Bureaucrats and Policies in Equilibrium Administrations*

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Abstract

We develop a model of policy making with an endogenous bureaucracy. Parties choose platforms and ideologically differentiated citizens decide whether to enter the public sector anticipating the platforms that they may be asked to implement. Bureaucrats prefer to work on policies closer to their ideal, and voters judge the performance of an administration taking both politicians' and bureaucrats' actions into account. The model provides an equilibrium framework to study the emergence of partisan or neutral bureaucracies and their consequences for government performance. It shows how bureaucratic partisanship can develop in modern civil service systems; why political polarization and bureaucratic partisanship reinforce each other; why bureaucratic neutrality is associated with competitive elections; and why partisanship lowers government efficiency and increases output fluctuations. Our results yield a number of policy implications regarding political appointments, public sector wages, seniority benefits, and recruiting measures that raise the intrinsic motivation of bureaucrats.

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1 Introduction

Effective government requires motivated bureaucrats. For this reason, it is common for newly elected leaders to worry about whether the bureaucracy they inherit will be willing to implement and promote their policy agenda. In the Trump administration, this conflict was thrust into the public eye by the president's comments about the "deep state" on the one hand, and by career civil servants speaking out against the administration's policies on the other.[1]

The existence of such conflicts shows both that bureaucrats have their own ideas regarding policies, and that their willingness to faithfully implement policies far from their ideal cannot be taken for granted. This simple observation raises far-reaching questions about the operation of government. Which citizens self-select into the bureaucracy under different policies, and what impact does this have on the size and productivity of government? How do politicians respond to the heterogeneity of bureaucrats' preferences? What will the distribution of bureaucrats' preferences and effort look like under different levels of political competition, in systems with more political appointees, or if wages in the public sector increase relative to the private sector?

Existing models have limited applicability to these questions. Most previous studies of bureaucrat selection (e.g., François (2000); Besley and Ghatak (2005); Delfgaauw and Dur (2008, 2010); Dal Bó et al. (2013)) focus on *public service motivation* (PSM), a preference for serving in government regardless of who is in power. They do not model policy preferences and the resulting conflict with politicians. On the other hand, models of bureaucrat-politician interactions (e.g., Fox and Jordan (2011); Ujhelyi (2014a); Forand (2019); Li et al. (2020); Sasso and Morelli (2021)) typically ignore the entry of bureaucrats.

In this paper, we combine these approaches in an equilibrium framework that features entry and effort by motivated bureaucrats, policy choices by elected politicians, and electoral choices by voters who understand that implemented policies are a function of both political and bureaucratic decisions. We call this framework an *equilibrium administration*, and show that it provides a useful vehicle for studying the above questions, and several others, regarding public sector personnel policies and the operation of governments.

In our model, a continuum of citizens and two policy-motivated parties all have preferences over a one-dimensional policy space. Policies are chosen by the party in power, but government outcomes also have an additional dimension, intensity or *output*, and this depends on the implementation effort of the bureaucracy as a whole. Citizens act both as voters and, if they choose to join the public sector, as bureaucrats. All actors prefer policies with

[1] For example, see Baker et al. (2019) ("Trump's war on the "deep state" turns against him") or Newland (2020) ("I'm haunted by what I did as a lawyer at the Trump Justice Department").

ideologies closer to their own ideal, and also value aggregate government output. For example, a voter who values environmental regulations prefers higher government output when the policy ideology is pro-environment than when it is pro-business. Bureaucrats value their own participation (effort) in the production of government output, particularly when the policy is close to their ideal. For example, an environmentalist bureaucrat prefers to work hard when implementing pro-environment policies than pro-business policies. Apart from this policy motivation, bureaucrats also have public service motivation, in the sense that they receive utility from contributing effort to government output regardless of which party is in power.

Voters choose parties based on the outcomes delivered by their administration. Because these outcomes depend on policy output as well as ideology, the bureaucracy is central to voters' evaluation of government performance. Parties choose policy ideology taking into account the effort that bureaucrats will be willing to exert. Because this generates a tradeoff between preferred policies and higher output, both the bureaucracy's ideological composition and public service motivation matters to office holders. Citizens decide whether to enter government or work in the private sector. Because this choice is based on the private-public wage gap and on citizens' expectations about what policies they will be asked to implement by the parties, the bureaucracy responds to both economic and political factors. In an equilibrium administration, these interrelated decisions by voters, parties and bureaucrats must all be consistent with one another.

Our model generates several insights. First, bureaucratic neutrality (a bureaucracy willing to exert effort regardless of the party in power) or partisanship (bureaucrats supporting specific parties) can emerge as equilibrium outcomes of the same model. We do not assume that bureaucrats are inherently neutral/partisan or motivated/lazy, nor that these behaviors are fixed by institutions (i.e., that partisanship is the result of political patronage or neutrality is ensured by a civil service system). Instead, we show how these phenomena can emerge in equilibrium from the simple incentives of citizens as policy makers, bureaucrats, and voters.

Second, we show that policy polarization between parties and partisanship in the bureaucracy are complements. Policy polarization leads to partisanship because no bureaucrat is willing to exert effort for both parties when their platforms are far apart. In turn, more partisan bureaucrats make it possible for a party to choose a more extreme platform without losing bureaucrat effort. Equilibrium administrations in which the bureaucracy is fully neutral have the least policy polarization. Conversely, parties choose their ideal policies, and hence are maximally polarized, in equilibrium administrations with a fully partisan bureaucracy.

Third, this complementarity between party polarization and bureaucratic partisanship gives rise to equilibrium multiplicity. In the same environment, expected policy convergence selects neutral bureaucrats who then act as a moderating force on parties' policy choices, whereas expected polarization selects partisan bureaucrats who then loosen the bureaucratic constraint on parties' policy choices. Thus, whether a bureaucracy is more neutral or more partisan depends in part on self-reinforcing expectations.

Fourth, the model explains why partisanship in the bureaucracy is (i) skewed towards the electorally stronger party, and (ii) associated with lower government output, larger bureaucracies and shirking bureaucrats. The result in (i) highlights the higher sensitivity of a partisan bureaucrat's entry decision to the electoral prospects of her preferred party. The results on government output in (ii) reflect this bureaucrat's lower productivity, because she chooses to shirk when her preferred party is out of office. Therefore, partisan bureaucracies require more workers than neutral bureaucracies to produce the same level of output. The mechanism behind these patterns does not rely on political patronage or machine politics - thus, our model can be used to understand the emergence and implications of bureaucratic partisanship in modern civil service systems. Because partisanship implies policy conflict between bureaucrats and politicians in equilibrium, the model can also be used to shed light on periods of pronounced conflict between the chief executive and administrative agencies.

Fifth, we find that bureaucratic neutrality is associated with competitive elections. Because partisan bureaucrats only work when their preferred party wins, elections that are expected to be close attract fewer partisans into the public sector. This in turn gives the winning party an incentive to choose a more moderate policy in order to maintain government output. For both of these reasons, elections that are expected to be closely contested are conducive to bureaucratic neutrality.

Finally, we derive a number of implications for public sector personnel policies. Reducing the number of political appointments available to winning parties encourages policy moderation, and this in turn leads to less partisanship in the permanent civil service. Increasing seniority benefits can lower partisanship by encouraging bureaucrats to stay on rather than quit when they disagree with the incoming party's policies. Higher public sector wages drive differential selection of citizens by ideology and can either decrease or increase partisanship in the bureaucracy. Recruitment measures that raise bureaucrats' PSM can have unintended political consequences because more motivated bureaucrats give parties a license to choose more extreme policies.

As we show below, various elements of our analysis find support in the empirical literature on bureaucracies.

2 Related Literature

Our paper provides a tractable model that features endogenous entry and output in the bureaucracy, political competition, and heterogenous voters. We are not aware of another model that combines all these features, but elements of our approach have antecedents in several different literatures.

Studying the implications of bureaucrats' preferences for the optimal design of the public sector has a long tradition in economics (e.g., Dewatripont et al. (1999); François (2000); Alesina and Tabellini (2007); Prendergast (2007)). Much of the recent literature has increasingly focused on the wider "general equilibrium" implications of these preferences. Macchiavello (2008), Delfgaauw and Dur (2008, 2010), and Jaimovich and Rud (2014) study equilibrium workforce composition and wages in both the public and private sectors when some agents have public service motivation (PSM). Aldashev et al. (2018) study equilibrium sorting of motivated agents between the non-profit and for-profit sectors, and the impact on donations to non-profits. Closer to our model, Besley and Ghatak (2005) study the matching of motivated workers to organizations with heterogenous missions, and present an extension where the organization's choice of mission is endogenous.

In contrast to the approaches listed above, we explicitly model the public sector as a *political* organization. In our model, the missions (i.e., policies) bureaucrats are tasked with implementing are the outcome of politicians' and voters' choices, and these missions are uncertain ex ante. Bureaucrats have both PSM and policy preferences, and we focus on understanding the implication of bureaucratic sorting in a political equilibrium. In closely related work, Gailmard and Patty (2007) consider the selection of bureaucrats in a model of delegation. In their setting, the possibility of future policy-making discretion gives policy-motivated bureaucrats incentives to invest in expertise. As in our model, policy preferences drive both the composition of the bureaucracy (in their case through exit) and its productivity. A key difference between the models is our focus on partisanship: policies are chosen by competing parties as opposed to a single fixed legislator. Thus, sorting into the bureaucracy reflects ideological polarization and electoral prospects, rather than the delegation of policy discretion.

Finally, because expected electoral outcomes are central to our model, it relates to the literature studying how agency relationships between politicians and bureaucrats affect voters' ability to screen and incentivize politicians (Fox and Jordan, 2011; Ujhelyi, 2014a; Vlaicu and Whalley, 2016; Forand, 2019; Forand and Ujhelyi, 2021; Li et al., 2020).[2] To maintain tractability, these models tend to allow for limited heterogeneity, do not distinguish PSM

[2] Also related is Sasso and Morelli (2021), in which populist politicians use bureaucratic implementation to screen competent bureaucrats.

from policy preferences, and ignore the endogenous formation of bureaucracies.

More generally, our paper contributes to the literature studying the endogenous formation of government. While the citizen-candidate literature initiated by Osborne and Slivinski (1996) and Besley and Coate (1997) studies the entry of politicians in equilibrium, we focus on the entry of bureaucrats. Similarly, a growing literature on state capacity highlights the need to understand how the state's ability to implement various policies emerges endogenously (Besley and Persson, 2009; Acemoglu et al., 2011). Our model provides a possible approach to microfounding state capacity in an established democracy by focusing on heterogenous bureaucrats' choices regarding entry and effort.[3]

3 Model

3.1 Setup

We consider a continuum of citizens with heterogenous preferences over the activities of government. Government activity has two components: an ideological policy $x \in [-1, 1]$, which will be chosen by politicians, and the intensity of its implementation (or simply "output") $Q \geq 0$, which will be determined by bureaucrats. For example, x can describe whether government policy promotes more or less extensive environmental regulations, while output Q can reflect how carefully the rules are written, how efficiently they are enforced, or how zealously government lawyers fend off legal challenges. The choice of x can also be interpreted as providing a single direction to many areas of government activity: for example, a liberal policy $x < 0$ might require that environmental departments develop more regulations *and* that health departments expand access to heath care, whereas a conservative policy $x > 0$ might push both departments to do the opposite. A higher Q would then indicate the more intense implementation of government policy across multiple issues.

Citizens value both policy ideology and output, with the crucial feature that they prefer higher levels of output when the policy is closer to their ideal point. A citizen's utility is

$$Q \times (\alpha - |x - b|), \tag{1}$$

where $\alpha > 0$ measures citizens' value from output at their ideal policy ideology $x = b$. Ideal points b are distributed uniformly over $[-\mathcal{I}/2, \mathcal{I}/2]$. We assume that the dispersion in citizens' ideologies, captured by $\mathcal{I}$, is large relative to the bound of 1 on the policy space: this simplifies our analysis by ruling out corner cases in which extreme policies cannot attract as

[3]Acemoglu et al. (2011) show how the interaction between a rich elite and the bureaucracy can affect state capacity during transitions to democracy.

many bureaucrats as moderate ones.[4]

Government output. As described below, a subset B of citizens will form a bureaucracy. Given a policy choice x by the governing party, a bureaucrat with ideology $b \in B$ chooses her level of effort $q \in \{0, 1\}$ in implementing the policy, where $q = 1$ represents working and $q = 0$ represents shirking. Her payoff from this decision is

$$q \times (\phi - |x - b|), \tag{2}$$

which is in addition to (1). The payoff in (2) decreases in the distance between the bureaucrat's and the policy's ideology: bureaucrats obtain lower utility from government work when asked to implement policies they disagree with. The parameter $\phi > 0$ is our measure of public service motivation: it captures bureaucrats' intrinsic utility from producing government output, regardless of the policy ideology. It follows immediately from (2) that a bureaucrat with ideology b will work, rather than shirk, for a party on the implementation of policy x whenever her public service motivation (ϕ) overcomes her ideological gap with the government's policy ($|x - b|$). Formally, an *optimal production decision* for bureaucrat b is

$$q_b(x) = \begin{cases} 1 & \text{if } |x - b| \leq \phi, \\ 0 & \text{otherwise,} \end{cases} \tag{3}$$

where for simplicity we resolve indifference in favor of working.[5]

Government output Q simply aggregates the effort decisions of individual bureaucrats. Given a bureaucracy B and a policy x, government output is $Q^B(x) = {}^1\!/\!_{\mathcal{I}} \int_B q_b(x) \mathrm{d}b$. Notice that each bureaucrat, and therefore her contribution to output, is negligible. Accordingly, a bureaucrat's decision to work is not based on her impact on government output, but on her intrinsic motivation to participate in government policy. In the aggregate, however, government output reflects the effort of the bureaucracy as a whole.[6]

Parties' policies. There are two political parties, L and R, with ideologies -1 and 1, respectively. They are policy motivated: given their own ideology, they receive the same utility (1) as citizens. Parties cannot commit to policies before an election: if elected, a party will choose policy x to maximize its payoff (1). In doing so, parties take the size and

[4] We provide a sufficient condition in Section 4, which is easy to understand after we characterize bureaucratic entry decisions.

[5] We assume that effort is discrete for simplicity. If instead $q \in [0, 1]$, then given bureaucrats' payoffs from effort in (2), almost all ideological types would still strictly prefer either $q = 0$ or $q = 1$.

[6] This is not meant to describe the incentives of senior bureaucrats who may have a significant impact not just on output, but also on policy ideology or the incumbent's electoral fortunes. Bureaucrats in our model are lower-level bureaucrats, and our goal is to capture the interactions of governing parties with the rank-and-file bureaucracy as a whole.

the ideological composition of the bureaucracy as given, and they anticipate how the level of effort exerted by bureaucrats will depend on the policy choice. Correspondingly, given a bureaucracy B, the set of *optimal policies* for party $P = L, R$ with ideal policy $b_P \in \{-1, 1\}$ is

$$x_P(B) = \text{argmax}_{x \in [-1,1]} Q^B(x)(\alpha - |x - b_P|). \tag{4}$$

To rule out corner solutions where a party chooses a policy that makes all bureaucrats shirk, we assume that $\alpha \geq 2$. Notice that, given any fixed bureaucracy B, (4) ensures that parties' optimal policies satisfy $x_L \leq x_R$.

Elections. In an election, citizens take the bureaucracy B and the policies (x_L, x_R) as given, and their preferences over the parties are determined by (1), where $Q = Q^B(x)$. In line with models of probabilistic elections, we assume that a party's support among the electorate maps noisily into winning probabilities. Specifically, given a bureaucracy B and policies (x_L, x_R), we specify the *winning probability* of party L, denoted $p_L(B, (x_L, x_R))$, as the fraction of citizens who prefer party L to party R, i,e., the fraction of citizens in the set $\{b \in [-\mathcal{I}/2, \mathcal{I}/2] : Q^B(x_L)(\alpha - |x_L - b|) \geq Q^B(x_R)(\alpha - |x_R - b|)\}$. The winning probability of party R is $1 - p_L(B, (x_L, x_R))$.

Bureaucratic selection. Citizens choose whether to pursue a career in the private or the public sector. When making this choice, citizens take the political environment in which their careers will take place, namely parties' policies and election probabilities, as given. These political expectations are captured by a *policy lottery* $\chi = (x_L, x_R; p_L, p_R)$, which yields policy x_L with probability p_L and policy x_R with probability p_R. Citizens also anticipate how hard they would work for the various governments they could serve, which is captured by the optimal production decision $q_b(x)$ in (3).

A citizen who joins the private sector receives a wage $w > 0$, whereas the public sector wage is 0. The private-public wage gap can reflect the power of public sector unions, differences in the relative productivity of the private and public sectors, or the presence of public sector rents delivered by politicians for redistributive or clientelistic reasons.[7]

Given a policy lottery χ and a private sector wage w, an *optimal application decision* for citizen with ideology b is

$$a_b(\chi) = \begin{cases} 1 & \text{if } p_L q_b(x_L)(\phi - |x_L - b|) + p_R q_b(x_R)(\phi - |x_R - b|) \geq w, \\ 0 & \text{otherwise,} \end{cases} \tag{5}$$

[7] Because all citizens have the option to enter government only to shirk, a negative private-public wage gap would lead to all citizens joining the bureaucracy. A positive wage gap would arise endogenously, for example, in a model in which citizens differ in their public sector motivation (as in Delfgaauw and Dur (2010)) or in their private sector productivity (along the lines of Caselli and Morelli (2004) or Mattozzi and Merlo (2008) who focus on the selection of politicians).

where $a_b(\chi) = 1$ denotes the decision to become a bureaucrat, and where for simplicity we resolve indifference in favor of joining the bureaucracy. Given a policy lottery χ and a private sector wage w, an *optimal bureaucracy* $B(\chi) = \{b : a_b(\chi) = 1\}$ collects those citizens who choose to join the bureaucracy. To rule out cases in which no citizen wants to become a bureaucrat, we assume that $2w < \phi$.

To summarize, the timing of our model is as follows:

1. Citizens decide whether to join the private or public sector, forming bureaucracy B.

2. Party L (R) is elected with probability p_L (p_R).

3. The elected party chooses policy x.

4. Bureaucrats in B decide whether to exert effort, resulting in output Q.

Equilibrium administrations. Our equilibrium notion ties together bureaucrats' entry decisions, parties' policy choices and citizens' preferences over governments. An *equilibrium administration* consists of a policy lottery $\chi^* = (x_L^*, x_R^*; p_L^*, p_R^*)$ along with a bureaucracy B^*, which satisfy:

(i) given policy lottery χ^*, B^* is an optimal bureaucracy, i.e., $B(\chi^*) = B^*$,

(ii) given the bureaucracy B^*, the policy x_P^* of party $P = L, R$ is an optimal policy, i.e., $x_P^* \in x_P(B^*)$,

(iii) given policies (x_L^*, x_R^*) and bureaucracy B^*, p_L^* is the winning probability of party L, i.e., $p_L(B^*, (x_L^*, x_R^*)) = p_L^*$.

