Civil Service and Patronage in Bureaucracies[*]

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Abstract

We develop a model of government personnel policy with electoral competition in an effort to understand when high quality bureaucracies will be created and sustained. In the model, two parties compete for office over an infinite horizon, and politicians in office choose a mix between civil servants (who produce public goods in a good bureaucracy) and patronage appointees (who produce private goods and can influence re-election). Civil servants make future good bureaucracies more likely, creating a collective action problem where each party would prefer not to pay the initial cost of investing in civil service. The analysis suggests that investment in civil service by the incumbent party is affected by the characteristics of the opposition, and by party system polarization. The electoral context is also important, and the model calls into question previous arguments that have linked electoral vulnerability to the creation of civil service. Finally, numeric results on long-term bureaucratic quality suggest that the factors affecting incentives to invest in civil service may differ in competitive democracies from factors that sustain civil service in the long-run.

1   Introduction

Good governance requires good bureaucracy, where civil servants do the day-to-day work delivering the public goods that government can best provide. But in democracies, since politicians must worry about re-election and and the policy consequences of losing, they often lack incentives to create good bureaucracy. They may prefer patronage-based system with incentives for bureaucrats to work on behalf of incumbents, even undertaking activities that help the incumbents win elections. If politicians choose to emphasize patronage, they undermine professionalism in the civil service and make it more difficult to achieve good governance.

This paper develops a model to study this trade-off. Its central purpose is to understand the electoral, ideological, and social factors that affect incentives to create good bureaucracies as opposed to bad ones that serve the private interests of politicians. At the heart of the model is the premise that bureaucracies simultaneously serve both these purposes. On one hand, bureaucracies with professional civil servants can produce public goods like defense, property rights enforcement, contract enforcement, education, internal security and public infrastructure that benefit the vast majority of citizens, regardless of who controls public office (e.g., Rauch 1995, Rauch and Evans 2000, Krause, Lewis and Douglas 2006, Lewis 2008, Gerber and Gibson 2009). Professional civil servants are largely insulated from political pressure, with policies in place – and respected – that ensure job security (so that who wins an election does not determine which bureaucrats get to keep their jobs) and merit-based hiring and promotion (so that individuals receive opportunity and pay commensurate with ability).

On the other hand, bureaucracies with patronage-based structures produce private goods that specifically benefit the party in power. Such private goods can include policies that benefit the party elite, policies that benefit party supporters, and campaign activities that help

the party get re-elected (e.g., Pollock 1937, Reid and Kurth 1989, Folke, Hirano and Snyder 2011). Election winners can hire and fire patronage appointees at will, and patronage jobs are at once rewards for helping a party win an election and incentives to help that party win re-election. Patronage-based bureaucrats typically lack the skills, experience and especially the incentives to produce public goods. Even in advanced countries, most bureaucracies are a mix of civil servants and patronage, and our goal is to understand the mix, and in particular to understand the circumstances under which democratic competition produces incentives for politicians to create bureaucracies with professional civil servants who provide good governance.

Several features of bureaucracy and political competition are central to our model. First, investing in civil service reform does not automatically produce good governance. In the US in the 19th century, for example, federal civil service reform began with the Pendelton Act in 1883, which required merit-based selection of civil servants. But civil servants were not protected from dismissal until the Lloyd-La Follette Act was adopted in 1912, and were not restricted from political activities until the Hatch Act was adopted in 1939. Not only can the road to good governance in the civil service be a long one, civil service reforms adopted by one party can often easily be reversed by another party, as occurred in efforts by state governments in the US to adopt civil service bureaucracies. And in Latin America, although many countries adopted civil service reforms in the last 30 years, few governments actually respected the spirit of the laws on the books, and instead adopting a range of strategies to circumvent the intent of these laws (Grindle 2012).

This observation has two implications for our modeling strategy. On one hand, we assume that the factors that contribute to the existence of high quality bureaucracies – e.g., insulation from political pressure, merit based-hiring and promotion, and competitive salaries – take time to take effect and produce public goods. Thus, investments in the civil service must be based on some anticipated future benefit. Low-quality, patronage-based bureau-

cracies do not have this feature. Indeed, they are valuable precisely because the incumbent expects a short-term benefit of putting "its own people" in public positions. On the other hand, we consider a dynamic model, where incumbent politicians, in making decisions about bureaucratic structure, must anticipate not only how choices affect their electoral prospects, but also how the opposition will approach the issue of bureaucratic structure if it wins the election.

Second, when civil service reforms result in a high quality bureaucracy, civil servants are protected from political pressure and incumbents cannot exploit them for electoral gain. Voters thus know that civil servants will produce public goods no matter which party is in control, decreasing the salience of bureaucracy to vote choice. Civil service protections also prevent bureaucrats from knocking on doors at election time, or from engaging in other activities for the benefit of incumbents. By contrast, under a low quality bureaucracy, parties can exploit patronage appointees for electoral gain. Thus, parties care not simply about personnel structure in the bureaucracy because it affects policy outcomes, but also because it affects electoral politics through the election-relevant activities that patronage appointees can offer. The model therefore incorporates the differential electoral implications of patronage and civil service bureaucracies.

Third, parties differ in their induced preferences for high quality bureaucracy. These induced preferences may be linked to policy. A class-based party, for example, may value public goods like tax enforcement because such enforcement facilitates redistribution. The induced preferences might also be linked to electoral considerations. A class-based party, for example, may have an electoral advantage, and thus have weaker incentives to exploit the electoral benefits of patronage. An ethnic-based party, by contrast, may rely on patronage-based appointments to encourage ethnic-based political competition. And parties in the same political system may differ in their ability to implement good governance even if civil service structures are in place. This may be a particular issue following some transitions

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from authoritarian to democratic government, especially if there has been a history of ethnic or racial politics. Following the second Iraq war, for example, the Shia-dominated party that won the first election faced a bureaucracy loyal to the Sunni-dominated government under Saddam Hussein, and most individuals with experience running the state were Sunnis. Thus, even if there had been formal civil service procedures in place, it would have been more challenging for the inexperienced Shia party to produce public goods, which in turn could have increased that party's emphasis on patronage. A similar situation likely existed in South Africa following the fall of apartheid, and in some colonies of Britain following independence. The model therefore allows party preferences for good bureaucracy to differ, and allows the costs of using good bureaucracy to produce public goods to vary across parties.

These observations undergird our model of bureaucratic structure. In the model, two parties compete for power over an infinite horizon. Each party is led by a candidate who can serve in government for up to two periods. The winning candidate chooses the mix of civil servants and patronage appointees. Civil servants contribute to the production of public goods if the bureaucracy is high quality, and also increase the likelihood of a high quality bureaucracy in the subsequent period. Patronage appointments produce private goods in the current period, and also can improve the electoral prospects of the incumbent party when the bureaucracy is low quality. Parties can vary in their policy extremism – their preference for outcomes that benefit only the party in power – and thus party systems can vary in their levels of polarization. In addition, parties can differ in their costs of implementing good government and in their (exogenous) level of electoral security.

We derive a unique Markov perfect equilibrium of the game, which allows us to address three types of questions about bureaucratic structure. First, following any given election, what affects the incentives of the winning candidate to invest in the civil service rather than patronage? Second, over the long-run, under what conditions should we expect civil service and good governance to prevail? And third, how do incentives with respect to bureaucratic

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structure influence electoral competition?

