respected and successful colleagues, so exposure to climate-attuned senior staff can shape behavior through both career-related expectations and emulation.

In an additional test, we probe one implication of this finding. If bureaucrats invest effort in climate as a career-motivated signal to superiors, we should see discussions of climate becoming more visible in Article IV reports (and thus more likely to be detected by superiors reviewing such work). To test this, we leverage the hierarchical structure of some recommendations in Article IV reports. Roughly 13% of recommendations in our sample include at least one *sub*-recommendation: additional policy advice nested under the primary recommendation. Nested recommendations are less focal and plausibly less visible to readers. Interestingly, we find that bureaucrats who previously worked alongside more climate-attuned senior colleagues are significantly more likely to discuss climate in a primary policy recommendation (i.e., less likely to nest it under recommendations concerning other issues). As in the preceding tests, we find that exposure to climate-attuned colleagues of equal rank and junior colleagues has no significant relationship with the placement of climate policy recommendations (Appendix I). This pattern is consistent with a career incentive mechanism driving our core result.

## CONCLUSION

Given the limited amount of effort they can expend on their work, which policy tasks do international bureaucrats prioritize? Prominent accounts emphasize the role of political principals; bureaucratic attention shifts when mandates change, discretion is delegated, or incentives are formally realigned (Holmstrom and Milgrom 1991; Nielson and Tierney 2003). Yet as institutions grapple with emergent policy challenges, such as climate change, such top-down demands are often mixed or contradictory. Some principals and bureaucrats

seek greater investment in these new issues; others question their pertinence to core institutional mandates. Individual bureaucrats interested in a novel issue must weigh its value against policy tasks of traditional focus of their institution. We advance an alternative and complementary perspective that centers the social nature of bureaucratic work as an explanation for how bureaucrats navigate these competing demands. Rather than treating effort allocation as a direct response to principal signals, we show how bureaucrats' choice of where to expend effort is a function of whom they interact with within their organization.

We develop and test this argument in the context of climate change, an issue that has become increasingly salient for international organizations historically oriented toward other policy domains. Focusing empirically on the IMF, we introduce original data on professional interactions among individual staff members and the content of more than 11,000 policy recommendations. Our analyses yield two core findings. First, bureaucrats continually devote greater effort to climate-related policy work after interacting with climate-attuned colleagues, producing more detailed and sophisticated climate advice relative to their own work in other domains. Second, these effects are asymmetric across the bureaucratic hierarchy: bureaucrats react strongly to the issue priorities of senior colleagues, but exhibit little responsiveness to the preferences of junior staff or peers of equal rank.

Taken together, these findings highlight how bureaucratic effort allocation is shaped by social and organizational context. Bureaucrats do not decide what to work on in isolation, nor do they mechanically follow formal mandates. Instead, they infer which issues merit sustained attention by observing the behavior of colleagues, especially those who occupy positions of authority within the organization. Hierarchy plays a central role in this process. Senior colleagues function simultaneously as evaluators who influence career trajectories and as respected reference points whose behavior signals what kinds of work are legitimate, valued, and professionally safe to pursue. Through this combination of evaluative authority and symbolic influence, hierarchical socialization becomes a powerful source of

institutional reorientation to new issues.

Our argument carries broad implications for theories of institutional change. Much existing scholarship portrays international organizations as rigid, adapting primarily in response to exogenous shocks or shifts in principal preferences (Wallander 2000; Stone 2011). We identify an endogenous pathway through which institutions reorient their attention even in the absence of reformed mandates or principal instruction. Routine personnel management practices, such as team assignments, rotations, and collaborative work, structure patterns of interaction that allow new priorities to diffuse through bureaucratic hierarchies over time. Institutional change is then not only imposed from the outside but also emerges from within as bureaucrats evaluate and trade off between various work tasks.