An equilibrium administration describes bureaucratic and political outcomes in a unified framework: the bureaucrats who choose to enter government must correctly forecast the policies they will be asked to implement over their careers, parties must have incentives to choose the policies that attract exactly these bureaucrats, and the resulting government policy and output must enjoy a level of support among voters that is consistent with bureaucrats' beliefs about which parties will hold office.

Our model is symmetric: the median citizen ideology of 0 is located in the middle of both the policy and ideological spaces, and parties' ideal polices and the distribution of citizen ideologies are both symmetric around 0. Therefore, it will be useful to focus on *symmetric* equilibrium administrations, in which $x_L^* = -x_R^*$ and $p_L^* = p_R^*$. However, our results will also describe equilibrium administrations that are not symmetric: in such cases, a party endogenously develops an advantage in both the electorate and the bureaucracy, even if it has no edge over its opponent in the underlying environment.

Outline of our analysis. In Section 4, we describe optimal bureaucracies: we fix arbitrary expectations for citizens regarding policy lotteries and derive their career decisions. In Section 5, we turn to parties' optimal policies: there, we fix an arbitrary bureaucracy and study how parties' choices balance ideology against the need to motivate bureaucrats to work. We think it is useful to start with these partial equilibrium results as our model introduces novel incentives and tradeoffs for bureaucrats and parties, and studying them in isolation helps us clarify these insights and highlight their empirical implications. Finally, in Section 6, we describe equilibrium administrations. There, we impose the constraint that all agents' expectations should be consistent with each other's actual behavior, and our results show how this shapes our model's joint predictions on political and bureaucratic outcomes.

3.2 Discussion of main modelling assumptions

The interaction of politicians and bureaucrats. Our setting is meant to capture a democracy with an established civil service that is central to policy implementation, but where parties have limited ability to exert political control over the bureaucracy. As a result, parties anticipate that government performance depends on the support that their polices enjoy in the bureaucracy.[8] At the same time bureaucrats' ability to influence government policy also faces limits: contrary to models of delegation like Epstein and O'Halloran (1999) or Gailmard and Patty (2007), bureaucrats cannot directly affect a policy's ideology. This reflects the idea that rank-and-file bureaucrats are too small to influence the overall policy direction. Rather, it is the bureaucracy as a whole that has power to shape policy, both directly through output and indirectly because parties'policies respond to the distribution of bureaucrats' ideologies. Our model also abstracts from various tools that politicians can leverage to improve policy implementation, but Section 7.1 considers an extension along these lines.

Interpretation of model timing. Although our model describes a "one-shot" interaction between citizens, bureaucrats and parties, its timing reflects the long time horizon involved in a bureaucrat's choice of occupation. Citizens join the bureaucracy before elections take place and policies are realized. Indeed, in many countries public service is considered to be a lifelong vocation and shifting between the public and private sectors is uncommon (Peters,

[8] There is extensive anecdotal evidence on this view of the bureaucracy as a constraint for politicians. As noted by Peters (2002) in the British context, political executives coming into power "have almost invariably reported overt or covert resistance by their civil servants and the existence of a "departmental view" about policy that limits the effectiveness of any political leader." (p.222) Similarly, several US presidents are famous for viewing civil servants in the federal bureaucracy with distrust (Aberbach and Rockman, 1976; Rourke, 1992; Golden, 2000)

2002). In some cases (e.g., France), bureaucrats must attend specific schools or academic programs, implying that their decision to work in government must be made years before they learn what policies they will implement. In the U.S., Farber (2008) shows that workers' average tenure with the same employer is longer in the public than in the private sector, and that since the 1970s, tenure with the same employer has increased for public sector workers whereas it has declined for private sector workers. Under these circumstances, bureaucrats who join the public sector must form expectations about the winning probabilities of the parties they may be asked to serve (or the fraction of their career they will spend serving each party), and the policies these parties will implement when in office. These expectations are captured by (p_L, p_R) and (x_L, x_R).[9]

Relatedly, we assume that a bureaucrat expects to stay and shirk, instead of quitting, when serving a party she disagrees with. Empirically, politically motivated quitting among career civil servants is infrequent (Bolton et al., 2021; Spenkuch et al., 2021). One reason for this persistence is that bureaucrats accumulate job-specific human capital that would be lost if they left government employment (Gailmard and Patty, 2007; Bertelli and Lewis, 2012). Another reason is that civil service systems provide various seniority benefits, including rigid rules on hiring, promotion, and job protections. The combination of barriers to entry and benefits to tenure increases the option value of public sector jobs and reinforces bureaucrats' incentives to "wait out" a government they dislike.[10] Section 7.3 presents an extension that explicitly incorporates such benefits from staying while giving bureaucrats the option to quit.

Bureaucrats' motivations. Our modelling of bureaucrats' motivations contains elements from several literatures. The public administration literature, where the concept of PSM originated, takes a broad view of public service motivation. Perry and Wise (1990, p.368) define PSM as "an individual's predisposition to respond to motives grounded primarily or uniquely in public institutions." An important element emphasized in this literature, which is central to our model, is that bureaucrats derive intrinsic value from public service.[11] Formal models in political science and economics have focused on various elements of the concept. Like us,

[9] The three conditions in the definition of an equilibrium administration impose increasing levels of sophistication on these expectations. Condition (i) requires only that bureaucrats's career decisions are optimal against *some* expectation of policy and electoral outcomes. Condition (ii) requires that expectations regarding policies be consistent with parties' optimal choices given the bureaucracy B^* that results from (i). Finally, condition (iii) requires that expectations regarding electoral outcomes be consistent with voter preferences given the bureaucracy B^* from (i) and parties' policies from (ii).

[10] See Golden (2000) for case studies of such "waiting it out" in response to ideological misalignment with the government. See also Selden and Moynihan (2000), who provide evidence that unionization and higher internal opportunities are associated with lower turnover intentions.

[11] For example, the survey instrument to quantify PSM developed by Perry (1996) measures agreement with such statements as "I consider public service my civic duty" and "Serving citizens would give me a good feeling even if no one paid me for it."

Delfgaauw and Dur (2008) model PSM as a form of "impure altruism" (Andreoni, 1989), where the employee values her effort directly. In contrast, François (2000) and Prendergast (2007) model PSM as "pure altruism" where value is placed on government output. Besley and Ghatak (2005) and Gailmard and Patty (2007) take a similar approach but allow for heterogeneity in policy preferences based on ideology or the organization's "mission".[12] Delfgaauw and Dur (2010) and Dal Bó et al. (2013) present models where PSM is captured by a fixed utility from working in the public sector. Bureaucrats in our model are motivated both by ideology and by the ideology-independent component ϕ, and for clarity we refer to the latter alone as PSM: in our setting, ideological conflict with the governing party provides incentives to shirk, and these are countervailed by bureaucrats' public service motivation.[13]

Government size. We assume that the size of the bureaucracy is endogenous: it is determined by the desirability of government jobs, which captures both political and economic factors. This is allows our model to address how labor supply and government size are related to electoral politics and policy polarization. In reality, the number of bureaucratic positions can be constrained by a number of fiscal or legislative factors. To capture this, one could alternatively assume that the government has a fixed number of positions denoted $\overline{B} > 0$. In itself, this does not affect our analysis. To see this, suppose that when the supply of bureaucrats exceeds its demand (i.e., $|B(\chi)| > \overline{B}$), the bureaucracy is staffed randomly from the applicant pool. In this case a fraction $\overline{B}/|B(\chi)|$ of each type of applicant from $B(\chi)$ is employed. Clearly, this would affect neither bureaucrats' production decisions nor citizens' decisions to apply for a government job. Given any policy x, government output would be $Q^B(x) = \overline{B}/|B(\chi)| Q^{B(\chi)}(x)$. Therefore, parties' optimal policies are also the same as in (4).

In Section 7.2 we explore what happens if the number of positions is fixed *and* the private-public wage gap adjusts to clear the labor market.[14]

Elections. We do not specify an explicit model of electoral competition. Recall that neither bureaucrats' nor parties' choices are driven by electoral concerns: bureaucrats take winning probabilities as given in (5), and parties cannot commit to policy platforms ahead of the election in (4). For our purposes, the role of elections is to ensure that, in equilibrium, bureaucrats' expectations about parties' chances of forming the government are consistent

[12] In our setting, pure altruism cannot influence a bureaucrat's behavior because she has a negligible impact on output. Nevertheless, our model yields similar complementarities: in Besley and Ghatak (2005), employees exert higher effort to achieve organizational goals that they agree with; in Gailmard and Patty (2007), bureaucrats invest in expertise in order to improve a policy they care about.

[13] Recent empirical results by Spenkuch et al. (2021) (using procurement data) and Piotrowska (2021) (using survey data) show that ideological preferences and the resulting conflict with politicians indeed matter for bureaucrats' performance.

[14] In reality, politicians can also directly change the size of the bureaucracy. Changing civil service positions is typically difficult, and we ignore this possibility in the model. Adding political appointees tends to be easier, and we study this as an extension in Section 7.1.

with citizens' expectations of parties' performance in office. For tractability, we assume directly that a party's winning probability is given by the share of citizens who prefer this party to its opponent. This is equivalent to a model of elections in which there is uncertainty about the ideological location of the median voter, which can differ from the median citizen (here, $b = 0$) because of, say, factors outside the model that affect turnout. To see this, suppose that in any election the median voter is drawn from a uniform distribution over citizen ideologies $[-\mathcal{I}/2, \mathcal{I}/2]$. In that case, the winning probability of party L, which is the probability that the median voter prefers L, is the same as the share of voters who prefer party L.[15] More generally, nothing important would change if we assumed that p_L is an increasing, continuous function of the share of citizens who prefer L to R.[16]

4 Optimal bureaucracies

In this section, we treat parties' policy platforms and winning probabilities as parameters and describe bureaucrats' entry and effort decisions. Our goal is to study what these and other parameters imply for the composition of the bureaucracy and government output. Without loss of generality for optimal bureaucracies, we assume that $p_L \geq p_R$, so that party L has an (at least weak) electoral advantage. In many countries, some parties have enjoyed disproportionate access to government over long stretches of time, and our setting will address the effects of such partisan imbalances on the bureaucracy.

4.1 Polarization, partisanship and neutrality

Given a policy lottery χ, let $U_b(\chi, L) = p_L(\phi - |x_L - b|)$ denote the expected payoff of a citizen with ideology b if she becomes a bureaucrat and works ($q = 1$) only if L wins, $U_b(\chi, R) = p_R(\phi - |x_R - b|)$ her payoff if she works only if R wins, and $U_b(\chi, LR) = \phi - p_L|x_L - b| - p_R|x_R - b|$ her payoff if she always works. Figure 1 illustrates these payoff functions for different policy pairs (x_L, x_R). For simplicity, we begin with the special case of $p_L = p_R = 1/2$. The triangle on the left is $U_b(\chi, L)$, the one on the right is $U_b(\chi, R)$, and the trapezoid on the two upper graphs is $U_b(\chi, LR)$. The bureaucrat's optimal production decision (3) is determined by the maximum of these payoff functions, indicated in bold.

[15] The literature on electoral competition has developed many models of probabilistic elections. Median uncertainty, and its uniform special case, has been important in the study of elections with valence heterogeneity (Groseclose, 2001; Aragones and Palfrey, 2002; Ashworth and De Mesquita, 2009).

[16] In a discontinuous model of deterministic elections where p_L is respectively $0/1/2/1$ when this share is smaller than/equal to/larger than $1/2$, the symmetric equilibrium administrations would be identical to those of our model, described in Section 6.1.

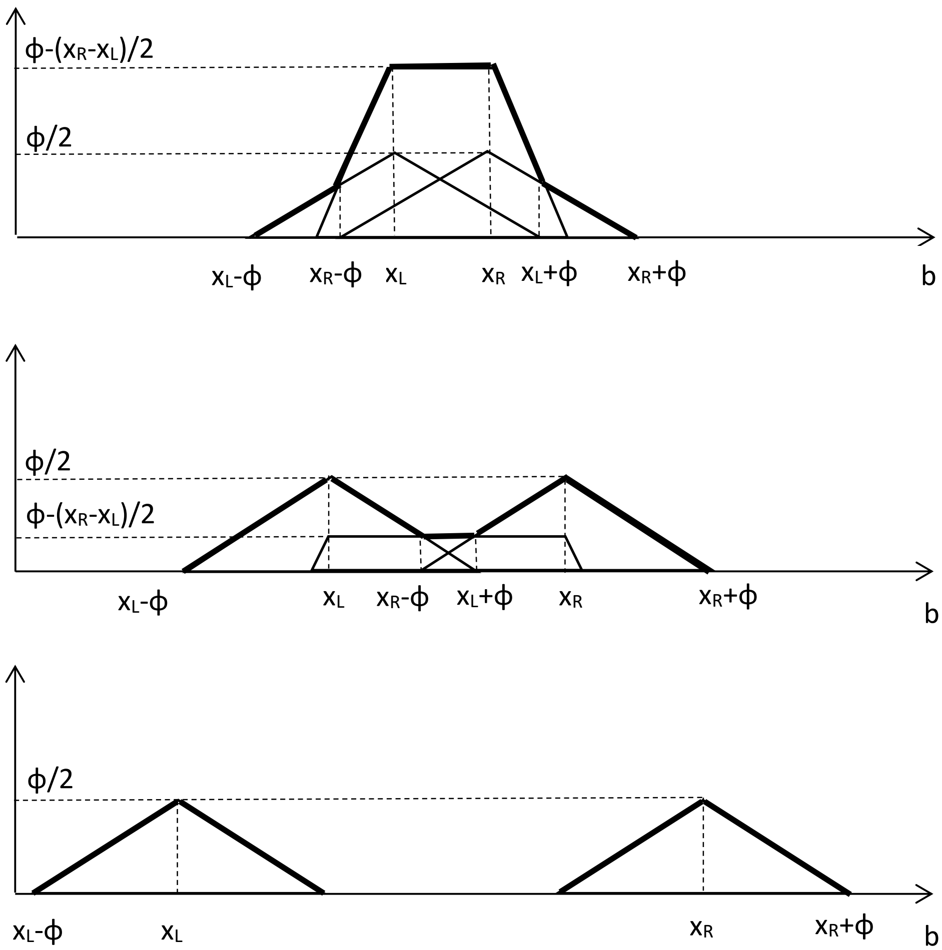

Figure 1: Polarization and bureaucratic effort. As polarization increases, the set of neutral bureaucrats shrinks: more bureaucrats exert effort for only one party.

We can identify four groups of bureaucrats. On the first panel of Figure 1, bureaucrats with ideology $b < x_L - \phi$ or $b > x_R + \phi$ always shirk ($q = 0$). Bureaucrats with ideology $b \in [x_L - \phi, x_R - \phi)$ work only if party L wins, while bureaucrats with ideology $b \in (x_L + \phi, x_R + \phi]$ work only if party R wins. We will refer to bureaucrats who only work for one of the parties as *partisans*. Finally, bureaucrats with ideology in $b \in [x_R - \phi, x_L + \phi]$ work regardless of which party wins. We will refer to bureaucrats who work for both parties as *neutral*. Note that here, partisanship or neutrality is not an inherent characteristic of bureaucrats. Rather, it is a *choice* that results from the simple interaction between bureaucrats' policy preferences and the policy platform of the party in power.[17]

[17] Notice that partisanship vs. neutrality depends on, but is nevertheless distinct from, bureaucrats' "moderate" or "extreme" position on the ideological spectrum $[-\mathcal{I}/2, \mathcal{I}/2]$.

Suppose that there is no political polarization in the sense that $\Delta x \equiv x_R - x_L = 0$. Then clearly all bureaucrats who work under one party also work under the other party: all bureaucrats are neutral. As political polarization increases, some neutral bureaucrats become partisans. For these bureaucrats, the party farther from their preferred policy is now "too far": they prefer to shirk if this party wins. At the same time, each policy moves closer to some of the more extremist bureaucrats. Some of these bureaucrats previously shirked but now become partisans. The resulting pattern is illustrated on the top panel of Figure 1. Bureaucrats in the middle maximize their payoff on the trapezoid: these bureaucrats will be neutral. Bureaucrats on either side pick points on the triangles: these bureaucrats will be partisans. As political polarization increases, the triangles slide further apart, while the trapezoid is lowered. The resulting pattern is shown on the middle panel, where the number of neutral bureaucrats (on the trapezoid) has decreased while the number of partisans (on the triangles) has gone up. As polarization increases further, neutral bureaucrats disappear completely and all bureaucrats are now partisan (bottom panel).

While simple, the analysis so far yields an important lesson: political polarization reduces neutrality and creates partisanship in the bureaucracy. This is true even though political patronage and other forms of explicit political interference are absent from the model. Instead, partisanship emerges due to the incentives of policy-motivated bureaucrats: when polarization is high enough, there are simply no bureaucrats who are willing to work for both parties.

To describe optimal bureaucracies, we must determine which citizens choose to apply for a public sector job. Recalling (5), this depends on the private-public wage gap. Graphically, this participation constraint limits the bureaucracy to those citizens with payoffs above a horizontal line at w. This screens some citizens out of the public sector - citizens who would have been partisan *or* neutral bureaucrats had they entered. One possibility is illustrated on the top panel of Figure 2, which follows up on the top panel of Figure 1. The optimal bureaucracy $B(\chi)$ consists of those bureaucrats with payoffs on the bold segment: here, $w > 0$ screens out partisan bureaucrats. Intuitively, when polarization is relatively low, citizens who would become partisan bureaucrats choose to work in the private sector instead, and only citizens who will become neutral bureaucrats enter government. Thus, for relatively low polarization Δx, a higher w can make the bureaucracy more politically neutral.