To see the intuition of the equilibrium, consider the situation of a newly elected politician who inherits a low quality bureaucracy. The incentive to invest in civil servants is affected not only by the politician's preferences in the intuitive manner, but also by characteristics of the political opponent that affect the opponent's incentives to invest in good government. This is true for two reasons. First, since investments in civil service take time to bear fruit, civil servants will only have an effect on public goods production in the subsequent period. Second, if the politician loses after investing in civil service, the public goods that will be produced in the subsequent period will increase as the opposition has greater incentives to produce public goods. Thus, a politician who wins an election will invest more in civil service if the opposition has non-extreme preferences (and thus puts a high value on public goods) and low costs of investing in civil service.

This observation highlights a considerable challenge that exists with respect to creating a high quality bureaucracy where none exists. There is a collective action problem of sorts that stems from the fact that the party that initially invests in good government will bear a cost (forgoing the electoral benefits of patronage while reaping no public goods) that the other party does not. Thus, each party prefers that the other party make the initial investment. And to overcome this problem, it is not enough for the incumbent party to have the characteristics that foster good governance. If there are competitive elections and good governance can be undone, it is also crucial that the opposition also has the characteristics that favor good governance.

The salience of the opposition also affects how electoral competition can influence good governance in our model. In the preceding discussion, it influences the decision to hire civil servants through the importance of the opposition's characteristics to the incumbent politician. When the incumbent is secure electorally, the preferences and capacity of the opposition have little effect on decision-making because the incumbent puts little weight

on losing. By contrast, when the incumbent is electorally vulnerable, the incumbent puts greater weight on the opposition's preference and capacity.

Electoral competition also has a direct effect on civil service, one that differs from the effect typically emphasized in the literature. A common argument i is that civil service protections are a strategy incumbents faced with electoral loss use to "lock in" preferred policies (Geddes 1994, de Figueiredo 2002, Ruhil and Camões 2003, Lewis 2008, Besley and Persson 2011, Ting, Folke, Hirano, and Snyder 2013). In the model here, investing in civil service does not allow a party to lock-in its preferred policy, so any relationship between electoral insecurity and civil service investment does not exist for this reason. Instead, the model suggests that the direction of the relationship between electoral vulnerability and civil service hires depends on the preferences and capacity of the opposition party. When the opposition has extreme preferences or low capacity for public goods, the incumbent has the least to gain from investing in civil service and the most to gain from hiring patronage appointees who can help win re-election. In this situation, the model predicts that civil service hires should decrease with electoral vulnerability. When the opposition has less extreme preferences and relatively low costs of investing in civil service, the incumbent has the most to gain from investing in the civil service and the least to lose if the challenger wins, creating a positive relationship between electoral vulnerability and civil service investment. Our result therefore helps to reconcile the lock in story with a number of accounts that predict the opposite (Besley and Persson 2010, Acemoglu, Ticchi, and Vindigni 2011).

We can exploit the Markov structure of the equilibrium to arrive at numerical results on how the incentives to invest in civil service following an election affect the long-run probabilities of observing a high quality bureaucracy. This analysis suggests that electoral competition – where no party has a clear exogenous electoral advantage – will encourage civil service only under quite limited conditions. In particular, there needs to be no differential costs of civil service across parties, and party system polarization must be low. Analysis

of long-run behavior also suggests that when party system polarization is high, incentives related to bureaucratic design help entrench the electoral security of the favored party, particularly when the favored party has *higher* costs of civil service. When polarization is low, the incentives related to bureaucratic design have a much weaker relationship with electoral outcomes. Thus, the model suggests that in countries where there is high polarization across parties or groups and differential costs of good government, there are strong incentives for patronage-based systems, and these incentives tend to entrench the electoral prospects of the favored party.

The paper proceeds as follows. Section 2 describes the model and section 3 describes the equilibrium. Sections 4 and 5 analyzes the comparative static results, with section 4 focusing on incentives politicians have to invest in civil service and section 5 focusing on the numerical results for long-run investment in civil service. Section 6 concludes.

1.1   Related Literature

Our model joins an emerging body of theoretical work on the relationship between elections and bureaucrats. The distinction between the production of political appointees and civil servants resembles that of Rauch's (1995) study of U.S. municipal governments. More recent models that incorporate electoral concerns include Ujhelyi (2014) and Nath (2015). All of these papers focus on the incentives of bureaucrats, while we focus on the long-run behavior of politicians and leave bureaucratic behavior non-strategic. One exception that explores politician's personnel policy choices over an infinite horizon is Ting, Folke, Hirano, and Snyder (2013), who explore a simpler environment with non-reversible civil service reforms.

A closely related and now extensive literature explores the origins of civil service reform (Knott and Miller 1987, Johnson and Libecap 1994, Horn 1995, Gailmard and Patty 2007, Hollyer 2011). Elections typically play a prominent role in these accounts, but some of

the non-electoral factors emphasized include interest group politics, economic development, expertise, and the costs of patronage systems.

Our emphasis on the political determinants of public goods provision also relates to a growing scholarly interest in "state capacity" (Huber and McCarty 2004, Ting 2011). One particular view of state capacity that is related to the one in our model is the ability to collect taxes (Besley and Persson 2010). The theoretical approach most closely related to ours is Acemoglu, Ticchi, and Vindigni (2011), who develop a theory of redistribution and state efficiency with an infinite horizon model that features electoral competition and endogenous taxes, pork, bureaucratic quality, and bureaucratic size. Their paper shares our assumptions about the constraints of bureaucratic quality on policy and the effect of personnel choices on future quality, but it focuses on emerging democracies and how the rich can use inefficient personnel policy to affect redistribution, particularly when inequality is high.

We view our model as a potential basis for theoretically informed empirical research on government personnel systems and the quality of government. Numerous authors have documented the effects of public sector employment on electoral outcomes in the U.S. (e.g., Folke, Hirano and Snyder (2011) and elsewhere (e.g., Roett 1999, Golden 2003). In our view, a logical next step would be to address directly the relationships between personnel policies and measures of the quality of governance (Knack and Keefer 1995, La Porta, Lopez-de-Silanes, Shleifer, and Vishny 1999, Rauch and Evans 2000).

2   Model

The model features partisan elections and personnel decisions over an infinite horizon. There are two political parties, A and B, each of which produce a sequence of identical candidates, with one drawn each period. A newly elected candidate may hold office for up to two periods, and cares about retaining office and policies over both periods of political life regardless of

whether she is re-elected. There is no discounting. If a sitting incumbent is in her first term, she becomes her party's candidate in the subsequent election. Otherwise, the party draws a new candidate. The winning politician determines the distribution of government personnel. This mix affects the quality of the bureaucracy, which in turn influences the production of public and private goods and the probability that the incumbent can be re-elected (if she is eligible). The goal is to understand the incentives of politicians to make civil service appointments and their consequences for policies and elections.

The bureaucracy is composed of a unit measure of non-strategic bureaucrats, which can be of two types: *civil servants* can produce public goods that benefit both parties, while *patronage* appointees can produce private goods that benefit only the incumbent party. Patronage appointees can also directly enhance the incumbent party's chance of re-election (see below). In each period, t, the politician from the winning party can invest in civil service appointments or in a patronage appointments, with $c_i^t \in [0, 1]$ denoting the investment in civil service by party i's politician and $1 - c_i^t$ denoting the investment in patronage.