More generally, our research suggests bureaucrats ought to be studied in the context of the social environments in which they work. Influential work holds that bureaucrats possess fairly homogeneous preferences within institutions as a result of selection processes and self-reinforcing organizational cultures (Weaver 2008; Chwieroth 2015). When scholars have studied change in bureaucratic preferences, they have examined individual bureaucrats of a specific rank in isolation (Kentikelenis, Lang, and Wellner 2024; Clark and Zucker 2024). Assessments of how bureaucrats affect institutional performance similarly examine staff members as individuals operating independently of their colleagues (Heinzel 2022). We show instead that internal social dynamics, and particularly those structured by bureaucratic hierarchies, are central to understanding how organizations allocate effort, set agendas, and confront emerging policy challenges. Future research should therefore take seriously how patterns of interaction among bureaucrats shape effort allocation and institutional adaptability, alongside the more familiar roles of principals, mandates, and external pressure.

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## APPENDICES

A. Name Matching .....	2
B. Extraction of Policy Recommendations .....	3
C. Climate Keywords .....	4
D. LLM-Based Recommendation Classification .....	5
E. Keyword-Assisted Topic Models .....	6
F. LLM-Based Policy Categorization .....	8
G. Effort Reallocation: Median and Maximum Complexity .....	9
H. Colleagues by Rank: Median and Maximum Complexity .....	10
I. Colleagues by Rank: Issue Nesting .....	11

## A. NAME MATCHING

We track individual IMF bureaucrats over time using the author lists included in Article IV staff reports. We primarily link bureaucrats based on exact names matches. However, to account for slight differences in name spelling across reports, we also link a small number of bureaucrats based on the Levenshtien distance between two names, which records the minimum number of character deletions, insertions, and substitutions required to match two strings. This is a metric widely used for approximate string matching.

We link bureaucrats conservatively, only matching names that have a Levenshtien distance of one (i.e., just a single character adjustment) to minimize false positives. Prior to matching, we trim white space and remove prefixes from names (e.g., “Ms.”). For example, “Pierre-Paul” and “PierrePaul” have a Levenshtien distance of one. We exclude cases where one name has multiple matches meeting this condition. We additionally require that two authors’ initials match in order to proceed with linking. We conduct this procedure on 3.2 million name pairs (after excluding exact-match names), arriving at 50 approximate name matches.

## B. EXTRACTION OF POLICY RECOMMENDATIONS

Research team members read each sampled Article IV report in full and manually extracted the text of individual policy recommendations. Recommendations were generally delivered in consistent format across reports. Figure B1 is a page from Cambodia's 2018 report. Highlighted are example policy recommendations that were extracted.

CAMBODIA

8. **Medium-term fiscal pressures.** Although risks to fiscal sustainability remain contained in the short-term, they are expected to grow over the medium-term. Absent tax policy reforms, revenue growth is expected to slow as past revenue mobilization reforms mature. International trade taxes are projected to decline as import tariffs are reduced and grants are to fall as the middle-income status is solidified. To help support growth and sustainable development, in line with the authorities National Social Protection Policy Framework (SPPF), the composition of public spending should be re-oriented towards infrastructure and development spending. These developments will place a greater burden on domestic financing, with government deposits projected to decline to around 7 percent of GDP – close to the estimated floor at 6.5 percent.