A different possibility is illustrated by the two bottom panels of Figure 2, which correspond to the middle panel of Figure 1 but show two different levels of w. In the middle panel, $w > 0$ screens out some partisan bureaucrats. However, as w increases further, it screens out neutral bureaucrats, as shown on the bottom panel. When polarization is high, neutral bureaucrats' payoffs are relatively low, and a higher private-public wage gap makes it more likely that these bureaucrats will choose the private sector. For relatively high polarization,

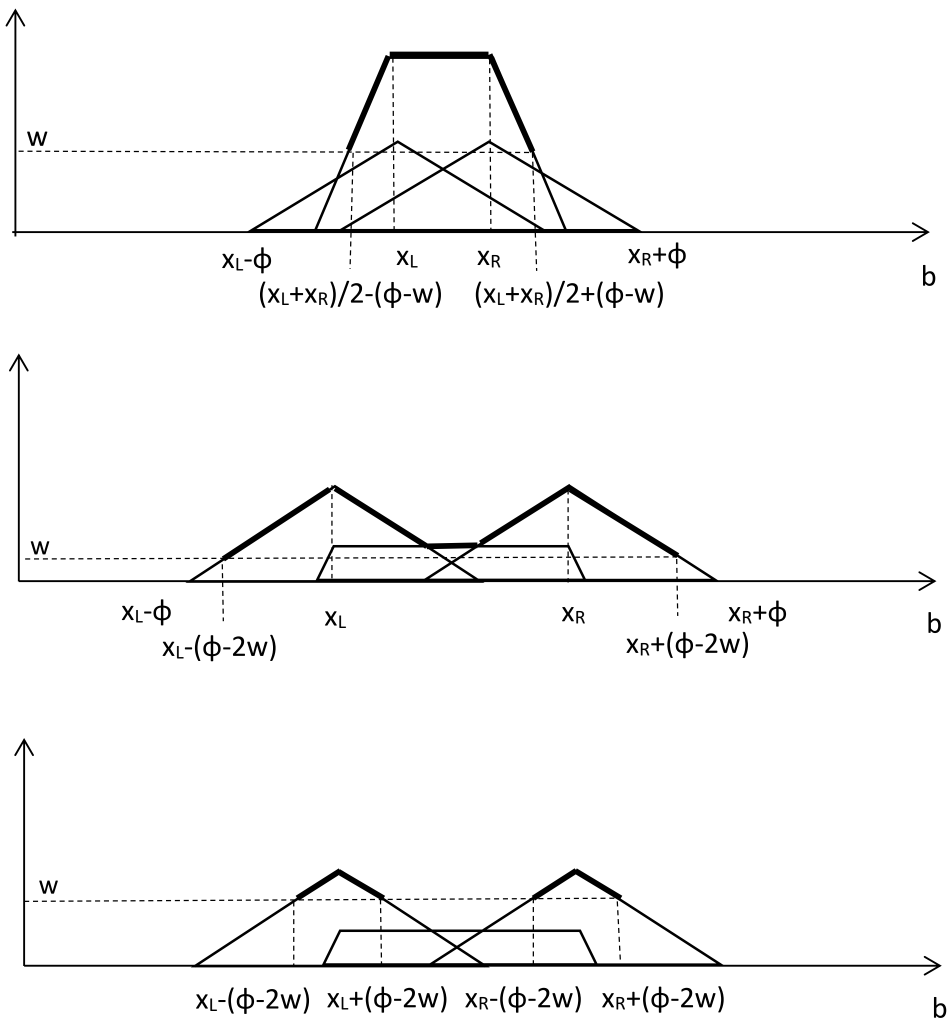

Figure 2: Wages and polarization. In the top panel, polarization is low and only centrist, neutral bureaucrats are willing to join the bureaucracy. The middle and bottom panels show that under high polarization, higher private sector wages can lead to partisanship in the bureaucracy. The top two panels are ideologically connected, while the bottom panel is ideologically disconnected.

a higher w makes the bureaucracy more partisan.

Figure 2 suggests three possible types of optimal bureaucracies: on the top panel, all entrants are neutral so the bureaucracy is *fully neutral (N)*; on the bottom panel all entrants are partisan so the bureaucracy is *fully partisan (P)*; and on the middle panel then entrant pool contains both partisans and neutrals, so the bureaucracy is *partially partisan (PP)*.

The fact that in general party L may have an electoral advantage ($p_L \geq p_R$) creates another possibility, illustrated in Figure 3. In this case, the optimal bureaucracy is partially partisan but while all bureaucrats are willing to work for the stronger party L, not all bureaucrats are willing to work for the weaker party R. In other words, only the stronger party has partisan bureaucrats. This happens when polarization increases just above the level required for a fully neutral bureaucracy. As polarization moves into this range, the first partisan bureaucrats to enter will be those of the stronger party, L, since these bureaucrats' utility from working for only one party is larger. Here again, a feature commonly associated with party machines and political patronage can emerge endogenously: a stronger party may gain an administrative advantage by attracting partisan bureaucrats.

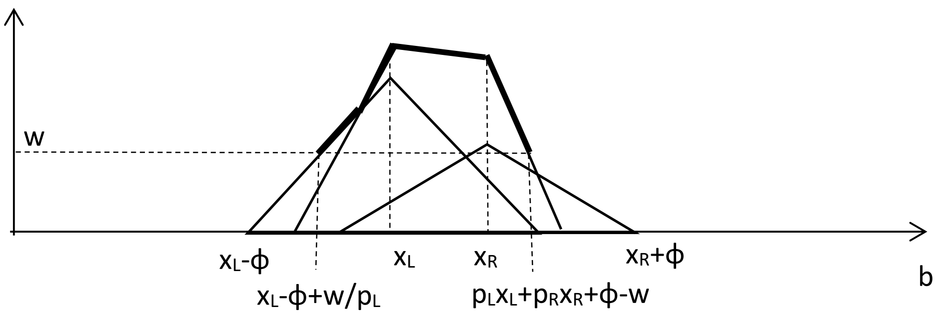

Figure 3: Asymmetric, partially partisan bureaucracy. Under medium polarization and a large party L electoral advantage, bureaucrats are either neutral or L partisans. This corresponds to case (PP3) of Proposition 1.

For future reference, note that the top two panels of Figure 2 and Figure 3 feature a bureaucracy that is *ideologically connected*, in that $B(\chi)$ consists of a single interval, while the bottom panel of Figure 2 show a bureaucracy that is *ideologically disconnected*, in that $B(\chi)$ consists of two disjoint intervals.[18]

The following proposition describes optimal bureaucracies in detail. To ensure that each party has at least some bureaucrats working for its policy (a feature that will always have to be true in equilibrium administrations), we assume that $\phi > {}^{w}/_{p_R}$ (and hence also $\phi > {}^{w}/_{p_L}$).[19]

[18]If we assumed that bureaucrats' losses from policy ideology were strictly convex instead of linear (e.g., quadratic), then our model would allow an additional case of a bureaucracy formed of three disjoint intervals: left and right partisans along with centrist neutrals. In this case, some moderate left-wing citizens would stay out of the bureaucracy because (*i*) the policy lottery is too risky for them to become neutrals, and (*ii*) party L's policy is too extreme for them to become partisans. With linear losses, this cannot occur: a moderate left-wing citizen joins the bureaucracy as a neutral whenever a more centrist left-wing citizen does, because the former's expected policy difference with the winning party is (weakly) smaller than the latter's (because party L is weakly favored, and the moderate left-wing citizen is closer to x_L than the centrist).

[19]The proofs of all results are in the Appendix.

Proposition 1 *(P) The optimal bureaucracy is fully partisan if and only if party polarization is high ($\Delta x > 2\phi - {}^{w}/_{p_L}$). In this case*

$$B(\chi) = \left[x_L - (\phi - {}^{w}/_{p_L}), x_L + (\phi - {}^{w}/_{p_L})\right] \cup \left[x_R - (\phi - {}^{w}/_{p_R}), x_R + (\phi - {}^{w}/_{p_R})\right].^{20}$$

(PP) The bureaucracy is partially partisan if and only if party polarization is medium (${}^{w}/_{p_L} < \Delta x \leq 2\phi - {}^{w}/_{p_L}$). If further

- *(PP1) $2\phi - {}^{w}/_{p_R} < \Delta x \leq 2\phi - {}^{w}/_{p_L}$, then both parties have partisan bureaucrats, and some neutral bureaucrats enter while some stay out of the public sector. In this case*

  $$B(\chi) = \left[x_L - (\phi - {}^{w}/_{p_L}), {}^{1}/_{p_L - p_R}\left(p_L x_L - p_R x_R + (\phi - w)\right)\right] \cup \left[x_R - (\phi - {}^{w}/_{p_R}), x_R + (\phi - {}^{w}/_{p_R})\right].$$

- *(PP2) ${}^{w}/_{p_R} < \Delta x \leq 2\phi - {}^{w}/_{p_R}$, then both parties have partisan bureaucrats, and all neutral bureaucrats enter the public sector. In this case*

  $$B(\chi) = \left[x_L - (\phi - {}^{w}/_{p_L}), x_R + (\phi - {}^{w}/_{p_R})\right].$$

- *(PP3) ${}^{w}/_{p_L} < \Delta x \leq {}^{w}/_{p_R}$, then only party L has partisan bureaucrats, and some neutral bureaucrats enter while others stay out of the public sector. In this case*

  $$B(\chi) = \left[x_L - (\phi - {}^{w}/_{p_L}), p_L x_L + p_R x_R + (\phi - w)\right].$$

(N) The bureaucracy is fully neutral if and only if party polarization is low ($\Delta x \leq {}^{w}/_{p_L}$). In this case

$$B(\chi) = \left[p_L x_L + p_R x_R - (\phi - w), p_L x_L + p_R x_R + (\phi - w)\right].$$

To see the intuition behind the conditions for the different cases in Proposition 1, note that the incentives that constrain the existence of both fully partisan and fully neutral bureaucracies are those of the bureaucrats who prefer the advantaged party L (as reflected in the fact that the conditions on polarization in both the (P) and (N) cases involve only the winning probability p_L). This is because party L's electoral advantage draws more bureaucrats into government. Therefore, the key constraint on fully partisan bureaucracies is that party L might attract more centrist citizens who could be tempted to work for party R once in government. Similarly, the key constraint on fully neutral bureaucracies is

[20] As explained in Section 3, our assumption that the ideology space $[-{}^{\mathcal{I}}/_2, {}^{\mathcal{I}}/_2]$ is large enough relative to the policy space $[-1, 1]$ requires that these intervals of bureaucratic ideologies be well-defined. A sufficient condition is that $\mathcal{I} \geq 2[1 + (\phi - w)]$.

that party L may attract more left-wing citizens who could be tempted to become partisan once in government. The fact that the advantaged party L is more adept at attracting both partisan and neutral bureaucrats also explains our results on partially partisan bureaucracies. In particular, it is possible both for party L to have partisan bureaucrats while party R does not (relatively low polarization, case $(PP3)$), and for neutral bureaucrats closer to L to enter while those closer to R stay out (relatively high polarization, case $(PP1)$).

4.2 Implications and Evidence

4.2.1 Public sector wages and bureaucratic neutrality

What is the impact of government wages on bureaucrats' motivations? Previous studies have asked whether higher wages lead to the selection of bureaucrats with higher or lower PSM (e.g., Macchiavello (2008); Delfgaauw and Dur (2010); Valasek (2018); Gibbs (2020)). Our model highlights a complementary dimension of heterogeneity: bureaucrats' policy preferences. Unlike public service motivation, which has a monotonic effect on the utility from accepting a government job, the effect of changing a bureaucrat's ideology is fundamentally nonmonotonic, as it depends on the location of government policy.

Proposition 1 shows how public sector wage policies can influence the bureaucracy's ideological composition and hence its partisanship or neutrality. We saw that higher polarization reduces neutrality and leads to more partisanship in the bureaucracy. Proposition 1 shows that a higher w makes full bureaucratic neutrality more resilient to a small degree of political polarization (partisanship in the bureaucracy only appears once $\Delta x > {}^{w}/_{p_L}$, and this condition becomes more stringent as w goes up). At the same time, as polarization increases, a higher wage gap w also speeds up the transition from a partially partisan to a fully partisan bureaucracy (in Proposition 1, the bureaucracy becomes fully partisan once $\Delta x > 2\phi - {}^{w}/_{p_L}$, and this is facilitated by a high w). In this sense, high-w environments are conducive to either a fully neutral or a fully partisan bureaucracy: low pay in the public sector restricts entry to those citizens who most value becoming bureaucrats, and these are neutral if polarization is low and partisan if polarization is high. On the other hand, low-w environments are more likely to have a mix of neutral and partisan bureaucrats. In particular, if $w \approx 0$ the opportunity cost of joining the bureaucracy just to work for their preferred party vanishes, so that any amount of polarization $\Delta x > 0$ will attract some partisan bureaucrats.

Some of these results on how wages affect the selection of bureaucrats with different *policy* preferences (as opposed to PSM) are testable, and we are not aware of any such tests in the empirical literature (see Finan et al. (2017) for a review of the relevant empirical literature). Our model also predicts that the impact of wages on bureaucrat effort will be mediated by the policies that bureaucrats are tasked with implementing. By contrast, the empirical literature has mostly looked at the direct impact of wages and other benefits on bureaucrats' performance (e.g., Deserranno (2019), Ashraf et al. (2020)).[21] Our results suggest, for example, that the impact of wages on performance may depend on policy polarization: higher wages may lead to the entry of neutral bureaucrats, who never shirk, or to the entry of partisans, who sometimes do. This may provide an explanation for mixed results regarding the impact of public sector wages on productivity across countries (Macchiavello, 2008).

4.2.2 The size and output of the bureaucracy

We now discuss the implications of Proposition 1 for government size and production. Let $\tilde{Q} = p_L Q^B(x_L) + p_R Q^B(x_R)$ denote expected output.

Corollary 1 *Expected government output $\tilde{Q}$ and the size of the bureaucracy, $|B|$, are both increasing in PSM ϕ and decreasing in the private-public wage gap w. Expected output is decreasing in polarization Δx. It is highest under a fully neutral bureaucracy, lower under a partially partisan bureaucracy, and lowest under full partisanship. The size of the bureaucracy is increasing in polarization when $\Delta x < 2\phi - {}^{w}/_{p_R}$ and decreasing when $\Delta x > 2\phi - {}^{w}/_{p_R}$. Per-capita output ($\tilde{Q}/|B|$) is decreasing in polarization.*

Not surprisingly, expected output is higher when bureaucrats have higher public service motivation, and if the private-public wage gap is lower (since the latter helps staff the bureaucracy). Importantly, output is higher when political polarization is lower and the bureaucracy is more neutral. While a common view is that partisan bureaucracies produce less output because their bureaucrats are somehow "worse," note that we made no such assumption here. Instead, our results follow from the combination of policy motivation and selection. In our model when there is no selection ($w \approx 0$), expected output is independent of bureaucratic neutrality and partisanship.[22]

In our model, neutral and partisan bureaucrats represent two different "technologies" for producing output. Neutral bureaucrats always work, so they do not need be as numerous, while partisans only work some of the time, so there needs to be more of them to produce the same level of expected output. Thus, neutral bureaucrats can be substituted with more partisan bureaucrats to some extent. For example, when $\Delta x < 2\phi - {}^{w}/_{p_R}$, output $\tilde{Q}$ is constant in Δx, but partially partisan bureaucracies ($\Delta x > {}^{w}/_{p_L}$) are larger than neutral bureaucracies ($\Delta x < {}^{w}/_{p_L}$).

[21] An exception is Carpenter and Gong (2016), who show that the impact of wages interacts with workers' views regarding the organization's mission.

[22] Corollary 5 in the Appendix shows that when $w \approx 0$, $\tilde{Q} = \frac{2\phi}{\mathcal{I}}$ regardless of Δx.

These two technologies respond differently to selection effects (i.e., w). In particular, because partisan bureaucrats only get utility under one of the parties, they will be more sensitive to changes in w than neutrals. Consider a small increase in the private-public wage gap from $w \approx 0$. In a fully neutral bureaucracy, the marginal bureaucrats who stay out of government are neutral, while in a partially or fully partisan bureaucracy they are partisan. Comparing the fully neutral and the partially partisan cases, the substitution effect described above prevails: although an increase in w causes more partisan bureaucrats to stay out of government, these bureaucrats only contributed to output some of the time, so the drop in output is the same in both regimes. What distinguishes full partisanship from both of these cases is that not only the most extreme (relative to the party platforms) but also the most moderate bureaucrats are marginal, and stay out of government for a small increase in w. This makes fully partisan bureaucracies particularly sensitive to selection effects, which in turn explains why these bureaucracies produce lower output than the other two regimes.

Most of the empirical literature takes individual bureaucrats' motivations as exogenous when dealing with questions such as how to ensure the hiring of bureaucrats with high PSM (Dal Bó et al., 2013; Ashraf et al., 2020) or how bureaucrats with different preferences respond to monitoring (Callen et al., 2018). This approach is most relevant when the policies bureaucrats work on are fixed but bureaucratic personnel or procedures can be flexibly adjusted. It appears incomplete, however, when the bureaucracy is fixed but policies change over time - as is the case in modern civil service systems. In such cases, it is important to consider that bureaucrats' motivations may be endogenous to the policies they will have to implement. Our model shows not only how preference parameters, but also how parties' policy ideologies affect the distribution of bureaucrat motivations and, in turn, government output. The evidence in Carpenter and Gong (2016), Zoutenbier (2016), Piotrowska (2021) and Spenkuch et al. (2021) demonstrates the empirical relevance of this approach.

The combination of policy motivations and different policies provides a complementary explanation for understanding differences in bureaucratic performance across countries. While the focus in the literature has been on heterogeneity in PSM (e.g., Macchiavello (2008); Hanna and Wang (2017); Barfort et al. (2019)), our model shows that heterogeneity in policies combined with heterogeneity in policy preferences among bureaucrats can also yield differences in government output.

4.2.3 The impact of electoral advantage

Our results on optimal bureaucracies have a number of implications for government output when one party has an electoral advantage ($p_L > p_R$).

Corollary 2 *(i) If $p_L > p_R$, then $\Delta Q \equiv Q^B(x_L) - Q^B(x_R) \geq 0$. (ii) The output cycle ΔQ is increasing in political polarization.*

With asymmetric winning probabilities, citizens who have chosen to enter the public sector will be biased towards the stronger party (L). When that party wins, more bureaucrats who have chosen to enter will be willing to work on implementing its policy platform x_L. Thus, our model predicts that electorally advantaged parties will have bureaucratic advantages - even in civil service systems that forbid partisan interference in personnel practices.[23]

The idea that electoral advantage translates into bureaucratic advantage is consistent with both empirical and anecdotal evidence. Using a survey of a large panel of countries, Kappe and Schuster (2021) find that bureaucrats are more left-leaning than citizens when leftwing parties have held office more often in the past. Much anecdotal evidence shows that conflicts between the chief executive and the bureaucracy are more likely when a strong incumbent is replaced. For example, when in 1953 Eisenhower's election ended the longest streak of a party's control over the presidency in modern history, the new president and his appointees "were reluctant to trust the career bureaucracy built during 20 years of Democratic rule." (Maranto, 1993, p. 681). In Sweden, when in 1976 the first non-socialist government in over 40 years was elected, incoming officials were faced with a "forest of red needles" (a badge worn by Social Democrats) and corresponding resistance among civil servants toward the new administration's policies (Pierre, 2004). Because in each case the conflict is with career civil servants rather than simply the previous administration's political appointees, episodes like this are not easily explained by political patronage. Instead, the source of conflict was likely the policy preferences of bureaucrats who self-selected into government.[24]

As stated in Corollary 2, electoral advantages translate into political cycles in government output associated with changes in the party in power. Fully partisan bureaucracies have the largest output cycle, whereas fully neutral bureaucracies have no cycle because all bureaucrats work regardless of who is elected. Because partisanship is increasing in ideological polarization Δx (Proposition 1), these political cycles are larger when policies are more polarized.

Some recent empirical studies identify drops in various measures of government output around transitions of power and link them to bureaucratic politics (Bostashvili and Ujhelyi,

[23] This mechanism may also be viewed as a source of incumbency advantage, if politicians could exploit bureaucratic effort to increase vote shares. As this would require a more sophisticated model of elections (e.g., focusing on ex post incumbents instead of ex ante advantaged parties), we leave it for future work.