The composition of the bureaucracy affects its quality, denoted by $q^t \in \{0, 1\}$. A *bad* bureaucracy ($q^t = 0$) can produce private but not public goods. A *good* bureaucracy ($q^t = 1$) has the combination of professionalism, talent and insulation from political pressure necessary to produce public goods. Importantly, incumbents cannot instantly establish good bureaucracies; civil service rules and procedures take time to develop and take hold, and the decision by politicians to establish such bureaucracies is a clear investment in the future. Thus, bureaucratic quality is determined by actions in the previous period. If party i was in power in period $t - 1$, then the bureaucracy is good in period t with probability $\Pr\{q^t = 1\} = c_i^{t-1}$ and bad with probability $1 - c_i^{t-1}$. Thus, the probability of a good bureaucracy in period t increases as the politician elected in the previous period invests more in civil servants, and is also independent of quality in preceding periods. A politician can obviously guarantee a good (respectively, bad) bureaucracy in the next period by appointing

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all (respectively, no) civil servants.

Public goods production under a good bureaucracy in period t with a party i incumbent is given by c_i^t. Private goods production does not depend on bureaucratic quality, and is given by $1 - c_i^t$. Politicians can therefore exploit a good bureaucracy by investing in civil service, and in so doing, they increase the probability of a good bureaucracy in the future. Incentives to produce public and private goods can vary across parties. Let $w_i \in [0, 1]$ denote party i's marginal valuation from public goods, and let $1 - w_i$ be its marginal valuation on its own private goods. Party i's valuation of party $j \neq i$'s private goods is 0. Thus, party i's utility from civil servants in period t is given by $q^t w_i c^t$ (where c^t is the level of civil servants by *whichever* party is in power). The parameter w_i is an inverse measure of party party's policy extremism. As w_i increases, party i's policy interests become more aligned with that of w_j, and as w_i decreases, party i values different policies than party j. Thus, as w_A and w_B both decrease, party system polarization increases.

Politicians face two kinds of costs. First, each incumbent politician incurs a fixed cost $k \in [0, 1]$ for losing her re-election bid.[1] This assumption simply assures that no politician can be better off from losing than from winning. Second, investing in both types of bureaucracy is costly. The model captures two aspects of these costs. The first is the relative cost of civil servants as opposed to patronage appointees. The second is the relative costs across the two parties. We therefore assume that the costs to party i of investing c_i^t in the civil service is $\beta_i(c_i^t)^2$ and the cost of the remaining $1 - c_i^t$ investment in patronage appointees is $\alpha_i(1 - c_i^t)^2$, where $\alpha_i = (2 - \beta_i)$ and $\beta_i \in (\frac{1}{2}, 2)$.

A party i politician's utility from bureaucratic appointments in period t can therefore be

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[1]We bound k so that its magnitude can be no greater than the maximal policy benefit in a given period.

written as follows:

$$u_i(c^t, q^t) = \begin{cases} q^t w_i c_i^t + (1 - w_i)(1 - c_i^t) - \beta_i(c_i^t)^2 - \alpha_i(1 - c_i^t)^2 & \text{if party } i \text{ is in power} \\ q^t w_i c_j^t & \text{if party } j \neq i \text{ is in power.} \end{cases}$$

(1)

Bureaucratic appointments can influence but do not determine elections outcomes. Each party i has a base re-election probability of $\gamma_i \in (0, 1)$, where $\gamma_A = 1 - \gamma_B$. When the bureaucracy is good, patronage appointments do not affect election prospects because the civil service system ensures that patronage appointees cannot undertake activities, like campaiging, that benefit the electoral prospects of the party in power. When the bureaucracy is bad, patronage appointees improve the incumbent party's election prospects. Thus, if i is an incumbent eligible for re-election at time t, her re-election probability is given by:

$$\rho_i(c_i^t, q^t) = \gamma_i + (1 - q^t)m_i(1 - c_i^t),$$

where $m_i \in (0, 1 - \gamma_i)$ measures the effectiveness of patronage appointees at delivering votes. The opposition party thus wins the election with probability $1 - \rho_i(q^t)$. In what follows, we assume that $m = m_A = m_B$, though this assumption is not necessary for the results.

The model captures a number of incentives in the choice of a personnel system. Professional civil servants can provide public goods when the bureaucracy is good, and also improve the chances that a good bureaucracy will be sustained in the future. First term incumbents may then invest in civil servants not only to produce public goods if they are re-elected, but also to benefit from public goods if they lose their re-election bids. By contrast, patronage appointees produce private goods for the incumbent, and can be used to maintain power when the bureaucracy is bad. A newly-elected politician therefore faces different trade-offs depending on inherited bureaucratic quality, but must always consider the future ability to produce public goods.

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We derive a unique Markov Perfect equilibrium, and therefore dispense with notation for time periods in what follows. The state variables in period t are given by the triple (i, n, q), where $i \in \{A, B\}$ is the party in power, $n \in \{1, 2\}$ is the term of the current incumbent, and $q \in \{0, 1\}$ is bureaucratic quality. Denoting the set of states by $\mathcal{S}$, each party's strategy is then a mapping $\mathcal{S} \to [0, 1]$ from the state space to a level of civil service appointments. For convenience, we denote the civil service appointments by a party i politician in her n-th term of office under bureaucratic quality q by c_i^{nq}, so for example the civil service investment by a Party A politician who inherits a bad bureaucracy in her first term is c_A^{10}.

Using this notation, the expected utility of a newly-elected (first-term) party i incumbent as a function of her level of civil service appointments c and bureaucratic quality q can be written as follows:

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\begin{aligned}
EU_i(c|s) \;=\; & u_i(c, q) + \rho_i(c, q) \left[cu_i(c_i^{21}, 1) + (1 - c)u_i(c_i^{20}, 0) \right] + \\
& (1 - \rho_i(c, q)) \left[cu_i(c_j^{11}, 1) + (1 - c)u_i(c_j^{10}, 0) - k \right].
\end{aligned}
\tag{2}
$$

The first term is i's utility in the current period (as described in equation (1)) from the public and private goods that are produced as a function of c, as well as the cost of her personnel appointments. Recall that if $q = 0$, public goods production will be zero and patronage appointments will increase i's re-election probability through $\rho_i(\cdot)$. If $q = 1$ then c units of public goods will be produced and there will be no effect of personnel decisions on re-election. The second term in equation (2) is i's probability of re-election $\rho_i(\cdot)$ and her payoff conditional upon re-election, and the third term analogously expresses the case where party $j \neq i$ wins the election and sets future personnel policy. In both cases, bureaucracy quality is good in the subsequent period with probability c. Thus the choice of c affects i's expected utility through its effect on bureaucratic production in period t, through its effect on re-election, and through its effect on the quality of bureaucracy in the subsequent period

(which in turn affects i's personnel decision if i is re-elected and j's personnel decision if j defeats i).

3   Equilibrium

We will assume that the newly elected incumbent is from party i throughout. We begin by solving for c_i^{2q}, or the personnel choices of second term politicians. A second term politician simply chooses the level of civil service that maximizes her utility according to (1). The stage utility function is concave for all $c \in [0, 1]$ with a second derivative of -4, and thus i's optimal level of civil service is:

$$c_i^{2q} = \frac{3 + w_i(1 + q) - 2\beta_i}{4}. \tag{3}$$

This expression is obviously interior for all q.