9. **Policy Recommendations.**

- **Restraining current spending.** Further wage increases should be contingent on maintaining adequate fiscal buffers and supported by on-going public administration reforms. Balancing the goals of fiscal sustainability and civil service salaries will require careful targeting of pay increases to priority functions and good performers. Rec. 1
- **Raising revenues, while making taxes more efficient and progressive.** The authorities are formulating a new Revenue Mobilization Strategy (RMS), which should aim to sustain revenue growth by reforming tax policies to improve their efficiency and equity and modernizing revenue administration, in line with Fund TA recommendations.<sup>1</sup>
  - **Real-estate taxes.** Gradually raise the (inherently progressive) recurrent property tax rate from current 0.1 percent, a low level by regional standards; re-assess property values for tax purposes; and introduce regulations for valuations to be reassessed at least every 5 years. Reforms should also widen the base and enhance transparency and compliance. Sub-Rec. 2a
  - **Corporate and personal income taxes.** Abolish the corporate income tax holiday for new investments while maintaining the statutory corporate tax rate at 20 percent; reduce the withholding tax rate for repatriated dividends to 10 percent; abolish or reduce customs tariffs on intermediate goods; and ensure timely VAT refunds. Eliminate the patent tax, remove notches in the business tax scale between small and medium-sized enterprises, and implement a simplified tax on micro firms. Initiate preparations for introducing a comprehensive personal income tax regime over the medium term. Sub-Rec. 2b
  - **Other tax policies.** Replace ad valorem by specific excises for tobacco, fuels and beer and adjust them with inflation; abolish the lighting tax; and consider introducing/raising excises on luxury goods. Assess tax implications of e-commerce activity and prepare a reform plan for the adoption of VAT on e-commerce. Sub-Rec. 2c
- **Introducing a medium-term fiscal framework (MTFF).** The authorities are making progress towards introducing a MTFF, which should include a debt-based medium-term fiscal ceiling at about 40 percent of GDP (Box 2). The authorities should integrate the MTFF into the budget. Rec. 3

<sup>1</sup> For tax administration, see IMF Fiscal Affairs Department (2018), 'Cambodia: Tax Administration Modernization Priorities 2019–23'.

**Figure B1:** Page from Cambodia's 2018 Article IV report. Policy recommendations highlighted. Analyses of advice sophistication separate out sub-recommendations from parent recommendations (e.g., sub-recommendations 2a–c in the above would be considered separate from recommendation 2).

## C. CLIMATE KEYWORDS

We conducted keyword searches of each extracted policy recommendation to identify those related to climate. Recommendations are coded as climate-relevant if they include at least one of the following terms:

- “adaptation”
- “bali action plan”
- “bali roadmap”
- “cap and trade”
- “carbon” (note leading whitespace to exclude “hydrocarbon” cases)
- “clean development mechanism”
- “climate change”
- “climate finance”
- “climate politics”
- “conference of the parties”
- “disaster risk”
- “disaster hazard”
- “emissions trading scheme”
- “framework convention on climate change”
- “ghg”
- “global average temperature”
- “global environmental facility”
- “global warming”
- “green climate fund”
- “greenhouse effect”
- “greenhouse gas”
- “environmental politic”
- “intergovernmental panel on climate change”
- “ipcc”
- “kyoto protocol”
- “mitigation”
- “nationally determined contribution”
- “natural disasters”
- “paris accord”
- “paris agreement”
- “renewables”
- “renewable energy”
- “unfccc”

This keyword search-based approach follows, among others, Clark and Zucker (2024).

## D. LLM-BASED RECOMMENDATION CLASSIFICATION

We primarily identify climate-related recommendations via a keyword search (Appendix C). To validate this coding, we use the gpt-5-mini large language model (22 December 2025) to separately code all 11,608 recommendations extracted from Article IV reports. We indicate to the model that it should act as a “helpful, careful research assistant.” We prompt the model as follows:

The following is a policy recommendation issued by the IMF to a member state. Carefully determine whether the recommendation concerns climate change, decarbonization, or green/renewable energy (a recommendation about fossil fuels without reference to climate, decarbonization, or climate change mitigation does not count). Recommendations about natural disasters should be considered as being about climate change. If it is about climate change or decarbonization, return the number 1. If it is not, return the number 0. Include nothing else in your output. Here is the recommendation: [recommendation text]