[24] In the US, an alternative explanation sometimes suggested for Republican administrations' conflicts with the bureaucracy is that bureaucrats are inherently liberal, but according to some observers this view may be too simplistic (Maranto, 1993; Michaels, 2017; Rothman and Lichter, 1983). To the extent that bureaucrats in the US federal government *are* relatively liberal, this begs an explanation. Our model offers one possibility, pointing to self-selection in an era when bureaucrats would likely be tasked with implementing liberal policies.

2019; Fagernäs and Pelkonen, 2020; Toral, 2021; Akhtari et al., 2022). However, the explanation of these phenomena have generally been tied to inefficiencies driven by patronage. Our results suggest that output cycles could also be present in less manipulable civil service systems as a function of political polarization.

Finally, we consider how an increase in the competitiveness of elections (a reduction in p_L and an increase in p_R) affects bureaucratic partisanship and government output.

Corollary 3 *An increase in the competitiveness of elections (i) increases the set of parameter values for which the bureaucracy is fully neutral; (ii) increases expected government output* $\tilde{Q}$ *if* $\Delta x \leq 2(\phi - w)$ *and has an inverse U-shaped effect on* $\tilde{Q}$ *if* $\Delta x > 2(\phi - w)$.

For parameters that admit a fully neutral bureaucracy, an increase in the competitiveness of elections is more likely to lead to a fully neutral bureaucracy and to a bureaucracy producing higher expected output. These findings provide an interesting perspective on the incentives for institutional reforms that led to the establishment of the modern civil service. It has been argued that increased political competition was a driver for these reforms because incumbents could use them to remove patronage from the political toolkit of future opponents (Ruhil and Camões, 2003; Ting et al., 2013) and to make future policy changes more difficult (Hanssen, 2004). Our analysis above provides a complementary, efficiency rationale for why political competitiveness should matter for reform. Civil service systems created under different political conditions give rise to different incentives for bureaucrat entry and effort. When there is less political competition, citizens who choose to enter the public sector under a civil service system will tend to be more partisan. As shown above, this will cause expected government output to be lower. Civil service systems established in a more competitive environment are the most likely to result in full bureaucratic neutrality *and* maximize expected government output. In this sense, political competitiveness may increase the potential benefits from civil service reform.[25]

5 Optimal policies

In the last section, we determined how potential bureaucrats' expectations about political outcomes shaped their decision to enter government. Here, we investigate how parties respond to the bureaucracy by characterizing their optimal policies given a fixed bureaucracy.

[25] Interestingly when polarization is high (so that full neutrality is not possible), closer elections can lead to neutral bureaucrats staying out of the public sector and move the bureaucracy from partial to full partisanship. This can happen in case ($PP1$) in Proposition 1, where the marginal neutral entrant is moderate but close to party L, and she will choose the private sector if p_L falls. As $p_L \searrow 1/2$, this case disappears.

5.1 Parties' ideology-output tradeoff

must take one of two forms: either $B = [\underline{b}, \overline{b}]$ (ideologically connected), or $B = [\underline{b}_L, \overline{b}_L] \cup [\underline{b}_R, \overline{b}_R]$ where $\overline{b}_L < \underline{b}_R$ (ideologically disconnected). We will first characterize parties' optimal policies when served by ideologically connected bureaucracies, and then use these results to study ideologically disconnected bureaucracies. From Proposition 1, we know that an ideologically connected bureaucracy must have $\underline{b} \geq x_L - \phi$ and $\overline{b} \leq x_R + \phi$ because any bureaucrat who is so far to the left (right) that she would not be willing to work for policy x_L (x_R) would never join the bureaucracy in the first place. This implies that we can restrict attention to bureaucracies that satisfy $\underline{b} \geq -1 - \phi$ and $\overline{b} \leq 1 + \phi$. In the following proposition, we characterize the optimal policies of party L only, which is without loss of generality. Because optimal policies are unique, we abuse notation and let $x_L(B)$ denote that policy.

Proposition 2 *Suppose that the bureaucracy is ideologically connected, and let $\hat{x} = {}^1\!/_2\,(\alpha - 1 + \underline{b} - \phi)$.*

- *If the bureaucracy is small ($\overline{b} - \underline{b} \leq 2\phi$), then party L's optimal policy is*

$$x_L(B) = \begin{cases} -1 & \text{if } \hat{x} < \max\{\underline{b} - \phi, -1\}, \\ \hat{x} & \text{if } \max\{\underline{b} - \phi, -1\} \leq \hat{x} \leq \max\{\overline{b} - \phi, -1\}, \\ \max\{\overline{b} - \phi, -1\} & \text{if } \hat{x} > \max\{\overline{b} - \phi, -1\}. \end{cases} \tag{6}$$

- *If the bureaucracy is large ($\overline{b} - \underline{b} > 2\phi$), then party L's optimal policy is*

$$x_L(B) = \begin{cases} -1 & \text{if } \hat{x} < \max\{\underline{b} - \phi, -1\}, \\ \hat{x} & \text{if } \max\{\underline{b} - \phi, -1\} \leq \hat{x} \leq \underline{b} + \phi, \\ \underline{b} + \phi & \text{if } \hat{x} > \underline{b} + \phi. \end{cases} \tag{7}$$

Because implementing more left-wing policies will tend to induce more right-wing and centrist bureaucrats to shirk, party L's optimal policy resolves a tradeoff between more extreme, ideologically preferred policies and more moderate policies which yield higher output. How this tradeoff is resolved depends on the size of the bureaucracy. If the bureaucracy is small ($\overline{b} - \underline{b} \leq 2\phi$, as on the top panel of Figure 2), then party L will at most moderate its policy until bureaucrat $\overline{b}$ is willing to work, which is policy $\max\{\overline{b} - \phi, -1\}$. Because the bureaucracy is small, party L still has the support of bureaucrat $\underline{b}$ when implementing this policy. Put differently, it is the rightmost bureaucrat who constrains the policy choices of party L. However, party L need not have incentives to choose the moderate policy $\max\{\overline{b} - \phi, -1\}$ and guarantee that all bureaucrats choose to work. By moving left from this policy, party L loses on production but gains on policy ideology. Clearly, party L will never choose a policy so extreme that it loses the production of the leftmost bureaucrat $\underline{b}$. This is policy $\max\{\underline{b} - \phi, -1\}$. It is straightforward to verify that party L's utility in this range is strictly concave, so that it admits a unique global maximizer, which is the policy $\hat{x}$ in the statement of Proposition 2. Therefore, if $\hat{x} < \max\{\underline{b} - \phi, -1\}$, party L prefers ideology to production and chooses its ideal policy, whereas if $\hat{x} > \max\{\bar{b} - \phi, -1\}$, party L prefers production and chooses policy $\max\{\bar{b} - \phi, -1\}$. If instead $\max\{\underline{b} - \phi, -1\} \leq \hat{x} \leq \max\{\bar{b} - \phi, -1\}$, then party L's optimal policy choice is interior and, at the margin, incentives for ideology and production are balanced.

If the bureaucracy is large ($\bar{b} - \underline{b} > 2\phi$, as might be the case on the middle panel of Figure 2), then party L's optimal policy choice is similar to the case of a small bureaucracy. The key difference is that party L cannot provide incentives for bureaucrat $\bar{b}$ to work without inducing bureaucrat $\underline{b}$ to shirk. Put differently, if the bureaucracy is sufficiently large then no government can induce all bureaucrats to work. Therefore, in this case the rightmost bureaucrat plays no role in party L's policy decision. Instead, the most right-wing policy that party L will choose is constrained by the preferences of the leftmost bureaucrat.

In our results on equilibrium administrations below, we require an analogue of Proposition 2 that characterizes parties' optimal policies when bureaucracies are ideologically disconnected. While this result is obtained by a simple adaptation of the result from Proposition 2, its statement is cumbersome, therefore we relegate its detailed discussion to Appendix A.2. Briefly, the key issue is that when the bureaucracy is ideologically disconnected, party L faces the choice of which section of the bureaucracy to try to motivate with its policy choice. This new tradeoff can provide incentives for policy extremism. For example, if the left section of the bureaucracy is large, then party L can choose to ignore right-wing bureaucrats. Alternatively, if there are few left-wing bureaucrats and the right section of the bureaucracy contains enough moderates, then party L can choose a policy which leads all left-wing bureaucrats to shirk.[26] Finally, if the gap between the two sections of the bureaucracy is small, then party L can choose a policy that induces both some left and right-wing bureaucrats to work. In this case, an ideologically disconnected bureaucracy provides incentives for policy moderation: because the bureaucracy has a missing moderate section, party L must move further away from its ideal policy in order to increase production.

[26] In both these cases, we can characterize party L's optimal policy by applying the results of Proposition 2 to the left and right sections of the bureaucracy separately.

5.2 Implications and Evidence

The following corollary describes how party L's optimal policy is affected by the parameters of the model.

Corollary 4 *Suppose that the bureaucracy is ideologically connected. Party L chooses a more moderate policy when it values output more (higher α), the bureaucracy is more right-wing (higher $\underline{b}$ or $\overline{b}$), and when bureaucrats' PSM ϕ is lower.*

Party L's policy choice balances the tradeoff between output and ideology, and thus naturally favors the former when α is high. The remaining parameters affect this tradeoff by changing the degree to which the bureaucracy constrains politicians. When either $\underline{b}$ or $\overline{b}$ is higher, the bureaucracy contains more right-wing bureaucrats. This tightens party L's bureaucratic constraint: for a given policy x_L, there will be more conflict between the party and the bureaucracy, i.e., more bureaucrats will shirk. To restore output, L has to choose a more moderate policy.

Interestingly, we also find that *lowering* the PSM parameter ϕ constrains the party's ability to choose policies it prefers, and leads to policy moderation. This is because low-PSM bureaucrats produce less output for all policies, giving parties an incentive to moderate in order to increase output. Conversely, high-PSM bureaucrats make it easier for parties to choose extreme policies.

The tradeoffs arising from ideological conflict with the bureaucracy are consistent with anecdotal evidence on newly elected leaders' tense relations with incumbent bureaucrats (see the examples from Britain, Sweden and the US described in Sections 3.2 and 4.2.3). They are also consistent with empirical evidence on politicians strategically choosing which agencies to politicize (Lewis, 2008). For example, Clinton et al. (2012) find that in the G.W. Bush administration, the more liberal political appointees were allocated to more liberal agencies. This is consistent with an incentive to limit administration-agency ideological gaps in order to increase productivity.[27]

There also exists both anecdotal and empirical evidence consistent with the result that politicians can exploit high-PSM bureaucrats' relative insensitivity to ideology in order to implement more extreme policies. Newland (2020) describes the decision of high-PSM career bureaucrats to remain in the Trump administration. She notes that this allowed the president to successfully pursue policies that these bureaucrats did not agree with: "We may have been victims of the system, but we were also its instruments." In a different context, observers

[27] Ujhelyi (2014b) and Bostashvili and Ujhelyi (2019) present direct evidence that politicians alter their policies (the allocation and timing of government spending) in response to the bureaucrats they face (civil servants or patronage appointments).

often note the contribution of motivated bureaucrats to extreme policies under dictatorship. For example, empirical work by Heldring (2019) shows how an efficient Prussian bureaucracy also contributed to a more "efficient" deportation of Jews in Nazi Germany.

Because the literature on the implications of bureaucrats' PSM tends to ignore politics, higher PSM is typically viewed as unambiguously beneficial.[28] Our model shows that when political parties' responses are taken into account, higher PSM can have an offsetting negative effect by making it easier for politicians to choose policies away from the median voter's ideal.

6 Equilibrium administrations

So far, our results have limited the interactions of the political and bureaucratic components of our model. In Section 4, we fixed parties' policies and electoral prospects and studied the formation and composition of the bureaucracy. In Section 5, we held the bureaucracy fixed and studied the policies that resolved parties' ideology-output tradeoff. In this section, we study equilibrium administrations (as defined in Section 3), where both the politics and the bureaucracy are treated as endogenous.

6.1 Symmetric equilibrium administrations

Because our model is symmetric, we first focus on symmetric equilibrium administrations ($x_L^* = -x_R^*$ and $p_L^* = p_R^* = 1/2$). As the next result shows, this can take one of three forms: an equilibrium administration with a fully partisan bureaucracy (EAP), an equilibrium administration with a fully neutral bureaucracy (EAN), or an equilibrium administration with a partially partisan bureaucracy that is ideologically connected and where both parties have partisan bureaucrats (EAPP) (this corresponds to case PP2 of Proposition 1).

Proposition 3 *A symmetric equilibrium administration exists. If $w \geq 1$, the equilibrium administration is EAN with $x_L^* = -x_R^* = -1$. If $w < 1$, then there exists $\tilde{\phi} \in [1, 1+w)$ such that:*
(i) A symmetric EAN exists iff $\phi \leq \frac{1}{2}(\alpha - 1 + 3w)$. In this case, $x_L^* = -x_R^* = -w$.
(ii) A symmetric EAP exists iff $\phi \leq \tilde{\phi}$. In this case, $x_L^* = -x_R^* = -1$.
(iii) A symmetric EAPP exists iff $\frac{1}{2}(\alpha - 1 + 3w) < \phi$. In this case, $x_L^* = -x_R^* = \max\{-1, \alpha - 1 - 2(\phi - w)\}$.

Proposition 3 shows that our model can explain all three kinds of bureaucracies (fully partisan, fully neutral, or partially partisan) as equilibrium phenomena arising from bu-

[28] For example, Ashraf et al. (2020) and Callen et al. (2018) show that PSM improves performance, and Wright et al. (2016) and Meyer-Sahling et al. (2019) find that PSM is related to ethical behavior.

reaucrats' entry and effort decisions, parties' policy choices, and voters' preferences. In this model, whether the bureaucracy is neutral or partisan does not depend on institutional choices regarding bureaucratic regulations, nor on assumptions that bureaucrats are either apolitical technocrats or subservient to party machines. Rather, bureaucratic structure emerges as a function of a small set of parameters capturing actors' trade-off between ideology and output (ϕ and α) and the private-public wage differential (w).

In some cases, the same underlying parameters can be consistent with multiple types of equilibrium administrations. If $\phi \leq \min\{\frac{1}{2}(\alpha - 1 + 3w), \tilde{\phi}\}$, the equilibrium administration can have a fully neutral *or* a fully partisan bureaucracy, and if $\frac{1}{2}(\alpha - 1 + 3w) < \phi \leq \tilde{\phi}$ the equilibrium administration can have a fully partisan *or* a partially partisan bureaucracy.[29] Thus, another factor explaining the "politicization" and performance of government bureaucracies is actors' self-reinforcing expectations. If bureaucrats enter the bureaucracy expecting it to be partisan, this will lead to parties' choosing policies that indeed lead to partisanship among bureaucrats.

Equilibrium administrations with fully partisan bureaucracies feature maximum polarization: in an EAP, parties always implement their ideal policies. The reason for this result is that under full partisanship, each bureaucrat only works for one party, and because $w > 0$ all entering bureaucrats must derive a strictly positive payoff from doing so. But then party L can always reduce x_L slightly and move the policy closer to its ideal policy without sacrificing any production. Therefore, equilibrium policies are maximally polarized.[30] By contrast, depending on the parameters, equilibrium administrations with at least some neutral bureaucrats (EAPP or EAN) can have policy moderation.[31] This extends the finding from Section 4, where we saw that more polarization leads to more partisanship.

Thus, in our model partisanship in the bureaucracy and polarization in parties' policy platforms are complements. Under high polarization, no bureaucrat is willing to work for both parties, i.e., all entering bureaucrats must be partisan. In turn, parties can exploit partisan bureaucrats and increase polarization. While the idea that partisanship and polarization are complements would be natural in a patronage system where politicians have

[29]Note that if $\alpha \geq 3$, then $\frac{1}{2}(\alpha - 1 + 3w) \geq 1 + w > \tilde{\phi}$ so the latter case disappears.

[30]To see the intuition behind the conditions for EAP, note that bureaucrats' PSM ϕ cannot be too strong relative to w, because otherwise the moderate bureaucrats in both sections of the bureaucracy would choose to work for the opposite party ex post. This requires that $2 = x_R^* - x_L^* > 2\phi - {}^{w}/{}_{p_L^*} = 2(\phi - w)$, or $\phi < 1 + w$. In addition, parties cannot have incentives to moderate in order to increase production. This will be satisfied if the two sections of the bureaucracy are sufficiently far apart, which imposes the upper bound $\tilde{\phi}$ on bureaucrats' PSM.

[31]For example, in EAPP, parties face a bureaucracy which contains partisans for both L and R (as well as neutral bureaucrats). Parties' trade off choosing more extreme policies by relying on their own partisans or moderating further to attract their opponent's partisans. In the typical equilibrium party L balances these objectives by choosing the interior policy $\hat{x}$ from Proposition 2.

control over bureaucrats, our model most closely resembles a modern civil service system where bureaucrats are independent. Yet, we find that one possible equilibrium of such an administration looks very much like a patronage system, with parties choosing polarized policies that are implemented by partisan bureaucrats.

The result also shows that equilibrium administrations always feature some policy polarization. Even full bureaucratic neutrality, which results in the lowest level of polarization, yields $x_R^* - x_L^* > 0$. The reason for this is straightforward: since a neutral bureaucracy exerts effort for both parties, there is a range of policy ideologies where parties can move away from each other without sacrificing any production, but moving closer to their favorite policies.[32]

6.2 Asymmetric equilibrium administrations

Asymmetric equilibrium administrations (where $x_L^* \neq -x_R^*$ and/or $p_L^* \neq 1/2$) are interesting both as a robustness check on the results from symmetric equilibria, and because they allow us to study the relationship between bureaucratic partisanship and the competitiveness of elections. For consistency with our results on optimal bureaucracies, we focus on equilibria where $p_L^* > p_R^*$ (equilibria where $p_L^* < p_R^*$ can be described symmetrically). For clarity and ease of comparison, we focus on how asymmetry affects the three types of equilibrium administrations that exist in the symmetric case.

Proposition 4 *(i) There are no asymmetric EAN.*
(ii) If an asymmetric EAP exists, then there also exists a symmetric EAP. In this case, $x_L^* = -1$ *and* $x_R^* = 1$.
(iii) If an asymmetric EAPP with $p_L = p_L^{**} > 1/2$ *exists, then an EAPP also exists for any lower level of electoral advantage for party L,* $p_L^* \in [1/2, p_L^{**})$. *In this case,* $x_L^* = \max\{-1, \alpha - 1 - 2\phi + w/p_L^*\}$ *and* $x_R^* = \min\{1, 1 - \alpha + 2\phi - w/p_R^*\}$.

Proposition 4 has several implications. First, it justifies our earlier focus on symmetric equilibrium administrations. It shows that an EAN is always symmetric, whereas asymmetric EAP and EAPP can only exist when the corresponding symmetric equilibria exist as well.