When choosing the optimal level of civil service in the first period, the politician can anticipate that she will adopt c_i^{2q} if re-elected. She further needs to anticipate how her choice will not only affect her probability of re-election, but also how j will choose if j wins the election. To this end, it is helpful to consider the possible payoffs a newly elected politician could face in the subsequent period. There are four cases:

1. Win re-election and inherit a bad bureaucracy;

2. Win re-election and inherit a good bureaucracy;

3. Lose re-election and the other party inherits a bad bureaucracy;

4. Lose re-election and the other party inherits a good bureaucracy.

In a Markov perfect equilibrium, the payoff from each of these cases can be seen as a component of equation (2). The first case yields the newly elected party i politician $u_i(c_i^{20}, 0)$,

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and the second case, $u_i(c_i^{21}, 1)$. Substituting (3) into the stage payoff (1) produces:

$$u_i(c_i^{20}, 0) = \frac{w_i^2 + (1 - 2\beta_i)^2 - 2w_i(1 + 2\beta_i)}{8} \tag{4}$$

$$u_i(c_i^{21}, 1) = \frac{(1 + 2w_i - \beta_i)^2}{8}. \tag{5}$$

In the third case, the party i incumbent anticipates no public goods and also no party i private goods. Thus, we have:

$$u_i(c_j^{10}, 0) = 0. \tag{6}$$

The solution for the fourth case is less straightforward, as it involves the opponent j's civil service investment, which itself depends on i anticipated civil service investment. However, substituting expressions (4)-(6) into the incumbent's objective (2) greatly simplifies the problem. Our first result characterizes the unique equilibrium level of civil servants chosen by new politicians. The proof also establishes that the concavity of the objective function.[2]

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[2] All proofs are found in the Appendix.

Proposition 1 Civil Servants for First Term Politicians. *In the unique Markov perfect equilibrium where an interior solution exists,*

$$c_i^{10} = \frac{\begin{array}{c} -24 - 8w_i + 16\beta_i + m(1 + 8k - 8w_i - 2w_i^2 - 4\beta_i + 4\beta_i^2) - \\ 8\Omega_i(1 - \gamma_i + m) - 6w_i\gamma_i - 3w_i^2\gamma_i + 4w_i\beta_i\gamma_i \end{array}}{2m(8\Omega_i + w_i(4\beta_i - 3w_i - 6)) - 32}, \qquad (7)$$

$$c_i^{11} = \frac{\begin{array}{c} 32 - 64\beta_i + 12w_i^2\gamma_i + w_i[2w_j(11 - 2\beta_j(1 - \gamma_i) - \gamma_i)(1 - \gamma_i) + \\ 3w_j^2(1 - \gamma_i)^2 + 8(11 - 2\beta_j(1 - \gamma_i) - 2\beta_i\gamma_i)] \end{array}}{128 - 8w_iw_j(1 - \gamma_i)\gamma_i}, \qquad (8)$$

where

$$\Omega_i = \frac{\begin{array}{c} w_i(96 - 64\beta_i - 12w_j^2(\gamma_i - 1) + w_j(88 + 16\beta_j(\gamma_i - 1) - \\ 16\beta_i\gamma_i + 3w_i^2\gamma_i^2 + 2w_i\gamma_i(8 + 3\gamma_i - 2\beta_i\gamma_i))) \end{array}}{8(16 + w_iw_j(\gamma_i - 1)\gamma_i)}.$$

Along with expression (3), Proposition 1 characterizes the unique equilibrium civil service investment strategies.

4   Investing in good government.

We begin by considering factors that influence the creation of good bureaucracy where none exists. Assume that Party A's candidate has won the election and must decide how much to invest in civil service (i.e., c_A^{10}) and patronage, and that Party B is in opposition, and will thus make the same sort of investment decision if A loses. We consider three factors that affect A's investment in civil service: characteristics of the opposition, party system polarization, and the electoral environment.

4.1   Characteristics of the opposition.

When A inherits a bad bureaucracy, the value of investing in civil service lies strictly in the future because civil servants cannot produce public goods in the current period. If A wins

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re-election, she will adopt her optimal level of civil service according to eq. (3), which is independent of any characteristic of B. But if A loses re-election, she receives a payoff in the next period only if B produces public goods, which can only occur if A's investment in civil service is sufficient to produce a good bureaucracy. A's payoff from having invested in civil service is therefore affected by characteristics of B that affect B's incentives to invest in civil service if B inherits a good bureaucracy.

One such characteristic is B's cost of investing in civil servants as opposed to patronage. Even with the best of Weberian democracies, it takes some skills and experience on the part of politicians to maximize the output from the bureaucracy, and not all parties will have the same level of skills and experience. After a democratic transition, for example, there may be an opposition party that has little or no ministerial experience. And if the opposition represents groups that have been subject to discrimination under an authoritarian regime, there may even be a relatively small pool of talented individuals the party can tap to help run the state. The model captures these differences that can exist across parties (and the groups they may represent) through the β parameters. Since an increase in β_B will decrease B's incentive to invest in civil service, an increase in β_B will also lower the value to A of investing in civil service. Thus, we should see lower investment in civil service by the incumbent party as the opposition party's cost of civil service increase.

A second crucial characteristic is the extremism of B's preferences. As w_B decreases, B values private over public goods, and thus wants to design the bureaucracy to produce outcomes that have little value to A. Thus, whether B inherits a good or bad bureaucracy, B will invest more in civil service, and thus produce more public goods, as w_B increases. Holding A's preferences fixed, then, the propensity for A to invest in civil service increases with w_B. These two results are summarized in Proposition 2.

Proposition 2 Opposition characteristics and civil service investment. *When A inherits a bad bureaucracy,*

$$\frac{\partial c_A^{10}}{\partial w_B} > 0$$
$$\frac{\partial c_A^{10}}{\partial \beta_B} < 0.$$

When A inherits a good bureaucracy,

$$\frac{\partial c_A^{11}}{\partial w_B} > 0$$
$$\frac{\partial c_A^{11}}{\partial \beta_B} < 0.$$

Proposition 2 emphasizes a cooperation problem that exists in the *creation* of good governance. Any investment by Party A in civil service will reap no benefits for A if A loses an election and B has little incentive to also invest in civil service. Thus, creating civil service requires cooperation across parties. The prospect of such cooperation will diminish when the other party has relatively high costs of civil service or relatively extreme preferences. Even when A inherits a good bureaucracy, incentives to invest in civil service will diminish when B has extreme preferences or high costs of civil service.

4.2 Party system polarization.

Another measure of party systems of interest is polarization. We can think of party system polarization as a situation where both A *and* B want to produce private goods. We can capture the inverse of polarization in a single parameter by assuming $w = w_A = w_B$. Our next result shows that investment in civil service is decreasing in party system polarization,

regardless of whether A inherits a good or bad bureaucracy.