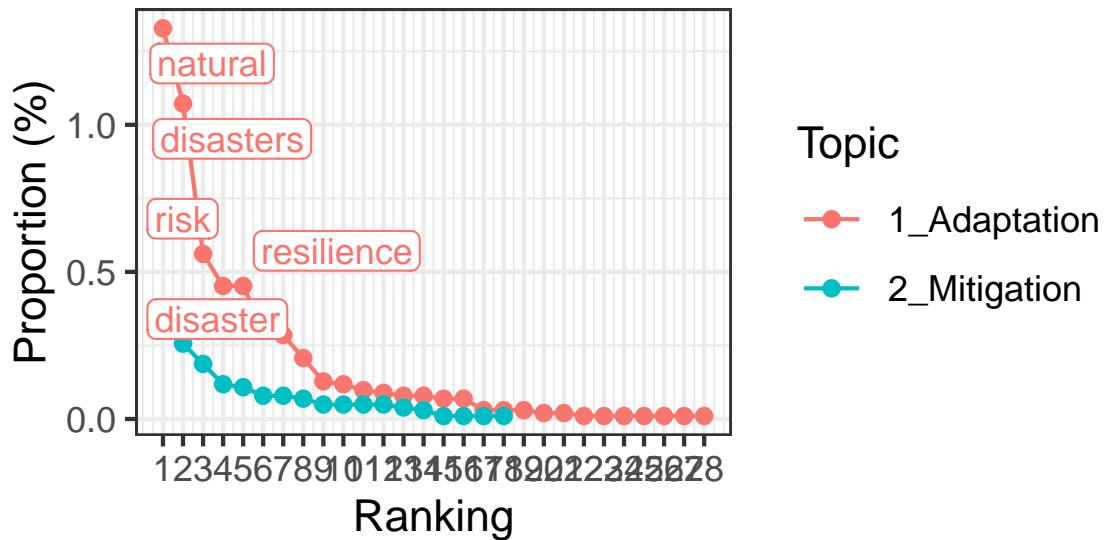
This approach identified 351 climate-related recommendations, more than the 234 identified via the keyword search. Of the 234 identified via the keyword search, 204 (87%) were likewise classified as climate-relevant by the LLM. One-hundred forty-seven recommendations were classified as concerning climate by the LLM, but not by the keyword search.

## E. KEYWORD-ASSISTED TOPIC MODELS

This appendix presents processing and diagnostic information on the keyword-assisted topic models used to characterize climate policy recommendations (Eshima, Imai, and Sasaki 2024). We use the below keyword sets to direct keyATM to detect adaptation- or mitigation-related recommendations.

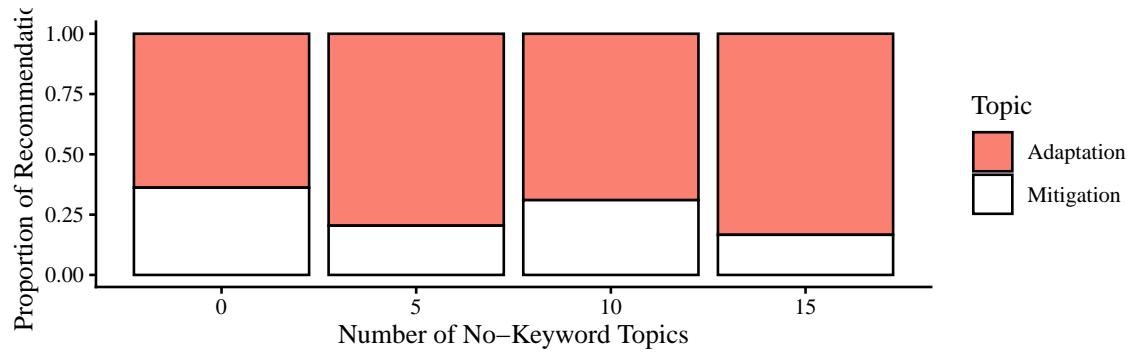
- **Adaptation:** "adapt", "adaptation", "resilience", "resilient", "coastal", "storms", "drought", "droughts", "cyclone", "cyclones", "hurricane", "hurricanes", "flood", "flooding", "temperature", "temperatures", "natural", "disaster", "disasters", "vulnerable", "vulnerability", "extreme", "weather"
- **Energy:** "emission", "emissions", "energy-efficient", "pollution", "greenhouse", "renewable", "renewables", "clean", "solar", "green", "sustainability", "dirty", "fossil", "paris", "hydrocarbon", "hydrocarbons", "non-hydrocarbon", "oil", "gas", "coal", "petroleum"

### E.1. Keyword Frequency



**Figure E1:** Proportion of adaptation- or mitigation-related climate policy recommendations including the keywords listed above.