Second, the proposition shows that fully neutral bureaucracies are incompatible with either party having an electoral advantage in equilibrium. Intuitively, in an equilibrium with a fully neutral bureaucracy, each party optimally chooses the most extreme policy which still induces the bureaucrats most opposed to them to work. If party L had an electoral

[32] To see the intuition for the conditions for existence of fully neutral equilibria, note that parties must not have incentives to choose more extreme policies. When $w \geq 1$, parties implement their ideal policies, so this is not a concern. Otherwise, party L prefers a moderate policy if its value from output (α) is high, or if the left wing of the bureaucracy is not too large. The latter occurs if ϕ is low or if w is high.

advantage, then the most right-wing bureaucrat would strictly prefer working for party L to shirking. But this would be incompatible with party L's incentives, because it could choose a more extreme policy while ensuring that all bureaucrats still worked. This result extends the finding in Corollary 3 showing that more competition was conducive to full neutrality.

Because Proposition 4 also shows that equilibria with electoral imbalances are possible with either fully or partially partisan bureaucracies, our model makes the prediction that full bureaucratic neutrality will be correlated with more competitive elections.

Third, the proposition extends the result of Proposition 3 on equilibrium multiplicity, and hence the importance of coordinated expectations in explaining bureaucratic outcomes. While in the symmetric case multiplicity arose across classes of equilibria (such as the coexistence of EAP and EAN), the asymmetric case shows that multiplicity is also possible within a class. In part (ii) of Proposition 4, there can be both an asymmetric and a symmetric EAP. Even though parties' policies are the same in both cases, asymmetric winning probabilities can persist in equilibrium because of different output levels $Q^{B^*}(x_L^*)$ and $Q^{B^*}(x_R^*)$ arising from self-reinforcing expectations. For example, if party L is expected to have an electoral advantage, then it will draw in more bureaucrats, which leads to higher output and hence confirms party L's electoral advantage.

In an EAPP, the electorally advantaged party L exploits the bureaucracy's bias in its favour by choosing a more extreme policy than the electorally disadvantaged party R. Here, parties' policies adjust continuously to changes in electoral advantage, and equilibrium multiplicity is endemic.

Interestingly, comparing across the different EAPP, party polarization is *higher* when political competition is more intense (i.e., $x_R^* - x_L^*$ is decreasing in p_L^*). This is in contrast to our discussion in Section 5, which emphasized that a lower p_L shrinks the number of bureaucrats working for L, and hence gives L an incentive to moderate its policy platform. An offsetting effect arises because L's reduced advantage also leads to the entry of more partisan bureaucrats willing to work for R only. This gives an incentive for R to choose a more extreme policy, which more than offsets L's moderation and leads to increased polarization. Thus, the endogenous formation of the bureaucracy can explain why parties' platforms might fail to converge even when elections are expected to be close.[33]

[33] Recall that we also found a lack of policy convergence with close elections in an EAN (Proposition 3). However, in that case close elections were the *only* possible equilibrium. With EAPP, we obtain a range of equilibria with different levels of election closeness and corresponding polarization, and our model predicts a positive correlation between these two features.

7 Extensions

7.1 Political appointees and other means of implementation

Our model of the bureaucracy has focused on the permanent bureaucracy as the only tool of policy implementation at parties' disposal. In reality, there may be other options. Elected politicians can make a number of political appointments to the bureaucracy, providing them with trusted allies who are willing to work on implementing their policies. The federal government can delegate policy implementation to the states, thereby circumventing federal bureaucrats. Services can be privatized. Or, citizens can be empowered to litigate, effectively relying on the courts for policy implementation. Although studying the details of these different mechanisms is beyond the scope of the paper, we can use our model to investigate how these might impact an equilibrium administration.

Suppose that, once elected, parties can ensure some level of policy implementation $\rho > 0$ that does not require the effort of permanent bureaucrats. For concreteness, think of ρ as the mass of political appointments available: parties have access to separate pools of citizens that they hire, and these appointees always choose $q = 1$. Therefore, given a policy x and a permanent bureaucracy B, government output becomes $Q^B(x) + \rho$.

Notice that in this setting, the presence of political appointees has no direct effect on the permanent bureaucracy, i.e., given a policy lottery χ the optimal permanent bureaucracy is again determined through the optimal application decisions from (5). Yet, we find that political appointments can have an *indirect* effect on the permanent bureaucracy. Because they influence parties' optimal policy choices, political appointments will impact permanent bureaucrats' equilibrium entry and production decisions.

Proposition 5 *Given a mass $\rho > 0$ of political appointees, an equilibrium administration with a fully neutral bureaucracy exists if $w \geq 1$, or if $w < 1$ and $\phi \leq \frac{1}{2}(\alpha - 1 + 3w - \rho)$. Equilibrium policies are given by $x_L^* = \max\{-1, -w\} = -x_R^*$.*

This proposition shows that, holding other parameters constant, a larger mass of political appointees ρ can make it more difficult to have a fully neutral bureaucracy in equilibrium. With political appointees, the optimal policies for party $P = L, R$ are solutions to $\max_{x \in [-1,1]}(Q^B(x) + \rho)(\alpha - |x - b_P|)$. Given a permanent bureaucracy B, parties' optimal policies will be more extreme when ρ is higher. This is because political appointees contribute to output regardless of the policy ideology x, and this tilts parties' tradeoff between preferred policies and higher output towards more extreme policies. But we know from Proposition 1 that more policy polarization makes it less likely that the equilibrium bureaucracy will be fully neutral. Thus, a higher ρ can destroy the equilibrium with a fully neutral bureaucracy.[34]

In this way, political appointments can have a spillover effect on the permanent bureaucracy. Even without any direct conflict between political and career appointees, a system that provides elected governments with more political appointees may be incompatible with neutrality, and lead to partisanship, in the permanent bureaucracy.

The impact of political appointees on agency performance and career bureaucrats has been documented in the empirical literature (e.g., Lewis (2008) and Richardson (2019)). However, findings such as the negative perceptions or reduced performance of career employees in more politicized agencies are typically interpreted as the direct effect of political appointees. Our model shows that some of these effects may be indirect: agencies with more political appointees allow for more extreme policies, and it may be these policies, rather than the political appointees, that are the source of conflict with career bureaucrats.

The discussion so far has treated the mass of political appointments ρ made by parties as exogenous. This is equivalent to assuming that making appointments is costless but subject to a limit ρ, because a party would always use all available appointments to increase production. Suppose now that making appointments has some cost that is independent of the policy x. Since the marginal utility of output is higher when the policy x is closer to the party's ideal, parties will have more incentive to increase ρ in equilibria with more polarized policies. From Proposition 5, this will in turn reduce neutrality in the permanent bureaucracy. This creates another channel through which polarization leads to partisanship in the bureaucracy.

7.2 Equilibrium wages

In our model, the number of jobs available in the bureaucracy adjusts to meet the supply of workers applying to work for the government. As discussed in Section 3.2, we can also allow B to be fixed at some $\overline{B} > 0$ (reflecting fiscal, legislative, or other political constraints) and let jobs be rationed. As an alternative, we now consider what happens if the private-public wage gap adjusts to balance the demand and supply of government jobs. This setting allows us to explore the model's joint predictions on bureaucratic compensation and partisanship.

Denote the optimal bureaucracy associated with policy lottery χ as $B(\chi, w)$, to highlight the private-public pay gap in citizens' incentives to join the bureaucracy. Given a policy lottery χ, we say that w^* is an *equilibrium wage* if it clears the market for bureaucrats, i.e., if $|B(\chi, w^*)| = \overline{B}$.

In the following proposition, we characterize equilibrium wages under two simplifying assumptions. First, we restrict attention to the symmetric case $p_L = p_R = 1/2$. Second, we

[34] When $w \geq 1$, parties choose their ideal policies so that polarization is already maximized.

assume that $\overline{B} < {}^{2\phi}/_{I}$. This ensures that the government's hiring target is low enough that, given any policy lottery χ, the target can be exceeded by private-public wage gaps that are low enough (i.e., $\lim_{w \to 0} |B(\chi, w)| > \overline{B}$).

Proposition 6 *Fix policy lottery χ with $p_L = p_R = {}^1/_2$, and suppose that $\overline{B} < {}^{2\phi}/_I$.*

An equilibrium wage supporting a fully partisan bureaucracy (P) exists if and only if $\Delta x > \phi + {}^{\overline{B}I}/_4$, and this wage is $w^* = {}^1/_2 \left(\phi - {}^{\overline{B}I}/_4\right)$.

An equilibrium wage supporting a partially partisan bureaucracy (PP) exists if and only if $\overline{B} \geq {}^{\phi}/_I$ and $2(\phi - {}^{\overline{B}I}/_2) \leq \Delta x \leq {}^2/_3 \left(\phi + {}^{\overline{B}I}/_2\right)$, and this wage is $w^* = {}^1/_2 \left(\phi - {}^{\overline{B}I}/_2 + {}^{\Delta x}/_2\right)$.

An equilibrium wage supporting a fully neutral bureaucracy (N) exists if and only if $\Delta x \leq 2\left(\phi - {}^{\overline{B}I}/_2\right)$, and this wage is $w^* = \phi - {}^{\overline{B}I}/_2$.

In all types of bureaucracies (i.e., whether (P), (PP) or (N)), the equilibrium private-public wage gap (i) grows in PSM ϕ and (ii) declines in public sector labor demand $\overline{B}$. These types of effects also appear in previous studies of public sector wages that emphasize PSM (e.g., Besley and Ghatak (2005); Macchiavello (2008)). However, our model shows that the scale of such effects depends on the degree of partisanship in the bureaucracy. The reason for (i) is that workers with high PSM require more compensation to select into the private sector rather than becoming bureaucrats. The utility of public sector employment is most sensitive to PSM for neutral bureaucrats, and correspondingly the equilibrium wage gap grows fastest in PSM in a fully neutral bureaucracy (N). The reason for (ii) is that staffing a larger public sector requires higher relative wages for bureaucrats (i.e., a lower w). As discussed following Corollary 1, partisan bureaucrats are more sensitive to wages than neutral bureaucrats because they only obtain positive payoffs in the public sector under one of the parties. Therefore, the equilibrium wage gap shrinks most slowly in $\overline{B}$ in a fully partisan bureaucracy (P).

Our model can also be used to analyze the relationship between wages and bureaucrats' policy motivations. Due to the countervailing effects (i) and (ii), our model predicts a non-monotonic relationship between equilibrium wages and bureaucratic partisanship or policy polarization. Public sector wages can be lower (i.e., higher w^*) under full partisanship than under full neutrality if $\overline{B}$ is high enough (by computation, if $\overline{B} > {}^{4\phi}/_{3I}$).[35] The lowest public sector wage is achieved when the bureaucracy is partially partisan (as can be verified by computation, in particular because equilibrium wages increase in Δx under (PP)). This is due to the fact that medium levels of polarization maximize the number of citizens that prefer becoming a bureaucrat (whether as neutral or partisan) to joining the private sector.

[35] However, our previous results tell us that wage savings would be a poor measure of government effectiveness, as fully partisan bureaucracies produce less output than fully neutral bureaucracies that have the same size (here, expected outputs are ${}^{\overline{B}}/_2$ and $\overline{B}$, respectively).

In equilibrium, this increased labor supply leads to lower relative wages in the public sector. In this way, political polarization may affect equilibrium public sector wages by changing the attractiveness of bureaucratic careers.[36]

7.3 Politically-motivated quits and seniority benefits

Our model implicitly assumes that bureaucrats prefer to stay in government and shirk, rather than quit, when having to serve a party they disagree with. This assumption is not out of line with available evidence. In the US, turnover among career civil servants is low. Bolton et al. (2021) report that total annual turnover in the federal civil service over the period 1988-2011 was between 4.4%-8% on average (depending on the category of employees). They estimate that, on average, only 0.4 percent of employees quit due to a mismatch with the ideology of the incoming administration. Similarly, Doherty et al. (2018) find that bureaucrats who decide to leave government are more likely to do so before an election rather than after, and that these exits are uncorrelated with bureaucrats' ideology.[37]

Without disputing these empirical patterns, we now investigate what happens if bureaucrats can quit after an election, once x is realized. To make this problem interesting, let $0 \leq \delta \leq 1$ denote the rate at which bureaucrats' earnings potential decreases in the private sector relative to the public sector due to their time in government. That is, a bureaucrat who joins and then leaves the public sector earns $(1-\delta)w$. The "depreciation rate" δ could capture seniority benefits in the public sector, or the acquisition of bureaucracy-specific human capital as in Gailmard and Patty (2007). Notice that our main model had $\delta = 1$, whereas $\delta = 0$ would mean that the same relative private sector wage is always available to bureaucrats.

Clearly, any bureaucrat prefers (at least weakly) to leave the public sector rather than shirk. Therefore, in this model, partisan bureaucrats are those whose transitory stints in public office are tied to the political fortunes of a particular party, whereas neutral bureaucrats form the permanent part of the government workforce.

Proposition 7 *Suppose that bureaucrats have the option to quit and that the relative private sector wage depreciates at a rate $0 \leq \delta \leq 1$. The optimal bureaucracy is fully partisan if and only if $\Delta x > 2\phi - (1 + (1-\delta)(2p_L - 1))^{w}/_{p_L}$, and it is fully neutral if and only if $\Delta x \leq {}^{\delta w}/_{p_L}$.*

[36] In Besley and Ghatak (2005), it is possible to have a perfect match between a worker's and an organization's mission, and this always lowers equilibrium wages. In our case, the match between parties and the bureaucracy can never be perfect because (i) parties always need to work with heterogenous bureaucrats, and (ii) bureaucrats who enter the public sector do not know which party they will be matched with (i.e., who will win the election). In our case, better matching, as occurs under low polarization and bureaucratic neutrality, does not necessarily lead to lower wages.

[37] These patterns are different from less robust civil service systems (see Akhtari et al. (2022) and Bellodi et al. (2021)).

An option to quit has two effects on selection into the bureaucracy. First, by increasing the value of shirking ex post (which now involves returning to the private sector) this option increases the incentive for entry ex ante. Second, by reducing the incentive to work for their less preferred party, it also shifts the boundary between neutral (permanent) and partisan (transitory) bureaucrats towards the latter. Correspondingly, Proposition 7 shows that a lower δ increases the range of polarization for which the bureaucracy is fully partisan, and decreases the range of polarization for which the bureaucracy is fully neutral. (Notice that the expressions above reduce to those of Proposition 1 when $\delta = 1$). In the limiting case in which bureaucrats can always return to the private sector at no cost ($\delta = 0$), the bureaucracy can be fully neutral only if the parties converge: otherwise, any degree of polarization will attract some transitory partisan bureaucrats.[38]

The depreciation rate δ of the relative private sector wage captures the relative benefits of a career in government conditional on having become a bureaucrat. It is common for government bureaucracies to provide various benefits tied to employee seniority, such as increasing pay scales, government-specific training programs and promotion ladders. A higher value of δ can represent these benefits or other measures that help public sector retention. Proposition 7 then suggests a connection between improving career prospects inside government and discouraging bureaucratic partisanship. By forcing potential bureaucrats to anticipate the likelihood of serving many parties, making long careers in government more attractive promotes the selection of neutral bureaucrats.

8 Conclusion

In most countries, public sector organizations employ a sizable proportion of the labor force. Since politicians use bureaucracies to achieve contested policy ends, it is natural to ask how bureaucrats select into public service, when they are motivated to exert effort, and finally how policy platforms anticipate these choices. The "citizen bureaucrats" in our model provide the crucial link between the policies promised by parties and their implementation.

Our theory of equilibrium administration is centered around endogenous entry into government service by ideologically heterogeneous citizens. Citizens have some public service motivation and trade off the policies they expect to execute with private sector wages. In turn, parties trade off policies that they like with their implementation by motivated bureaucrats. In equilibrium, parties' winning probabilities reflect voters' valuation of their policies

[38] Proposition 7 takes parties' policies as given but recall that, by Proposition 3, equilibrium administrations with fully neutral bureaucracies must have positive levels of polarization. Therefore, it follows that the limiting model with $\delta = 0$ cannot admit such equilibrium administrations.

and their implementation. To our knowledge, this combination of endogenous bureaucracy, policy making, and elections is unique in the literature.

Our model explains the emergence of full bureaucratic neutrality, full partisanship, or the partially partisan cases in between, as equilibrium outcomes. We believe this provides a useful perspective for understanding how different types of bureaucracies might develop across modern democracies, or across different agencies within the same country. Bureaucratic partisanship is more likely when political polarization is high or elections are less competitive. It is also more likely if bureaucrats, politicians and voters all *expect* partisanship. In equilibrium, partisan bureaucracies have shirking bureaucrats, lower levels of government productivity, and political output cycles. We have cited various pieces of evidence consistent with such effects, but there is clearly a scope for empirical work to test some of these results further.

The model also yields a number of implications regarding public sector personnel policies. Reducing political appointments and increasing seniority benefits can lower partisanship in the permanent civil service. Wage policies have nonmonotonic effects that are conditional on political polarization and bureaucrats' PSM. Finally, recruitment policies that increase PSM may have unintended consequences by allowing parties to choose more extreme policy platforms.

By endogenizing the bureaucratic side of policy making, the model suggests numerous paths for future work. First, we consider only a rudimentary agency problem between politicians and bureaucrats. The "technology" of policy making could be enriched by including more subtle interaction between politicians, career bureaucrats, and, as in one of our extensions, political appointees. Our results suggest that features of this technology may be important for understanding who becomes a bureaucrat and how they perform on the job. Second, the electoral side of our model could be expanded to include more politics, different electoral institutions, and a variety of voter behaviors. Again, our approach suggests that these details may be relevant in determining bureaucrats' career choices. Third, it would be interesting to include other sources of heterogeneity between citizens (such as private sector productivity). Relatively little is known about how characteristics of the people who choose to work in government shape the policy agendas of elected politicians, and one contribution of our paper is to offer a framework that is well-suited for studying this question further. Finally, while our focus has been positive, developing the normative implications of our results on polarization, government output, or the size of government seems like an interesting avenue for future research.

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A Appendix

A.1 Proofs of results stated in the text

Proof of Proposition 1. (P) Suppose that the bureaucracy is fully partisan, as in the bottom panel of Figure 2. It follows that those bureaucrats who apply to work for party L only must be those with ideologies in the set $\{b : U_b(\chi, L) \geq w\} = [x_L - (\phi - {}^{w}/_{p_L}), x_L + (\phi - {}^{w}/_{p_L})]$. Similarly, those bureaucrats who apply to work for party R only must be those with ideologies in the set $\{b : U_b(\chi, R) \geq w\} = [x_R - (\phi - {}^{w}/_{p_R}), x_R + (\phi - {}^{w}/_{p_R})]$. It must be that the most right-wing bureaucrat entering to work for party L only is not willing to work for party R, or that $x_L + [\phi - {}^{w}/_{p_L}] < x_R - \phi$. This reduces to $x_R - x_L > 2\phi - {}^{w}/_{p_L}$. Similarly, it must be that the most left-wing bureaucrat entering to work for party R is not willing to work for party L, or that $x_R - (\phi - {}^{w}/_{p_R}) > x_L + \phi$. This reduces to $x_R - x_L > 2\phi - {}^{w}/_{p_R}$. Because $p_L \geq p_R$, the bureaucracy is fully partisan if and only if $x_R - x_L > 2\phi - {}^{w}/_{p_L}$. Bureaucrats willing to work for party $P = L, R$ are those with $b \in [x_P - \phi + \frac{w}{p_P}, x_P + \phi - \frac{w}{p_P}]$, which yields the Q's given in the proposition.