Proposition 3 Party system polarization. *Let $w = w_A = w_B$:*

$$\frac{\partial c_A^{10}}{\partial w} > 0, \quad and$$

$$\frac{\partial c_A^{11}}{\partial w} > 0.$$

Polarized party systems, then, are bad for good government. If both parties want to use the party system for electoral gain and private goods production, it is particularly unlikely that they will sustain the sort of cooperation that is required for good government in a competitive democracy. Thus, the model suggests that electoral systems and social structures that encourage centripetal rather than centrifugal party competition are good for the creation of civil service.

4.3   The electoral context.

Next consider the electoral context. As noted in the Introduction, scholars have emphasized that politicians may wish to invest in civil service when they are electorally vulnerable as a way to improve outcomes if they fall out of power. The typical mechanism in these arguments is some form of *lock-in*. If an incumbent party expects to lose tan election, the argument goes, the incumbent can create rigid civil service procedures that make it difficult for the electoral foe to change policy, or for this foe to divert the bureaucracy's actions to its own private ends. Civil service, then, emerges from conflict and distrust between parties.

The model here departs from this lock-in logic in several respects. The first concerns the mechanism by which an incumbent faced with electoral loss might benefit from investing in civil service. When the bureaucracy is bad, investing in civil service cannot reap a current

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benefit, only a future benefit. And the future benefit will be realized only if the opposition *chooses to invest in civil service* after defeating the incumbent. The opposition cannot be forced to do so in the model; that is, its hands cannot be tied. Thus, rather than tying the hands of the other party, the incumbent invests in civil service to encourage the opposition party to also invest in civil service, and thus to produce public goods. This perspective suggests that good bureaucracy requires – and emerges from – synergistic commitments to civil service that exist across parties, rather than to conflict and distrust between them.

The second departure from previous arguments about lock-in is that existing arguments typically assume that decisions about bureaucratic structure do not themselves affect electoral outcomes. In the model here, vulnerable incumbents make a choice about personnel structures that directly affects their chances of re-election, and commitment to civil service carries an electoral cost. For this reason, investment in civil service need not increase with electoral vulnerability, as the lock-in logic argues. A positive relationship between electoral vulnerability and civil service investment may exist, but the relationship might also be negative, and the direction of the effect depends on the expected benefits to the incumbent of creating good government for the opposition.

If the opposition's preferences are not very extreme, for example (so that w_B is relatively high), as A becomes more electorally insecure, she has something to gain in the future by creating a good civil service because so doing will give B an incentive to appoint civil servants, benefiting A. This situation therefore results in a relationship between electoral insecurity and civil service investment that is consistent (in direction) with that of lock-in arguments: the more electorally insecure the incumbent, the more the incumbent invests in civil service. The magnitude of this effect of γ_A, however, declines as w_B declines. That is, as B's preferences become more extreme, A has less to gain from investing in civil service (because the future production of public goods when B wins will be lower), weakening the relationship between γ_A and civil service investment. Figure 1 provides an example. It

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depicts how the equilibrium level of civil servants changes with γ_A at different values of w_B. With the top (dotted line), B has rather moderate preferences and civil service investment is decreasing rather sharply in w_B. When B's preferences are some what more extreme (the dashed line, with $w_B = .5$), civil service is still decreasing in γ_A, but the slope is considerably flatter.

If B's preferences become sufficiently extreme (i.e., w_B sufficiently low), the direction of the effect of γ_A on civil service investment can change. If B has little incentive to produce public goods, the future value to A of a good bureaucracy is low if A loses. This increases increases A's incentives to get re-elected because she will receive little in terms of public goods if she loses. Thus, a low γ_A encourages A to invest more in patronage and less in civil service. But as A's electoral security increases, her electoral incentives to make patronage appointments decline and she will have an increasing incentive to appoint more civil servants in order to take advantage of the public goods they may produced if A wins re-election. Thus, the optimal level of civil servants is *increasing* in γ_A at sufficiently low w_B, the opposite of the lock-in argument. We can see this in the figure, where civil service investment is increasing in γ_A when $w_B = .25$.

By an identical logic, the direction of the effect of γ_A on civil service investment varies with β_B. When β_B is high, A will reap little in terms of public goods if she creates a good civil service and B wins. Thus, A has considerable incentive to invest in patronage to avoid losing, creating a positive relationship between γ_A and civil service investment, as when w_B is low, and contrary to the lock-in argument. But when β_B is sufficiently low, A has a greater incentive to invest in civil service as A becomes more electorally insecure, as when w_B is high.

Proposition 4 states formally these results that the effect of γ_A on civil service investment depends on the levels of w_B and β_B, focusing on the cross-partial derivatives of γ_A with w_B and β_B. Given this focus on these cross-partials, the proposition suggests not only that
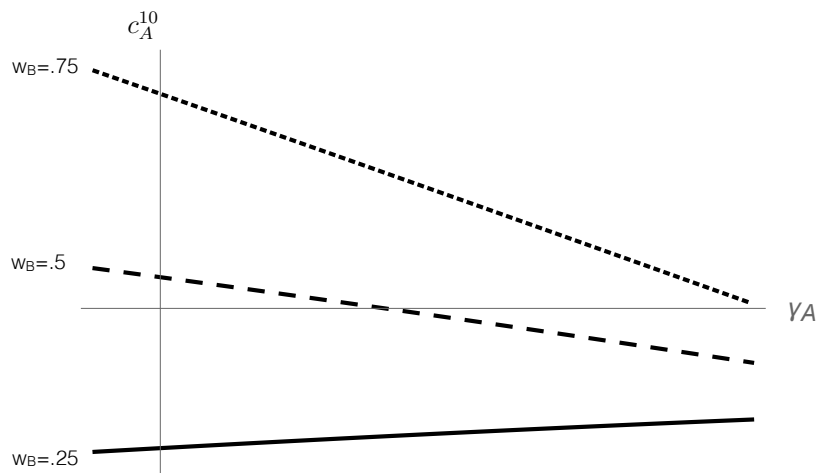
Note: The figure assumes that $m = .2$, all bureaucracy costs are 1, $w_A = \frac{1}{2}$ and $k = .15$.

Figure 1: Electoral security and civil service investment

the effect of electoral vulnerability depends of the opponent's preferences and costs of civil service, but also that the effects of the opponents preferences and costs of civil service are conditional on γ_A.

Proposition 4 Electoral Context. *If A inherits a bad bureaucracy, $\frac{\partial c_A^{10}}{\partial \gamma}$ can be positive or negative, and*

$$
\begin{aligned}
\frac{\partial^2 c_A^{10}}{\partial \gamma \partial w_B} &< 0 \\
\frac{\partial^2 c_A^{10}}{\partial \gamma \partial \beta_B} &> 0.
\end{aligned}
$$