## E.2. Topic Proportions



**Figure E2:** Proportions of climate policy recommendations that focus on adaptation or mitigation. Estimated for four no-keyword topic parameterizations, following Eshima, Imai, and Sasaki 2024.

## F. LLM-BASED POLICY CATEGORIZATION

We categorize the policies discussed in Article IV climate-related policy recommendations via the gpt-4o large language model (22 December 2025). We prompt the model as follows:

I am going to list some policy recommendations issued by the IMF to member states. I want you to identify the categories of policies discussed in each recommendation. These categories should be: natural disaster management (including general adaptation policies), fiscal policy (including debt management, deficits, and fiscal buffers), public sector employment and bureaucracies, insurance, tax policy (including carbon prices), labor policy, infrastructure investments, ease of doing business, monetary policy, welfare policies, financial sector risk, uncategorized mitigation/decarbonization. Be precise in your categorizations. You can list multiple categories for each recommendation, but do so only if it is necessary to capture the breadth of the recommendation. Return this in CSV form, with one column for the number of the recommendation, and then subsequent columns for each category you decide upon (1 = recommendation fits in category; 0 = it does not fit).

Model parameters were set as follows:

- Temperature: 0.5
- Top P: 1
- System prompt: “You are an AI assistant that helps people find information.”

Upon completion of the LLM process, we then conducted manual checks of random recommendations to ensure appropriate categorization; no manual changes were made to the LLM output. Of the 234 climate-related recommendations identified, 233 were sorted into at least one category. Of these, 192 (82%) were sorted into one or two policy categories. Thirty recommendations were sorted into three categories, 10 into four, and one into five.

**G. EFFORT REALLOCATION: MEDIAN AND MAXIMUM COMPLEXITY  
TO ADD**

**H. COLLEAGUES BY RANK: MEDIAN AND MAXIMUM COMPLEXITY**

**TO ADD**

## I. COLLEAGUES BY RANK: ISSUE NESTING

	Dependent variable: Pr(recommendation nested = 1)		
	(1)	(2)	(3)
Climate-relevant × senior coworkers (ln)	0.070** (0.022)	0.043+ (0.025)	0.054* (0.025)
Climate-relevant × equal-rank coworkers (ln)	-0.029 (0.019)	-0.032 (0.020)	-0.034+ (0.019)
Climate-relevant × junior coworkers (ln)	0.004 (0.028)	0.008 (0.029)	0.007 (0.027)
Climate-relevant recommendation	-0.008 (0.016)	-0.014 (0.015)	-0.020 (0.015)
Past senior coworkers' climate attentiveness (ln)	0.003 (0.014)	-0.064* (0.032)	-0.001 (0.001)
Past equal-rank coworkers' climate attentiveness (ln)	0.006 (0.007)	0.009 (0.017)	0.001+ (0.001)
Past junior coworkers' climate attentiveness (ln)	0.001 (0.011)	0.009 (0.019)	0.000 (0.001)
N	73577	73577	73577
Control: climate disasters		✓	
Control: years in sample		✓	✓
Control: % coworkers climate attuned		✓	
Fixed effect: year	✓	✓	✓
Fixed effect: bureaucrat		✓	✓
Fixed effect: report			✓

+ p <0.1, \* p <0.05, \*\* p <0.01, \*\*\* p <0.001

**Table I1:** Regressions of whether a given recommendation was nested under another recommendation on the climate relevance of that recommendation, interacted with the climate expertise of the contributing bureaucrat. Models estimated by OLS with standard errors clustered by bureaucrat.