(N). Suppose that the bureaucracy is fully neutral, as on the top panel of Figure 2. It follows that the set of applying bureaucrats must be those with ideologies in $\{b : U_b(\chi, LR) \geq$

$w\} = [\underline{b}, \bar{b}]$. Under the assumption that $\phi > {}^{w}/_{p_R} \geq {}^{w}/_{p_L}$, it follows that $U_{x_L}(\chi, L) > w$ and $U_{x_R}(\chi, R) > w$, so that we must have that $\underline{b} < x_L \leq x_R < \bar{b}$. Using the expression for $U_b(\chi, LR)$, we then have that $\underline{b} = p_L x_L + p_R x_R - (\phi - w)$ and $\bar{b} = p_L x_L + p_R x_R + (\phi - w)$. It must be that the most left-wing bureaucrat entering to work for both parties would not benefit from entering to work for party L only, or that $p_L x_L + p_R x_R - (\phi - w) \leq x_L - (\phi - {}^{w}/_{p_L})$. This reduces to $x_R - x_L \leq {}^{w}/_{p_L}$. Similarly, it must be that the most right-wing bureaucrat entering to work for both parties would not benefit from entering to work for party R only, or that $p_L x_L + p_R x_R + (\phi - w) \geq x_R + (\phi - {}^{w}/_{p_R})$. This reduces to $x_R - x_L \leq {}^{w}/_{p_R}$. Because $p_L \geq p_R$, the bureaucracy is fully neutral if and only if $x_R - x_L \leq {}^{w}/_{p_L}$. All bureaucrats $b \in B(\chi)$ work for both parties.

(PP) Finally, suppose that the bureaucracy is partially partisan. First, it must be the case that some citizens join the applicant pool to produce for one party only. The most left-wing citizen willing to enter to produce for party L only is not willing to produce for party R if $x_L - (\phi - {}^{w}/_{p_L}) < x_R - \phi$, which reduces to $x_R - x_L > {}^{w}/_{p_L}$. Similarly, the most right-wing citizen willing to enter to produce for party R only is not willing to produce for party L if $x_R + (\phi - {}^{w}/_{p_R}) > x_L + \phi$, which reduces to $x_R - x_L > {}^{w}/_{p_R}$. Second, it must be the case that some citizens join the applicant pool to produce for both parties. The most right-wing citizen willing to enter to produce for party L only is willing to produce for party R if $x_L + (\phi - {}^{w}/_{p_L}) \geq x_R - \phi$, which reduces to $x_R - x_L \leq 2\phi - {}^{w}/_{p_L}$. Similarly, the most left-wing citizen willing to enter to produce for party R only is willing to produce for party L if $x_R - (\phi - {}^{w}/_{p_R}) \leq x_L + \phi$, which reduces to $x_R - x_R \leq 2\phi - {}^{w}/_{p_R}$.

Collecting the results from the previous paragraph, it follows that the bureaucracy is partially partisan if and only if ${}^{w}/_{p_L} < x_R - x_L \leq 2\phi - {}^{w}/_{p_L}$. There are three subcases. PP3. First, if ${}^{w}/_{p_L} < x_R - x_L \leq {}^{w}/_{p_R}$, then the bureaucracy is $B(\chi) = [x_L - [\phi - {}^{w}/_{p_L}], p_L x_L + p_R x_R + (\phi - w)]$, and only party L has partisan bureaucrats. This case is illustrated in Figure 3. Some neutral bureaucrats to the right of party R do not enter. Bureaucrats willing to work for party L are those with $b \in [x_L - \phi + \frac{w}{p_L}, p_L x_L + p_R x_R + \phi - w]$, and bureaucrats willing to work for R are those with $b \in [x_R - \phi, p_L x_L + p_R x_R + \phi - w]$.

PP2. Second, if ${}^{w}/_{p_R} \leq x_R - x_L \leq 2\phi - {}^{w}/_{p_R}$, then the bureaucracy is $B(\chi) = [x_L - (\phi - {}^{w}/_{p_L}), x_R + (\phi - {}^{w}/_{p_R})]$. This case is illustrated on the middle panel of Figure 2. Both parties have partisan bureaucrats, and all neutral bureaucrats enter the public sector. Bureaucrats willing to work for party L are those with $b \in [x_L - \phi + \frac{w}{p_L}, x_L + \phi]$, and bureaucrats willing to work for R are those with $b \in [x_R - \phi, x_R + \phi - \frac{w}{p_R}]$.

PP1. Third, if $2\phi - {}^{w}/_{p_R} < x_R - x_L \leq 2\phi - {}^{w}/_{p_L}$, then the bureaucracy is $B(\chi) = [x_L - (\phi - {}^{w}/_{p_L}), {}^{1}/_{p_L - p_R}(p_L x_L - p_R x_R + \phi - w)] \cup [x_R - (\phi - {}^{w}/_{p_R}), x_R + (\phi - {}^{w}/_{p_R})]$ and it is not convex. This case is illustrated on Figure 4. In this case, both parties have

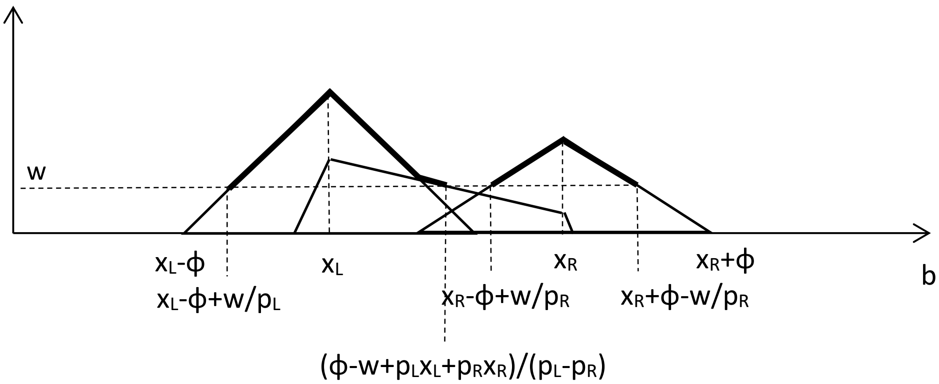

Figure 4: PP1. Both parties have partisan bureaucrats, and neutral bureaucrats are closer to the electorally favored party.

partisan bureaucrats, and there are neutral bureaucrats in the middle. However, some neutral bureaucrats closer to R prefer to stay out of the public sector. Bureaucrats willing to work for party L are those with $b \in [x_L - \phi + \frac{w}{p_L}, \frac{p_L x_L - p_R x_R + \phi - w}{p_L - p_R}]$. Bureaucrats willing to work for party R are those with $b \in \left[x_R - \phi, \frac{p_L x_L - p_R x_R + \phi - w}{p_L - p_R}\right] \cup [x_R - \phi + \frac{w}{p_R}, x_R + \phi - \frac{w}{p_R}]$.
■

Corollary 5 *Expected ($\tilde{Q}$) and ex post ($Q_L \equiv Q^B(x_L)$ and $Q_R = Q^B(x_R)$) government output is as follows:*
In case (P), $Q_L = {}^2/\mathcal{I}(\phi - \frac{w}{p_L})$, $Q_R = {}^2/\mathcal{I}(\phi - \frac{w}{p_R})$ *and* $\tilde{Q} = {}^2/\mathcal{I}(\phi - 2w)$.
In case (PP1), $Q_L = {}^1/\mathcal{I}\left(\frac{p_L x_L - p_R x_R + \phi - w}{p_L - p_R} + \phi - {}^w/{}_{p_L} - x_L\right)$, $Q_R = {}^1/\mathcal{I}\Big(\frac{p_L x_L - p_R x_R + \phi - w}{p_L - p_R} + 3\phi - 2{}^w/{}_{p_R} - x_R\Big)$ *and* $\tilde{Q} = {}^2/\mathcal{I}\left(\phi - 2w + \frac{p_L p_R}{p_L - p_R}\left(2\phi - {}^w/{}_{p_L} - (x_R - x_L)\right)\right)$.
In case (PP2), $Q_L = {}^1/\mathcal{I}(2\phi - \frac{w}{p_L})$, $Q_R = {}^1/\mathcal{I}(2\phi - \frac{w}{p_R})$ *and* $\tilde{Q} = {}^2/\mathcal{I}\,(\phi - w)$.
In case (PP3), $Q_L = {}^1/\mathcal{I}\,(2\phi - w - {}^w/{}_{p_L} + p_R(x_R - x_L))$, $Q_R = {}^1/\mathcal{I}\,(2\phi - w - p_L(x_R - x_L))$ *and* $\tilde{Q} = {}^2/\mathcal{I}\,(\phi - w)$.
In case (N), $Q_L = Q_R = \tilde{Q} = {}^2/\mathcal{I}\,(\phi - w)$.

Proof of Corollary 5. Immediate from Proposition 1. ■
Proof of Corollary 1. From Corollary 5, expected government production is

$$\tilde{Q} = \begin{cases} {}^2/\mathcal{I}\,[\phi - 2w] & \text{if } \Delta x > 2\phi - {}^w/{}_{p_L}, \\ {}^2/\mathcal{I}\left[\phi - 2w + \frac{p_L p_R}{p_L - p_R}\left[2\phi - {}^w/{}_{p_L} - \Delta x\right]\right] & \text{if } 2\phi - {}^w/{}_{p_R} < \Delta x \leq 2\phi - {}^w/{}_{p_L}, \\ {}^2/\mathcal{I}\,[\phi - w] & \text{if } \Delta x \leq 2\phi - {}^w/{}_{p_R}. \end{cases} \tag{8}$$

It is easily verified that the expressions for $\tilde{Q}$ in (8) are in increasing order: fully partisan bureaucracies yield the lowest expected output, partially partisan bureaucracies yield weakly more, and fully neutral bureaucracies yield weakly more than partially partisan bureaucracies. The results regarding the effects of ϕ, w, and Δx on $\tilde{Q}$ are immediate.

From Proposition 1, the size of the bureaucracy is given by

$$|B(\chi)| = \begin{cases} {}^2\!/\mathcal{I} \left[2\phi - \frac{w}{p_L p_R}\right] & \text{if } \Delta x > 2\phi - {}^w\!/_{p_L}, \\ {}^2\!/\mathcal{I} \left[2\phi - \frac{w}{p_L p_R}\right] + \frac{1}{\mathcal{I}} \frac{p_R}{p_L - p_R} \left[2\phi - {}^w\!/_{p_L} - \Delta x\right] & \text{if } 2\phi - {}^w\!/_{p_R} < \Delta x \leq 2\phi - {}^w\!/_{p_L}, \\ {}^1\!/\mathcal{I} \left[\Delta x + 2\phi - \frac{w}{p_L p_R}\right] & \text{if } {}^w\!/_{p_R} < \Delta x \leq 2\phi - {}^w\!/_{p_R}, \\ {}^1\!/\mathcal{I} \left[\Delta x + 2\phi - \frac{w}{p_L p_R}\right] + {}^{p_L}\!/_I \left[{}^w\!/_{p_R} - \Delta x\right] & \text{if } {}^w\!/_{p_L} < \Delta x \leq {}^w\!/_{p_R}, \\ {}^2\!/\mathcal{I}[\phi - w] & \text{if } \Delta x \leq {}^w\!/_{p_L}. \end{cases} \tag{9}$$

With some algebra, it is easily verified that $|B(\chi)|$ weakly increases in Δx for $\Delta x < 2\phi - {}^w\!/_{p_R}$ and decreases for $\Delta x > 2\phi - {}^w\!/_{p_R}$.

If the bureaucracy is fully neutral ($\Delta x \leq {}^w\!/_{p_L}$), then per-capita production $\frac{\tilde{Q}}{|B(\chi)|}$ is 1. For ${}^w\!/_{p_L} < \Delta x \leq 2\phi - {}^w\!/_{p_R}$, production remains constant while the bureaucracy expands, so per-capita production falls below 1. When $2\phi - {}^w\!/_{p_R} < \Delta x \leq 2\phi - {}^w\!/_{p_L}$ both production and the bureaucracy are decreasing in polarization. We can write per-capita production as

$$\frac{\tilde{Q}}{|B(\chi)|} = \frac{a - b\Delta x}{c - d\Delta x},$$

where $b = \frac{p_L p_R}{p_L - p_R}$ and $d = \frac{p_R}{2(p_L - p_R)}$. Therefore, it can be computed that $\frac{\partial}{\partial(\Delta x)} \frac{\tilde{Q}}{|B(\chi)|} \leq 0$ as long as $\frac{\tilde{Q}}{|B(\chi)|} \leq \frac{b}{d} = 2p_L$. However, because per-capita production is no greater than 1 and $p_L \geq {}^1\!/_2$, this is always satisfied. Thus, in this range, per-capita production is lowest when $\Delta x = 2\phi - {}^w\!/_{p_L}$.

Finally, if the bureaucracy is fully partisan ($\Delta x \geq 2\phi - {}^w\!/_{p_L}$), then per-capita production is

$$\frac{\tilde{Q}}{|B(\chi)|} = \frac{\phi - 2w}{2\phi - {}^w\!/_{p_L p_R}},$$

which is independent of party platforms. ■

Proof of Corollary 2. From Corollary 5, we have

$$\Delta Q = Q_L - Q_R = \begin{cases} 0 & \text{if } \Delta x < {}^{w}/_{p_L} \\ \Delta x - {}^{w}/_{p_L} & \text{if } {}^{w}/_{p_L} < \Delta x < {}^{w}/_{p_R} \\ {}^{w}/_{p_R} - {}^{w}/_{p_L} & \text{if } {}^{w}/_{p_R} < \Delta x < 2\phi - {}^{w}/_{p_R} \\ \Delta x - 2\phi - {}^{w}/_{p_L} + 2{}^{w}/_{p_R} & \text{if } 2\phi - {}^{w}/_{p_R} < \Delta x < 2\phi - {}^{w}/_{p_L} \\ 2({}^{w}/_{p_R} - {}^{w}/_{p_L}) & \text{if } 2\phi - {}^{w}/_{p_L} < \Delta x, \end{cases}$$

which immediately implies the statements in the corollary. ■

Proof of Corollary 3. (i) From Proposition 1, the condition for full neutrality is $\Delta x \leq {}^{w}/_{p_L}$, and this is relaxed when p_L goes down. (ii) Expected government production is given in (8). For $\Delta x < 2(\phi - w)$, a decrease in p_L can lead to a transition from the second case ($\Delta x \leq 2\phi - {}^{w}/_{p_R}$) to the third case ($2\phi - {}^{w}/_{p_R} < \Delta x \leq 2\phi - {}^{w}/_{p_L}$), which we already showed increases output. To establish that $\frac{\partial \tilde{Q}}{\partial p_L} \leq 0$ for all $\Delta x \leq 2(\phi - w)$ in the second case, the derivative can be shown to equal $\frac{1}{(2p-1)^2}(-2p^2 + 2p - 1 + \frac{w}{2\phi - \Delta x})$. This is negative for all p if and only if $\frac{w}{2\phi - \Delta x} \leq \frac{1}{2}$ which yields the stated condition. For $\Delta x > 2(\phi - w)$, $\frac{\partial \tilde{Q}}{\partial p_L}$ has an inverse U-shape maximized at $p = {}^1/_2[1 + (2\frac{w}{2\phi - \Delta x} - 1)^{1/2}]$. ■

Proof of Proposition 2. Suppose the optimal policy of party L is $x_L = \text{argmax}_{x \in [-1,1]} Q^B(x)(\alpha - 1 - x)$. First, note that it cannot be that $x_L < \max\{\underline{b} - \phi, -1\}$. If we have that $\underline{b} - \phi \leq -1$, then such a policy is not feasible. If instead $\underline{b} - \phi > -1$, then $Q^B(x_L) = 0$. Because there exists $x'_L > x_L$ with $Q^B(x'_L) > 0$ and, by assumption, we have that $\alpha - 1 - x > 0$ for any feasible policy x, party L strictly prefers setting policy x'_L, contradicting the optimality of x_L.

Second, note that it cannot be that $x_L > \max\{\bar{b} - \phi, -1\}$ (notice that, by assumption, $\bar{b} - \phi < 1$, so that some such policy is always feasible). If this was the case, then we would have that $x_L + \phi > \bar{b}$. Therefore, we would have that $Q^B(x^*_L) \leq Q^B(\max\{\bar{b} - \phi, -1\})$, so that party L could choose a policy closer to its ideal without sacrificing output. This would contradict the optimality of x_L.

Third, note that it cannot be that $x_L > \max\{\underline{b} + \phi, -1\}$. If this was the case, then we would have that $x_L - \phi > \underline{b}$. Therefore, we would have that $Q^B(x_L) \leq Q^B(\max\{\underline{b} + \phi, -1\})$, contradicting the optimality of x_L. Also, recall that, by assumption, $\underline{b} + \phi > -1$, so that this step implies that $x_L \leq \underline{b} + \phi$.

Therefore, it follows that $\max\{\underline{b} - \phi, -1\} \leq x^*_L \leq \min\{\max\{\bar{b} - \phi, -1\}, \underline{b} + \phi\}$, and for any such policy we have that $Q^B(x_L) = x_L + \phi - \underline{b}$. Notice that if $\bar{b} - \underline{b} \leq 2\phi$, then $\max\{\bar{b} - \phi, -1\} \leq \max\{\underline{b} + \phi, -1\} = \underline{b} + \phi$, while if $\bar{b} - \underline{b} > 2\phi$, then $\max\{\bar{b} - \phi, -1\} \geq \underline{b} + \phi$.

Correspondingly, if $\bar{b} - \underline{b} \leq 2\phi$, then x_L is a solution to

$$\max_{x \in [\max\{\underline{b}-\phi,-1\},\max\{\bar{b}-\phi,-1\}]} (x + \phi - \underline{b})(\alpha - 1 - x),$$

whereas if $\bar{b} - \underline{b} > 2\phi$, then x_L is a solution to

$$\max_{x \in [\max\{\underline{b}-\phi,-1\},\underline{b}+\phi]} (x + \phi - \underline{b})(\alpha - 1 - x).$$

These problems share the same objective function, which is strictly concave and has an unconstrained maximizer at $\hat{x} = {}^1\!/\!_2[\alpha - 1 + \underline{b} - \phi]$. From this the expressions for optimal policies in (6)and (7) follow. The only thing to note is that if $\hat{x} < \max\{\underline{b} - \phi, -1\}$, then it must be the case that $\underline{b} - \phi < -1$, and hence that $x_L^* = -1$. To see this, note that if $\hat{x} < \max\{\underline{b} - \phi, -1\} = \underline{b} - \phi$, then it follows that $\alpha - 1 - (\underline{b} - \phi) < 0$. But, because $\underline{b} - \phi \geq -1$ is a feasible policy, this contradicts the assumption that $\alpha > 2$. ■

Proof of Corollary 4. Immediate from the expressions for optimal policies in Proposition 2. ■

Proof of Proposition 3. Note first that, from Corollary 5, $p_L = \frac{1}{2}$ implies $Q^{B^*}(x_L^*) = Q^{B^*}(x_R^*)$. It follows that in a symmetric EA, the cutoff voter type (the voter who is indifferent between L and R) must have ideology $b = 0$.