Figure 2 provides examples illustrating the relationships described in Propositions 2 and 4. The top panel depicts the relationship between w_B and civil service investment at different levels of γ_A. As Proposition 2 states, A's investment in civil service is always increasing in w_B. But given that $\frac{\partial^2 c_A^{10}}{\partial \gamma_A \partial w_B} < 0$ (Proposition 4), the effect of w_B is decreasing as electoral security increases. Thus, the magnitude of the effect of w_B decreases as γ_A goes from .25 to .75 in the figure. The figure also depicts how the direction of the effect of γ_A can change with w_B. When $w_B < w_B^*$, civil service investment increases as electoral security increases. When $w_B > w_B^*$, the opposite is true. And near w_B^*, the effect of electoral security on civil service investment is quite small, but it grows in absolute magnitude as w_B moves away from w_B^*. The bottom panel depicts an example of the results for β_B. A's civil service investment is always decreasing as the opposition's cost of civil services increase (Proposition 2), but given $\frac{\partial^2 c_A^{10}}{\partial \gamma_A \partial \beta_B} > 0$ (Proposition 4), the magnitude of the effect of β_B is largest when the incumbent is most electorally vulnerable. And the direction of the effect of γ_A depends on whether β_B is larger or smaller than β_B^*.
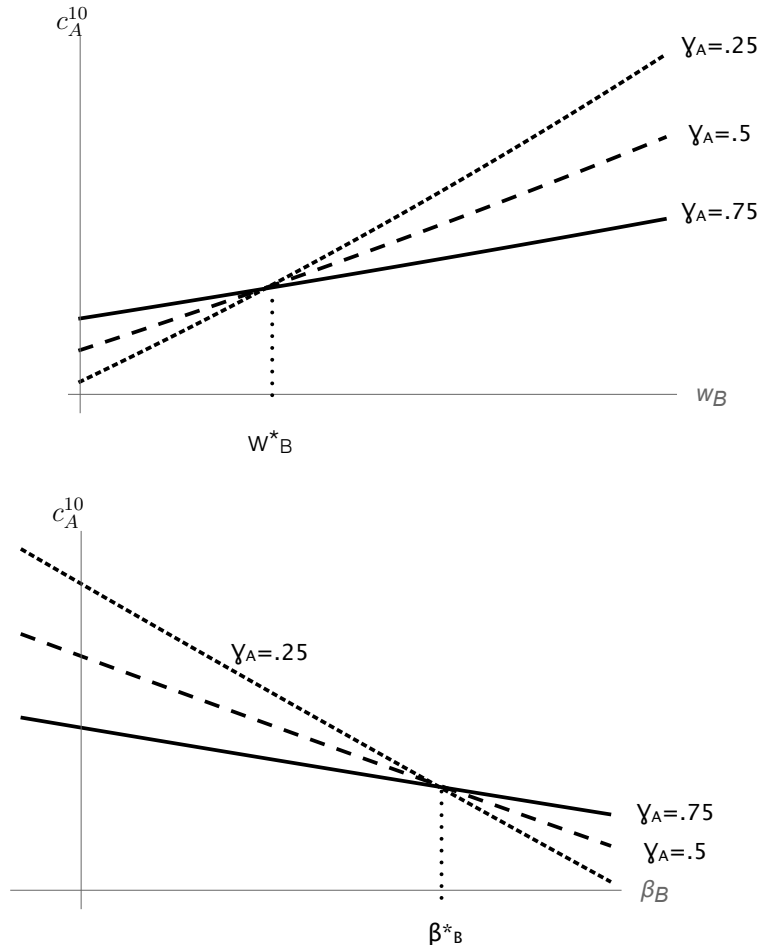
Note: The figure assumes that $m = .2$. In the top panel, all bureaucracy costs are 1 and $k = .15$. In the bottom panel, $w_A = w_B = .5$.

Figure 2: Civil service investment as a function of w_B, γ_A and β_B

5 Sustaining good government.

The previous section highlights factors that influence the incentives of a politician to invest in civil service after winning an election. But a central motivation for studying a dynamic model is to understand factors influencing whether good government can be sustained over time. Since a winning party can undo what has gone before, good governance requires a commitment by both parties to civil service. For some variables, the static results will be the same as the dynamic ones. For example, if one party's cost of civil service goes up, both parties will invest less in civil service because parties are sensitive to their own costs and the costs of the other party. Thus, in the long run, there is a lower probability of good governance when costs are high. The same is true for policy preferences. If w increases for either party, both parties have an incentive to invest in civil service, and thus we should expect a higher probability of good governance in the long-run if extremism is low.

The more interesting questions about long-run good governance are therefore related to the electoral environment. When (exogenous) electoral security is increasing for one party it is decreasing for the other, making it unclear how γ_A should be related to the long-run likelihood of good governance. This relationship is all the more complicated by the fact that the direction of the effect of γ_A can change with changes in variables like w and β. Since the Markov perfect equilibrium defines a recurrent, aperiodic, irreducible Markov process, we can use standard Markov process results to analyze the long-run behavior of the political system. This is not a trivial exercise because there are no absorbing states in the game, but we can rely on numerical results.

Recall that the equilibrium states are denoted (i, n, q), where i is the party in power, n is its term of office, and q is the quality of the bureaucracy. This defines eight states, as illustrated in Figure 3. The strategies characterized in the previous section allow us to write the transition probabilities to and from each state. For example the probability of

transitioning from $(A, 1, 0)$ to $(A, 2, 1)$ — that is, for a first-term party A incumbent with a bad bureaucracy to be re-elected with a good bureaucracy — is $\rho_i(c_A^{10}, 0)c_A^{10}$. Given the transition probabilities, we can calculate how likely it is on average to be in a state of substantive interest, such as a state with good governance, or a state where a particular party wins, at different values of the parameters in the model.

Figure 3: Equilibrium states and possible transitions
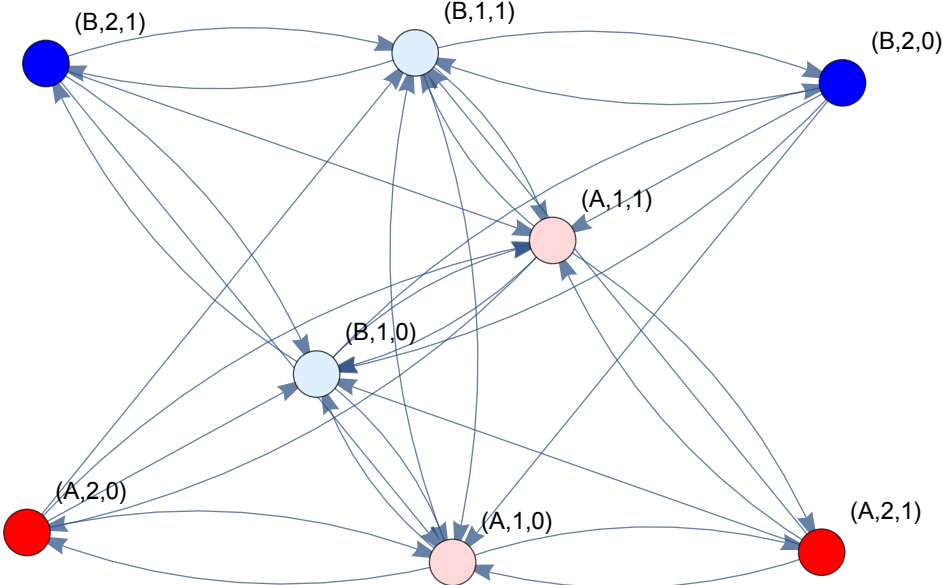
Note: Party A control in red, party B control in blue; light denotes first term and dark denotes second term.

Consider the relationship between the electoral environment and good governance. Figure 4 presents two examples: in the top graph, party polarization is low, and in the bottom graph, party polarization is high. Both graphs show the relationship between γ_A and the probability of good governance under different assumptions about the cost of investing in civil servants. In the top panel, for two of the graphs – the solid and the dashed – the cost of investing in civil service are the same for both parties, but the costs are lower for both parties in

the case depicted by the dashed line. Investment in civil service is obviously lower when costs are higher, but more interestingly, each of these graphs shows that good governance is maximized when $\gamma_A = .5$. In these examples, then, electoral competition fosters good governance, and as one party establishes a built-in electoral advantage, the probability of good governance declines.

A key assumption of the two graphs, however, is that the costs of investing in civil service are the same for both parties. As the other two graphs show, the role of electoral competition in fostering good governance disappears when the two parties have different costs of investment in civil service. The dotted graph depicts the case where Party A has lower costs than Party B, and the long-run probability of good governance is increasing in A's electoral security. The dot-dashed graph depicts the case where Party B has lower costs, and the long-run probability of good governance is increasing in B's electoral security. So when costs are asymmetric, good governance is enhanced in low polarization systems if the party with lower costs has an electoral advantage.

The bottom panel presents graphs under the same assumptions about costs, but in a high polarization environment, where $w_A = w_B = .1$. The long-run probability of good governance is much lower under any of the assumptions about costs. And there is never a discernible impact of electoral competition, even when costs are the same for both parties. Again there is an advantaged party, good governance is most likely when the party with lower costs has an electoral advantage.

The discussion to this point has focused on how electoral politics shapes the long-run probability of good government. But we can also turn the question around. Personnel decisions by a party in power affect not only the nature of bureaucracy, but also the electoral prospects of each party. If one party has a greater incentive to invest in patronage, it can reap an electoral advantage. If a party does this when it has a built-in electoral advantage, the politics of bureaucracy will entrench advantaged parties. If a party does this when it

Figure 4: Electoral competition and the long-run probability of good government
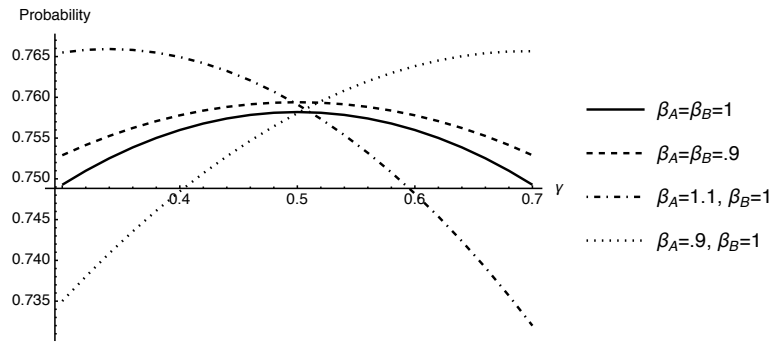
(a) Low party system polarization $(w_A = w_B = .9)$
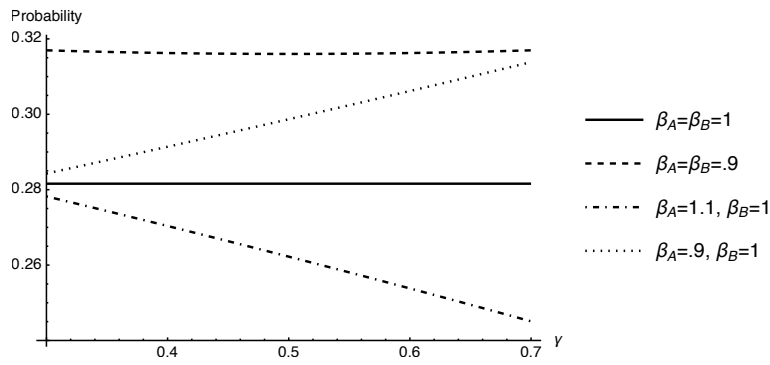
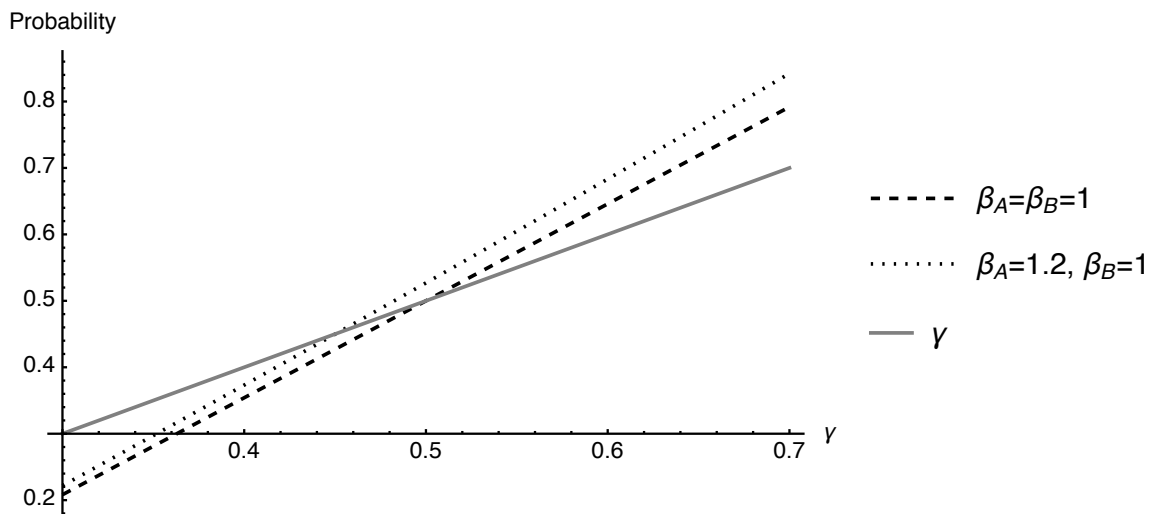(b) High party system polarization $(w_A = w_B = .1)$

Note: $m = 0.3$ and $k = .1$ in both graphs.

suffers an electoral disadvantage, it will lessen this disadvantage. We can use the model to consider how the party system interacts with differential civil service costs to affect a long-run electoral advantage.

Figure 5 plots the probability that A will win against γ_A. In the top panel, party system polarization is high ($w_A = w_B = .1$) and the dashed line is based on the assumption of symmetric costs of civil service across the two parties ($\beta_A = \beta_B = 1$). The effect of strategic personnel decision-making is to increase the electoral advantage of the favored party, and this increase grows larger as the electoral advantage grows larger. Thus, when party systems are polarized, there are relatively strong incentives for patronage politics, and these incentives can further entrench the advantage of the party with the stronger base of electoral support. But consider what happens when civil service costs are not symmetric. The dotted line depicts the graph when A has higher costs of civil service than B. These higher costs of course encourage A to invest more in patronage than does B, and thus increases the electoral advantage of A when A is favored and decreases the electoral advantage of B when B is favored (as one would expect given the cross-partials associated with Proposition 4). This suggests that when polarization is high, the politics of personnel will entrench parties that have an electoral advantage, and that this will be particularly true when the favored party has relatively high costs of civil service.

The bottom panel in the figure considers the case where polarization is low. The same basic pattern exists – the politics of personnel entrench the advantaged party and there is an electoral advantage for the party with higher costs of civil service. But the most striking thing about the graph in comparison with the top graph is how muted these effects are. Political polarization, by encouraging investment in patronage, also entrenches advantaged parties, but the extent to which it does so declines as party system polarization declines.