(i) Consider an equilibrium in which the bureaucracy is fully neutral. From Proposition 1, we have that $x_R^* - x_L^* \leq 2w$ and $B^* = B(\chi^*) = [\frac{x_L^*+x_R^*}{2} - (\phi - w), \frac{x_L^*+x_R^*}{2} + (\phi - w)]$. It can be verified that $x_L^* - \phi < \underline{b}^*$. Therefore, party L can never induce more left-wing bureaucrats to work by choosing more left-wing policies, but it also does not lose left-wing bureaucrats by choosing policies slightly more moderate than x_L^*.

Suppose that we have $x_L^* > -1$. From Proposition 2, we know that $x_L^* \leq \max\{\bar{b}^* - \phi, -1\}$, which reduces to $x_R^* - x_L^* \geq 2w$. It follows that $x_R^* - x_L^* = 2w$, and the symmetric EA must have $x_L^* = -w > -1$. For this equilibrium to exist, it must be the case that party L does not have incentives to choose more extreme policies, which would decrease output but improve its ideological payoff. By Proposition 2, this requires $x_L^* \leq \hat{x}$, or $-w \leq {}^1\!/\!_2[\alpha - 1 + \underline{b}^* - \phi]$, which reduces to $\phi \leq \frac{1}{2}(\alpha - 1 + 3w)$.

Using the symmetry of the parties' ideal policies, the previous argument can be repeated to show that $x_R^* < 1$ implies $x_L^* = -x_R^* > -1$. Therefore, the only possibility left is an equilibrium with $x_L^* = -x_R^* = -1$. The condition that $x_R^* - x_L^* \leq 2w$ then reduces to $w \geq 1$. In this case, no deviations by parties to more extreme policies are feasible.

(ii) Consider an equilibrium in which the bureaucracy is fully partisan.

Step 1. From Proposition 1, we have that $x_R^* - x_L^* > 2(\phi - w)$ and $B^* = B(\chi^*) = [x_L^* - (\phi - 2w), x_L^* + (\phi - 2w)] \cup [x_R^* - (\phi - 2w), x_R^* + (\phi - 2w)]$. The bureaucracy is ideologically disconnected; the left-wing section works for party L only, and the right-wing section works for party R only.

We first show that we must have $x_L^* = -1$. To see this, let $[\underline{b}_L^*, \overline{b}_L^*]$ denote the left-wing section of the equilibrium bureaucracy B^*, and note that $\overline{b}_L^* - \underline{b}_L^* < 2\phi$ because $w, p_L^* > 0$. From Proposition 8, the policy x_L^* must satisfy (6). If $x_L^* > -1$, then because $x_L^* \leq \max\{\overline{b}_L^* - \phi, -1\}$ by (6), we must have that $x_L^* \leq \overline{b}_L^* - \phi$. When combined with the fact that $x_L^* = 1/2[\overline{b}_L^* + \underline{b}_L^*]$, we obtain that $\overline{b}_L^* - \underline{b}_L^* \geq 2\phi$, a contradiction. The symmetric argument applies to party R, so that we must have $x_R^* = 1$. Note that $x_L^* = -x_R^*$ is indeed consistent with $p_L = \frac{1}{2}$.

Step 2. It remains to be verified that parties have incentives to choose their ideal policies. Note that $p_L^* = 1/2$ implies that $\overline{b}_L^* - \underline{b}_L^* = \overline{b}_R^* - \underline{b}_R^*$. Suppose further that $\underline{b}_R^* - \underline{b}_L^* \geq 2\phi$. This corresponds to the case of a "large distance" between the two sections of the bureaucracy from Proposition 8, and that result shows that the optimal policy of party L is the same as the one identified by Proposition 2 (i.e., as though the right section of the bureaucracy was absent). Furthermore, from Step 1 we know that $\overline{b}_L^* - \underline{b}_L^* < 2\phi$, so that this corresponds to the case of a "small bureaucracy" from Proposition 2. In that result, if we substitute $\max\{\underline{b}_L^* - \phi, -1\} = \max\{\overline{b}_L^* - \phi, -1\} = -1$, as is the case here, then it follows that $x_L^* = -1$ is indeed the optimal policy. The condition $\underline{b}_R^* - \underline{b}_L^* \geq 2\phi$ reduces to $\phi \leq 1$.

Finally, suppose that $1 < \phi < 1 + w$ (so that $\underline{b}_R^* - \underline{b}_L^* < 2\phi$). It must be that party L does not have the incentive to choose policies more moderate than -1 in order to increase government production. The most moderate policy that party L can choose which attracts some right-wing bureaucrats is $\underline{b}_R^* - \phi > -1$ and, by Proposition 8, the most extreme such policy that party L can choose is $\overline{b}_R^* - \phi$. For any $\underline{b}_R^* - \phi \leq x_L \leq \overline{b}_R^* - \phi$, party L's payoff is $Q^{B^*}(x_L)(\alpha - 1 - x_L) = 1/\mathcal{I}\left[\overline{b}_L^* - \underline{b}_L^* + (x_L + \phi - \underline{b}_R^*)\right](\alpha - 1 - x_L)$. It can be computed that

$$\frac{\partial}{\partial x_L} Q^{B^*}(x_L)(\alpha - 1 - x_L)|_{x_L = \underline{b}_R^* - \phi} = 1/\mathcal{I}\,[\alpha - 2(1 - w)] > 0. \tag{10}$$

The inequality follows because $2w \leq \phi < 1 + w$ implies $w < 1$, and $\alpha > 2$ by assumption.

Notice that if $\phi \approx 1 + w$, then $\underline{b}_R^* - \phi \approx -1$. Thus, from (10), increasing x_L slightly above -1 will increase party L's payoff. Therefore, no equilibrium exists in this case. If, on the other hand, $\phi \approx 1$, then $\underline{b}_R^* - \phi \approx \underline{b}_L^* + \phi \approx -1 + 2w \gg -1$. In words, to attract bureaucrats from the right section, party L must choose a policy strictly more moderate than -1. However, $Q^{B^*}(x_L) \approx Q^{B^*}(-1)$ for any policy $\underline{b}_R^* - \phi \leq x_L \leq \underline{b}_L^* + \phi$. In words, by moderating, party L can attract very few bureaucrats from the right section without starting to lose bureaucrats from the left section. In this case a deviation to a moderate policy cannot be beneficial for party L, therefore, the equilibrium exists.

Therefore, there exists $1 < \tilde{\phi} < 1 + w$ such that the equilibrium exists if and only if $\phi \leq \tilde{\phi}$. (For the case $\underline{b}^*_R - \underline{b}^*_L \geq 2\phi$, we saw that this holds for $\tilde{\phi} = 1$.) Since $\phi > 2w$, it also follows that $w < 1$ is necessary for the existence of a symmetric EAP.

(iii) *Step 1.* Consider an equilibrium in which the bureaucracy is partially partisan and in which both parties have partisan bureaucrats. From Proposition 1, we have that $2w \leq x^*_R - x^*_L \leq 2(\phi - w)$ and $B^* = B(\chi^*) = [x^*_L - (\phi - 2w), x^*_R + (\phi - 2w)]$. It can be verified that $x^*_L - \phi < \underline{b}^*$ and that $x^*_L > \overline{b}^* - \phi$, so that if party L chooses more moderate policies then all left-wing bureaucrats still work and some right-wing bureaucrats choose to start working. From Proposition 2, it follows that $x^*_L \geq \hat{x} = 1/2[\alpha - 1 + \underline{b}^* - \phi]$, which reduces to $x^*_L \geq \alpha - 1 - 2(\phi - w)$. Furthermore, if $x^*_L > -1$, then party L's policy choice is interior and we must have that $x^*_L = \alpha - 1 - 2(\phi - w)$. For party R, Proposition 2 yields that $x^*_R \leq 1/2[\overline{b}^* + \phi - \alpha + 1]$, which reduces to $x^*_R \leq 1 - \alpha + 2(\phi - w)$. Also, if $x^*_R < 1$, then we must have that $x^*_R = 1 - \alpha + 2(\phi - w)$.

Step 2. First, suppose that $-1 < x^*_L = \alpha - 1 - 2(\phi - w)$, or $\frac{\alpha}{2} + w \geq \phi$. From Proposition 1, the necessary and sufficient condition for the existence of a PP equilibrium is now $2w < 2(1-\alpha) + 4\phi - 4w \leq 2(\phi - w)$. This can be rewritten as $1/2(\alpha - 1 + 3w) < \phi \leq \alpha - 1 + w$. Note that $\frac{\alpha}{2} + w < \alpha - 1 + w$, and also that $\frac{\alpha}{2} + w > 1/2(\alpha - 1 + 3w)$ requires $w < 1$. Second, suppose instead that $\frac{\alpha}{2} + w < \phi$ and therefore $x^*_L = -1$. From Proposition 1, such an equilibrium exists if $2w < 2 \leq 2(\phi - w)$. Given $2w < \phi$, this reduces to $w < 1$. ■

Proof of Proposition 4. We proceed similarly to the proof of Proposition 3.

First, we verify that, given any equilibrium policies (x^*_L, x^*_R) and any equilibrium bureaucracy B^*, there exists a cutoff voter type $i^*_L \in [-\mathcal{I}/2, \mathcal{I}/2]$, such that voter with ideology i prefers party L only if $i \leq i^*_L$. The only reason this property may be in doubt is that parties differ in output, which complements policy ideology for voters. Note that the fraction of voters that prefer party L to party R are those voters with ideology i such that

$$\frac{Q^{B^*}(x^*_L)}{Q^{B^*}(x^*_R)} \geq \frac{\alpha - |x^*_R - i|}{\alpha - |x^*_L - i|}. \tag{11}$$

Assume that $x^*_L < x^*_R$, as this will be true of all equilibrium policies. It can be verified that the right-hand side of the inequality in (11) is strictly increasing in i (this can be verified by taking derivatives separately for the three cases in which $i < x^*_L$, $x^*_L < i < x^*_R$ and $i > x^*_R$, respectively). This establishes the existence of marginal supporter i^*_L for party L, Correspondingly, the equilibrium mass of supporters of party L is $p^*_L = 1/\mathcal{I}(i^*_L + \mathcal{I}/2)$.

(i) Suppose there was an asymmetric EA in which the bureaucracy is fully neutral. From

Proposition 1, we have that $x_R^* - x_L^* \leq {}^w/_{p_L^*}$ and $B^* = B(\chi^*) = [p_L^* x_L^* + p_R^* x_R^* - (\phi - w), p_L^* x_L^* + p_R^* x_R^* + (\phi - w)]$. It can be verified that $x_L^* - \phi < \underline{b}^*$.

Suppose that we have $x_L^* > -1$. From Proposition 2, we know that $x_L^* \leq \max\{\overline{b}^* - \phi, -1\}$, which reduces to $x_R^* - x_L^* \geq {}^w/_{1-p_L^*}$. It follows that $x_R^* - x_L^* \leq {}^w/_{p_L^*} \leq {}^w/_{1-p_L^*} \leq x_R^* - x_L^*$, which cannot hold if $p_L^* > 1/2$. By a symmetric argument, we also cannot have $x_R^* < 1$. Therefore, the only possibility left is an equilibrium with $x_L^* = -x_R^* = -1$. But because $Q^{B^*}(x_L^*) = Q^{B^*}(x_R^*)$ under a fully neutral bureaucracy, this would again imply $p_L^* = 1/2$, a contradiction.

(ii) Consider an asymmetric EAP.

Step 1 is the same as Step 1 of the proof of Proposition 3(ii), with the difference that $x_R^* - x_L^* > 2\phi - {}^w/_{p_L^*}$ and $B^* = B(\chi^*) = [x_L^* - [\phi - {}^w/_{p_L^*}], x_L^* + [\phi - {}^w/_{p_L^*}]] \cup [x_R^* - [\phi - {}^w/_{p_R^*}], x_R^* + [\phi - {}^w/_{p_R^*}]]$ from Proposition 1. As in that proof, this can be used to show that parties choose their ideal policies.

Step 2. Next, given any $p_L \geq 1/2$, we can evaluate the preferences over parties of the marginal voter $i_L = \mathcal{I}[p_L - 1/2]$ implied by that winning probability, taking as given the facts that $x_L^* = -1$ and $x_R^* = 1$. The marginal voter i_L prefers party L if

$$\begin{aligned} Q^{B^*}(x_L^*)[\alpha - |x_L^* - i_L|] &= {}^2/_{\mathcal{I}}[\phi - {}^w/_{p_L}][\alpha - (i_L + 1)] \\ &\geq {}^2/_{\mathcal{I}}[\phi - {}^w/_{p_R}][\alpha - (1 - i_L)] \\ &= Q^{B^*}(x_R^*)[\alpha - |x_R^* - i_L|], \end{aligned}$$

where the expressions for Q^B follow from Corollary 5. This reduces to

$$\frac{\phi(2p_L - 1)}{p_L(1 - p_L)} \left[\frac{w}{\phi \mathcal{I}}(\alpha - 1 + \mathcal{I}/2) - p_L(1 - p_L) \right] \geq 0. \tag{12}$$

If winning probability p_L^* is part of an equilibrium, then (12) must hold as an equality when evaluated at p_L^*. Therefore, there are two candidates for equilibrium, $p_L^* = 1/2$ or $p_L^* > 1/2$ such that $p_L^*(1 - p_L^*) = \frac{w}{\phi I}(\alpha - 1 + \mathcal{I}/2)$. (This second candidate is only well-defined if $\frac{w}{\phi \mathcal{I}}(\alpha - 1 + \mathcal{I}/2) < 1/4$.)

Step 3. Finally, we show that whenever the equilibrium with $p_L^* > 1/2$ exists, then so does the equilibrium with $p_L^* = 1/2$. To see this, given any $0 < p_L < 1$, let $\underline{b_L}(p_L) = -1 - [\phi - {}^w/_{p_L}]$, $\overline{b}_L(p_L) = -1 + [\phi - {}^w/_{p_L}]$, $\underline{b_R}(p_L) = 1 - [\phi - {}^w/_{1-p_L}]$ and $\overline{b}_R(p_L) = 1 + [\phi - {}^w/_{1-p_L}]$. Given any measurable $B \subseteq \mathcal{I}$, let $\mu(B)$ be the measure of B, and, given any policy x_L, let $U_L(x_L : p_L)$ denote the utility of party L when it chooses x_L facing the bureaucracy determined by p_L.

Using the fact that the bureaucracy is fully partisan, we can write

$$U_L(x_L : p_L) = \left[\mu\left([\underline{b}_L, \overline{b_L}] \cap [x_L - \phi, x_L + \phi]\right) + \mu\left([\underline{b}_R, \overline{b_R}] \cap [x_L - \phi, x_L + \phi]\right)\right](\alpha - 1 - x_L),$$

which is continuous and, for fixed x_L, differentiable at almost every p_L. Given $x_L > -1$, at points of differentiability, we have that

$$\begin{aligned}
\frac{\partial}{\partial p_L}\left[U_L(-1 : p_L) - U_L(x_L : p_L)\right] &= \frac{2w}{\mathcal{I}p_L^2}\alpha - \frac{\partial}{\partial p_L}[\mu\left([\underline{b}_L, \bar{b}_L] \cap [x_L - \phi, x_L + \phi]\right) \\
&\quad + \mu\left([\underline{b}_R, \bar{b}_R] \cap [x_L - \phi, x_L + \phi]\right)][\alpha - 1 - x_L] \\
&\geq \frac{2w}{\mathcal{I}p_L^2}\alpha - \frac{\partial}{\partial p_L}\left[\mu\left([\underline{b}_L, \bar{b}_L] \cap [x_L - \phi, x_L + \phi]\right)\right][\alpha - 1 - x_L] \\
&\geq \frac{2w}{\mathcal{I}p_L^2}[1 + x_L] \\
&> 0,
\end{aligned}$$

where the first equality uses the fact that $[\underline{b}_L(p_L), \bar{b}_L(p_L)] \cap [-1-\phi, -1+\phi] = [\underline{b}_L(p_L), \bar{b}_L(p_L)]$, the first inequality follows because $\partial/\partial p_L \underline{b_R}(p_L) > 0$ and $\partial/\partial p_L \overline{b_R}(p_L) < 0$, the second inequality follows because $\partial/\partial p_L \underline{b_L}(p_L) < 0$ and $\partial/\partial p_L \overline{b_L}(p_L) > 0$, and the final inequality follows because $x_L > -1$. It follows that if party L prefers setting policy -1 to policy x_L under p_L, then it also prefers setting policy -1 to policy $x_L > -1$ when $p_L' > p_L$.

Now suppose that an equilibrium with $p_L^* > 1/2$ exists. It follows that party R prefers setting policy 1 to setting any policy $x_R < 1$ under p_L^*. By a symmetric argument to the one above, it follows that party R must prefer setting policy 1 to setting any policy x_R under $p_L = 1/2$. Because the parties are symmetric when $p_R = p_L = 1/2$ and they both choose their ideal policies, this also establishes that party L prefers setting policy -1 to setting any policy $x_L > -1$ under $p_L = 1/2$. Therefore, the equilibrium with $p_L^* = 1/2$ must exist, as desired.

(iii) Consider an asymmetric EAPP.

Step 1 is the same as Step 1 of the proof of Proposition 3(iii), with the difference that $w/1-p_L^* \leq x_R^* - x_L^* \leq 2\phi - w/1-p_L^*$ and $B^* = B(\chi^*) = [x_L^* - (\phi - w/p_L^*), x_R^* + (\phi - w/1-p_L^*)]$. If $x_L^* > -1$, then we must have that $x_L^* = \alpha - 1 - 2\phi + w/p_L^*$, and if $x_R^* < 1$, then we must have $x_R^* = 1 - \alpha + 2\phi - w/1-p_L^*$.

Step 2. We show that $p_L^* \geq 1/2$ implies that party R must choose weakly more moderate policies than party L in any equilibrium: i.e., that $x_L^* + 1 \leq 1 - x_R^*$. To see this, note that, from Step 1,

$$\begin{aligned} x_L^* + 1 &= \max\{\alpha - 1 - 2\phi + {}^{w}/_{p_L^*}, -1\} + 1 \\ &= \max\{\alpha - 2\phi + {}^{w}/_{p_L^*}, 0\}. \end{aligned}$$

Similarly, we have that

$$\begin{aligned} 1 - x_R^* &= 1 - \min\{1 - \alpha + 2\phi - {}^{w}/_{1-p_L^*}, 1\} \\ &= \max\{\alpha - 2\phi + {}^{w}/_{1-p_L^*}, 0\}, \end{aligned}$$

so that $p_L^* \geq {}^1/_2$ implies that $x_L^* + 1 \leq 1 - x_R^*$, as desired. In words, this says (using Proposition 2) that a disadvantaged party has higher incentives to choose moderate policies in order to stimulate government production.

Step 3. Finally, we show that if there exists an equilibrium with $p_L^* > {}^1/_2$, then there must also exist an equilibrium for all ${}^1/_2 \leq p_L < p_L^*$. First, from Step 2, given any equilibrium with $p_L^* > {}^1/_2$, we cannot have that $x_L^* = -1$ and $x_R^* = 1$. Therefore, we have that $x_R^* = 1 - \alpha + 2\phi - {}^{w}/_{1-p_L^*}$ and $x_L^* = \max\{\alpha - 1 - 2\phi + {}^{w}/_{p_L^*}, -1\}$. Now consider any ${}^1/_2 < p_L < p_L^*$. Let $x_R = 1 - \alpha + 2\phi - {}^{w}/_{1-p_L}$ and $x_L = \max\{\alpha - 1 - 2\phi + {}^{w}/_{p_L}, -1\}$, which would be the parties' optimal policies if the bureaucracy was partially partisan with party L having winning probability p_L. It follows that

$$\begin{aligned} x_R - x_L &= \min\left\{2(1-\alpha) + 4\phi - \frac{w}{p_L(1-p_L)}, 2 - \alpha + 2\phi - \frac{w}{1-p_L}\right\} \\ &> \min\left\{2(1-\alpha) + 4\phi - \frac{w}{p_L^*(1-p_L^*)}, 2 - \alpha + 2\phi - \frac{w}{1-p_L^*}\right\} \\ &= x_R^* - x_L^* \geq \frac{w}{1-p_L^*} > \frac{w}{1-p_L}. \end{aligned}$$

Similarly, we have that

$$\begin{aligned} 2\phi - \frac{w}{1-p_L} - [x_R - x_L] &= \alpha - 1 + \max\left\{\alpha - 1 - 2\phi + \frac{w}{p_L}, -1\right\} \\ &\geq \alpha - 1 + \max\left\{\alpha - 1 - 2\phi + \frac{w}{p_L^*}, -1\right\} \\ &= 2\phi - \frac{w}{1-p_L} - [x_R^* - x_L^*] \geq 0. \end{aligned}$$

Therefore, probability p_L, policies (x_R, x_L) and bureaucracy $B = B(\chi)$ form an equilibrium with a partially partisan bureaucracy. Notice that, by taking limits and invoking continuity, there is also such an equilibrium with $p_L = {}^1/_2$. ■

Proof of Proposition 5. Since ρ does not affect the optimal bureaucracy or bureaucrats' optimal production choices, Proposition 1 still holds. Optimal policies for party $P = L, R$ are now solutions to $\max_{x\in[-1,1]}(Q^B(x)+\rho)(\alpha-|x-b_P|)$. Proceeding exactly as in the proof of Proposition 2, it can be verified that the proposition holds as written, with the interior optimal policy $\hat{x}$ changed to $\hat{x}_\rho = {}^1\!/_2\,(\alpha - 1 + \underline{b} - \phi - \rho)$. Note that this policy becomes more extreme as ρ goes up, and this in turn expands the parameter ranges for a more extreme optimal policy $x_L(B)$ when ρ is higher.

Consider an equilibrium administration with a fully neutral bureaucracy. Using the previous observations, one can proceed exactly as in the proof of Propositions 3(i) and 4(i) to establish the stated results. In particular, nothing changes when $x_L^* = -x_R^* = -1$. When $x_L^* > -1$, the condition for L not to have an incentive to choose more extreme policies becomes $-w \leq \hat{x}_\rho$, or $\frac{1}{2}(\alpha - 1 + 3w - \rho) \geq \phi$. ■

Proof of Proposition 6. Fix policy lottery χ with $p_L = {}^1\!/_2$. Suppose that there exists an equilibrium wage w^* such that the corresponding bureaucracy is fully partisan. Recall that (9)computes the size of optimal applicant pools, and substituting $p_L = p_R = {}^1\!/_2$ it follows that w^* must solve ${}^4\!/_I\,(\phi - 2w^*) = \overline{B}$, so that $w^* = {}^1\!/_2\left(\phi - {}^{\overline{B}I}\!/_4\right) > 0$, where the inequality follows from $\overline{B} < {}^{2\phi}\!/_I$. Furthermore, for the bureaucracy to be fully partisan, Proposition 1 requires that $\Delta x > 2\,(\phi - w^*)$, which reduces to $\Delta x > \phi + {}^{\overline{B}I}\!/_4$.

Now suppose that there exists an equilibrium wage w^* such that the corresponding bureaucracy is fully neutral. From (9), it follows that w^* must solve ${}^2\!/_{\mathcal{I}}\,[\phi - w^*] = \overline{B}$, so that $w^* = \phi - {}^{\overline{B}I}\!/_2 > 0$, where the inequality follows from $\overline{B} < {}^{2\phi}\!/_I$. Furthermore, for the bureaucracy to be fully neutral, Proposition 1 requires that $\Delta x \leq 2w^*$, which reduces to $\Delta x \leq 2\left[\phi - {}^{\overline{B}I}\!/_2\right]$.

Now suppose that there exists an equilibrium wage w^* such that the corresponding bureaucracy is partially partisan. From (9), it follows that w^* must solve ${}^1\!/_{\mathcal{I}}\,(\Delta x + 2(\phi - 2w^*)) = \overline{B}$, so that $w^* = {}^1\!/_2\left(\phi - {}^{\overline{B}I}\!/_2 + {}^{\Delta x}\!/_2\right) > 0$, where the inequality follows from $\Delta x \geq 0$ and $\overline{B} < {}^{2\phi}\!/_I$. Furthermore, for the bureaucracy to be fully neutral, Proposition 1 requires that $2w^* \leq \Delta x \leq 2(\phi - w^*)$, which reduces to the inequalities $2\left(\phi - {}^{\overline{B}I}\!/_2\right) \leq \Delta x \leq {}^2\!/_3\left(\phi + {}^{\overline{B}I}\!/_2\right)$. However, these inequalities are well-defined only if $2\left(\phi - {}^{\overline{B}I}\!/_2\right) \leq {}^2\!/_3\left(\phi + {}^{\overline{B}I}\!/_2\right)$, which reduces to $\overline{B} \geq {}^{\phi}\!/_I$. ■

Proof of Proposition 7. When bureaucrats have the option to quit, optimal production decisions from (3), which are now interpreted as optimal decisions to remain a bureaucrat, are such that $q_b(x) = 1$ if and only if $|x - b| \leq \phi - (1-\delta)w$. Notice that the expression for $U_b(\chi, LR)$, which is the payoff to a bureaucrat with ideology b of joining the bureaucracy and working for both parties, is the same as in our main model. On the other hand, the payoff to this bureaucrat of joining the bureaucracy to work for party L only is now $U_b(\chi, L) = p_L(\phi - |x_L - b|) + p_R(1-\delta)w$ (and symmetrically for $U_b(\chi, R)$). Given these substitutions, the proof of Proposition 7 is identical to the proof of Proposition 1 for cases (P) and (N). ■

A.2 Optimal policies with disconnected bureaucracies

Consider a bureaucracy that is ideologically disconnected, i.e., such that $B = [\underline{b}_L, \overline{b}_L] \cup [\underline{b}_R, \overline{b}_R]$, where $\overline{b}_L < \underline{b}_R$. Analogously to the case of an ideologically connected bureaucracy, we assume that the leftmost bureaucrat is willing to work for policy -1 and the rightmost bureaucrat is willing to work for policy 1: here, this implies $\underline{b}_L > -1-\phi$ and $\overline{b}_R < 1+\phi$. We can describe optimal policies for party L in this case through our results from Proposition 2. There are several cases, depending on (i) the relative size of the left and right sections of the bureaucracy ($[\underline{b}_L, \overline{b}_L]$ vs. $[\underline{b}_R, \overline{b}_R]$), and (ii) the distance between them.

Proposition 8 *Suppose that the bureaucracy is ideologically disconnected, and let* $\hat{y} = 1/2\left[\rho + \underline{b}_R - \phi - [\overline{b}_L - \underline{b}_L]\right]$. *Let* x_L^B *denote L's optimal policy if only bureaucrats from the left section of the bureaucracy work,* z_L^B *if only bureaucrats from the right section work, and* y_L^B *if bureaucrats from both sections work. Policy* x_L^B *is obtained from Proposition 2 by substituting* $\overline{b} = \overline{b}_L$ *and* $\underline{b} = \underline{b}_L$. *Policy* z_L^B *is obtained from Proposition 2 by substituting* $\overline{b} = \overline{b}_R$ *and* $\underline{b} = \underline{b}_R$.

- *Suppose the left section of the bureaucracy is larger than the right section* ($\overline{b}_L - \underline{b}_L \geq \overline{b}_R - \underline{b}_R$).
  - *If the distance between the two sections of the bureaucracy is small* ($\overline{b}_R - \underline{b}_L \leq 2\phi$), *then L's optimal policy is either* x_L^B, *or* y_L^B *which is obtained from (6) by substituting* $\overline{b} = \overline{b}_R$, $\underline{b} = \underline{b_L}$ *and* $\hat{x} = \hat{y}$.
  - *If the distance between the two sections of the bureaucracy is intermediate* ($\underline{b}_R - \underline{b}_L \leq 2\phi < \overline{b}_R - \underline{b}_L$), *then L's optimal policy is either* x_L^B, *or* y_L^B *which is obtained from (7) by substituting* $\overline{b} = \overline{b}_R$, $\underline{b} = \underline{b_L}$ *and* $\hat{x} = \hat{y}$.
  - *If the distance between the two sections of the bureaucracy is large* ($\underline{b}_R - \underline{b}_L \geq 2\phi$), *then L's optimal policy is* x_L^B.
- *Suppose the left section of the bureaucracy is smaller than the right section* ($\overline{b}_L - \underline{b}_L < \overline{b}_R - \underline{b}_R$), *then L's optimal policy is either* x_L^B, z_L^B, *or* y_L^B *which is obtained from*

Proposition 2 by substituting $\bar{b} = \bar{b}_R$ and $\underline{b} = \underline{b}_R$.[39]

Proof of Proposition 8. There are three cases for an optimal policy $x_L(B)$: (*i*) it could be that only bureaucrats in $[\underline{b}_L, \bar{b}_L]$ work for party L, which occurs if $x_L(B) + \phi < \underline{b}_R$; (*ii*) it could be that bureaucrats in both $[\underline{b}_L, \bar{b}_L]$ and $[\underline{b}_R, \bar{b}_R]$ work for party L, which occurs if $x_L(B) + \phi \geq \underline{b}_R$ and $x_L(B) - \phi \geq \bar{b}_L$; and finally (*iii*) it could be that only bureaucrats in $[\underline{b}_R, \bar{b}_R]$ work for party L, which occurs if $x_L(B) - \phi > \bar{b}_L$. In all three cases, strict concavity of the payoff of party L ensures that any such policy is unique.

If a policy x_L^B from case (*i*) is optimal, then this policy must correspond to the policy from Proposition 2 with the substitutions $\underline{b} = \underline{b}_L$ and $\bar{b} = \bar{b}_L$. Similarly, if a policy z_L^B from case (*iii*) is optimal, then this policy must correspond to the policy from Proposition 2 with the substitutions $\bar{b} = \bar{b}_R$ and $\underline{b} = \underline{b}_R$. However, note that policy z_L^B can never be optimal if there are at least as many left-wing as right-wing bureaucrats, i.e., if $\bar{b}_L - \underline{b}_L \geq \bar{b}_R - \underline{b}_R$. To see this, recall that, by assumption, $-1 < \underline{b}_L + \phi$, so that $Q^B(\underline{b}_L + \phi) = \min\{\bar{b}_L - \underline{b}_L, 2\phi\}$. Also, it must be the case that $\underline{b}_L + \phi < z_L^B$. Finally, because $Q^B(z_L^B) \leq \min\{\bar{b}_R - \underline{b}_R, 2\phi\} \leq Q^B(\underline{b}_L + \phi)$, we obtain a contradiction to the optimality of z_L^B, as desired.

Now suppose that a policy y_L^B from case (*ii*) is optimal. First, notice that if $\underline{b}_R - \underline{b}_L > 2\phi$, which can be rewritten as $\underline{b}_L + \phi \leq \underline{b}_R - \phi$, party L cannot choose a policy which induces right-wing bureaucrats to work without inducing some left-wing bureaucrats to shirk. Because $Q^B(x_L) = Q^B(\underline{b} + \phi)$ for any policy $\underline{b}_L + \phi < x_L \leq \bar{b}_L + \phi$, no such policy x_L can be optimal. Therefore, assume that $\underline{b}_R - \underline{b}_L \leq 2\phi$ in the following. Now, if $\bar{b}_R - \underline{b}_L \leq 2\phi$, then from arguments mirroring those of Proposition 2, any such solution must be such that $\max\{\bar{b}_R - \phi, -1\} \leq y_L^B \leq \max\{\bar{b}_R - \phi, -1\}$. Similarly, if $\bar{b}_R - \underline{b}_L > 2\phi$, any such solution must be such that $\max\{\underline{b}_R - \phi, -1\} \leq y_L^B \leq \underline{b}_L + \phi$. Correspondingly, if $\bar{b}_R - \underline{b}_L \leq 2\phi$, then y_L^B is a solution to

$$\max_{x_L \in [\max\{\underline{b}_R - \phi, -1\}, \max\{\bar{b}_R - \phi, -1\}]} [x_L + \phi - \underline{b}_R + [\bar{b}_L - \underline{b}_L]][\alpha - 1 - x_L],$$

whereas if $\bar{b}_R - \underline{b}_L > 2\phi$, then y_L^B is a solution to

$$\max_{x_L \in [\max\{\underline{b}_R - \phi, -1\}, \underline{b}_L + \phi]} [x_L + \phi - \underline{b}_R + [\bar{b}_L - \underline{b}_L]][\alpha - 1 - x_L].$$

These problems share the same objective function, which is strictly concave and has an unconstrained maximizer at $\hat{y} = 1/2 \left[\alpha - 1 + \underline{b}_R - \phi - [\bar{b}_L - \underline{b}_L]\right]$. From this the expressions

[39] Notice that Proposition 8 is restricted to describing the three possible candidates for optimal policies (x_L^B, y_L^B and z_L^B, respectively). Which of these policies is actually optimal would need to be verified through computing the payoffs of party L.

for optimal policies from (6)and (7) follow, after the appropriate substitutions. ■

When the bureaucracy is ideologically disconnected, party L faces the choice of which section of the bureaucracy to try to motivate with its policy choice. Party L can choose to ignore right-wing bureaucrats, and in this case we can characterize its optimal policy (x_L^B) by applying the result of Proposition 2 to bureaucracy $[\underline{b}_L, \overline{b}_L]$. Similarly, party L could also choose to ignore left-wing bureaucrats. In this case, the optimal policy (z_L^B) is obtained by applying the result of Proposition 2 to bureaucracy $[\underline{b}_R, \overline{b}_R]$. How could party L have incentives to ignore left-wing bureaucrats? This can happen because if there are more right-wing bureaucrats (i.e., if $\overline{b}_L - \underline{b}_L < \overline{b}_R - \underline{b}_R$), then choosing right-wing policies can yield levels of government production that left-wing policies cannot. No such policy can be optimal if instead there are more left-wing bureaucrats, because any level of government production achieved by right-wing bureaucrats only could be mimicked by a suitably chosen left-wing policy. From Section 4, this means that only a politically disadvantaged party, which draws fewer partisan bureaucrats, can face incentives to ignore its section of the bureaucracy.[40]

Proposition 8 also allows for the possibility that party L's policy choice induces bureaucrats from both sections of the bureaucracy to work. This can happen when the gap between the two sections of the bureaucracy is small enough.[41] In this case, we can characterize this optimal policy (y_L^B) by applying the result of Proposition 2 to bureaucracy $[\underline{b}_L, \overline{b}_R]$, after having modified government production to account for the fact that there are no bureaucrats with ideology in $(\overline{b}_L, \underline{b}_R)$. To see how this affects optimal policies, suppose that $\overline{b}_R - \underline{b}_L \leq 2\phi$. Ignoring the gap between the two sections of the bureaucracy, this case is analogous to a small ideologically connected bureaucracy from Proposition 2. Suppose that $\max\{\underline{b}_L - \phi, -1\} < \hat{x} < \max\{\overline{b}_R - \phi, -1\}$ so that policy $\hat{x}$ would be optimal if the bureaucracy was ideologically connected. With an ideologically disconnected bureaucracy, party L's objective has a unique global maximizer, which is $\hat{y}$. Comparing the expressions for $\hat{x}$ and $\hat{y}$ shows that $\hat{y} > \hat{x}$: conditional on wanting to induce bureaucrats from both sections of the bureaucracy to work, disconnected bureaucracies provide incentives for moderation. Intuitively, if the bureaucracy is connected, then party L can increase production by inducing moderate right-wing bureaucrats to exert effort. However, if the bureaucracy is disconnected, then increasing production requires additional policy moderation.

[40] Note that because all bureaucrats in the section of the bureaucracy being ignored by both parties would strictly prefer to join the private sector, this eventuality is ruled out by equilibrium administrations.

[41] If the gap between the two sections of the bureaucracy is large enough ($\underline{b}_R - \underline{b}_L \geq 2\phi$), then party L cannot induce right-wing bureaucrats to work without sacrificing the effort of leftmost bureaucrats. But then no policy garnering the support of both sections of the bureaucracy can be optimal, because choosing a more left-wing policy would keep production constant but increase party L's ideological payoff.

The following corollary verifies this last observation and establishes other comparative statics.

Corollary 6 *Suppose that the bureaucracy is ideologically disconnected and that party L finds it optimal to induce bureaucrats from both sections of the bureaucracy to work. Then* x_L^* *is increasing in* ρ*,* $\underline{b}_R - \overline{b}_L$ *and* $\overline{b}_R$*, and decreasing in* ϕ *and* $\overline{b}_L - \underline{b}_L$*.*

Proof of Corollary 6. Immediate from the expressions in Proposition 8. ■

These comparative statics results are analogous to those of Corollary 4, with two additional insights. First, party L's policy is decreasing in the size of its own section of the bureaucracy. A party with a strong position in the bureaucracy substitutes away from catering to bureaucrats from the opposite section. In Section 4, we saw that a party can acquire a strong position in the bureaucracy when it is electorally stronger. Together with Corollary 6, this suggests a novel mechanism through which a decrease in electoral competition can reduce policy convergence. In contrast to standard models where the incentive for more extreme policies comes from the increase in voter support, here this is the result of the large set of bureaucrats induced to work for the favored party. Thus, bureaucrats' behavior can reinforce the polarizing effect of decreasing electoral competition.

The second new insight of Corollary 6 is that, as described above, increased polarization in the bureaucracy can favor policy moderation by parties. This is a countervailing force compared to Section 4, where we showed that party polarization favors polarization in the bureaucracy (making a disconnected bureaucracy more likely).