Figure 5: Electoral competition and the long-run probability that A is in office

(a) High party system polarization $(w_A = w_B = .1)$
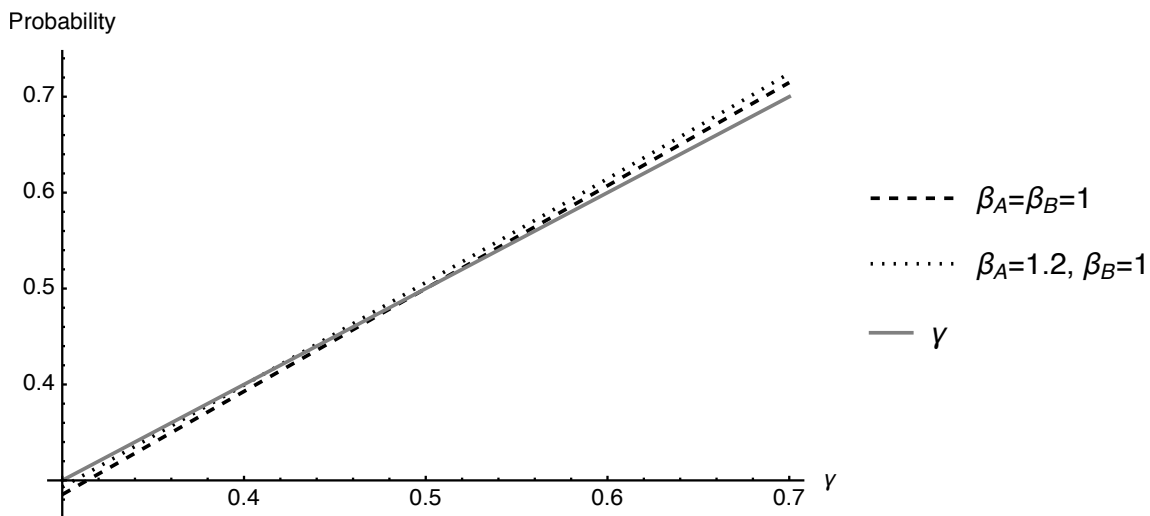
(b) Low party system polarization $(w_A = w_B = .9)$

Note: $m = 0.3$ and $k = .1$ in both graphs.

6 Conclusions

In recent years, there has been growing interest in both the adoption of civil service reforms and the somewhat elusive concept of state capacity. To our knowledge, no theoretical work has yet considered the combination of these features in a framework that allows the examination of their long-run viability. Our theory of personnel policy attempts to do so by modeling competing political parties over an infinite horizon. Its main features include the differentiation between types of bureaucratic personnel, the description of a bureaucratic production function that affects election outcomes, and definitions of the relationships between civil service appointments, the quality of bureaucracy and public goods production.

The model brings into sharp relief the deep challenges associated with creating good government, which is not something that can be imposed by one party on another, but rather must emerge from the mutual interest of competing political parties. Given the cooperation that is required over time to sustain good government, at any given moment, a party's investment in civil service will be influenced not simply by its own preferences, but also by the preferences and capacity of the other party. Expectations about electoral outcomes are also important. When the other party has high capacity and low extremism, investment in civil service is increasing in electoral vulnerability. When this is not true, such investment is decreasing in electoral vulnerability. The model therefore raises questions about both the generality and the mechanism in arguments about civil service lock-in. Over the long-run, sustaining good government is enhanced by electoral competition only when party system polarization is low and the costs of civil service are the same for each party. When these conditions are not met, good governance is maximized when the advantaged party has lower costs and less extreme preferences. And electoral incentives associated with personnel policies will entrench favored parties when these parties have non-centrist preferences.

The analysis suggests several avenues for further research. With respect to the theoretical

model, a difficult but useful extension would be to eliminate the exogenous constraint on the size of total investment in bureaucracy. Such as extension could produce predictions not only about the proportion of civil servants in bureaucracy, but also about the size of government itself. With respect to empirical applications, the models emphasizes the importance of thinking carefully about appropriate measures of good government, given that a central implication of the model here is that we cannot, to this end, rely on simple measures of civil service laws and procedures, which can easily be subverted by political parties. The model also underlines the importance of thinking about factors that affect the differential costs of civil service investment across parties, and of party extremism and party system polarization when preferences are related to a tradeoff between public vs private goods.

APPENDIX

Proof of Proposition 1. Let Ω_i denote a party i first-term incumbent's conjectured payoff from a subsequent period in which she is not re-elected and the bureaucracy is good. Substituting in expressions (4)-(6) into the objective (2), differentiating with respect to c, and solving this first order conditions yields the following solutions for c_i^{10} and c_i^{11} as functions of Ω_i:

$$c_i^{10} = \frac{\begin{array}{c}-24 - 8w_i + 16\beta_i + m(1 + 8k + 8\Omega_i - 8w_i - 2w_i^2 - 4\beta_i + 4\beta_i^2)+ \\ 8\Omega_i(-1 + \gamma_i) - 6w_i\gamma_i - 3w_i^2\gamma_i + 4w_i\beta_i\gamma_i\end{array}}{2(-16 + m(8\Omega_i + w_i(-6 - 3w_i + 4\beta_i)))}, \qquad (9)$$

$$c_i^{11} = \frac{\begin{array}{c}32 - 64\beta_i + 12w_i^2\gamma_i + w_i(-2w_j(11 + 2\beta_j(\gamma_i - 1) - \gamma_i)(\gamma_i - 1)+ \\ 3w_j^2(\gamma_i - 1)^2 + 8(11 + 2\beta_j(\gamma_i - 1) - 2\beta_i\gamma_i))\end{array}}{8(16 + w_iw_j(\gamma_i - 1)\gamma_i)} \qquad (10)$$

Note that Eq (9) is identical to Eq. (7) and Eq. (10) is identical to Eq. (8) in the proposition, so it only remains to solve for Ω_i. Since $\Omega_i = u_i(c_j^{11}(\Omega_j), 0)$ and $\Omega_j = u_j(c_i^{11}(\Omega_i), 1)$, we can solve these two simultaneous equations, which yields:

$$\Omega_i = \frac{w_i(96 - 64\beta_i - 12w_j^2(\gamma_i - 1) + w_j(88 + 16\beta_j(\gamma_i - 1) - 16\beta_i\gamma_i + 3w_i^2\gamma_i^2 + 2w_i\gamma_i(8 + 3\gamma_i - 2\beta_i\gamma_i)))}{(8(16 + w_iw_j(\gamma_i - 1)\gamma_i))}.$$

We next verify that the objective is concave. Substituting from (4)-(6) into (2), the second order condition is:

$$-4 + \frac{1}{4}m(8\Omega_i + w_i(-6 - 3w_i + 4\beta_i)),$$

which is clearly negative given $\Omega < 1$. ∎

Proof of Proposition 2.

Let $FOC = \frac{\partial EU_A(c|s)}{\partial c}$ be the first order condition using eq 2. By the implicit function rule, at a maximum, $\frac{\partial c_A^{10}}{\partial x}$ is $-\frac{\frac{\partial FOC}{\partial x}}{\frac{\partial FOC}{\partial c}}$. Since $\frac{\partial FOC}{\partial c} < 0$ (this is the second order condition, see Proposition 1), the sign of $\frac{\partial c_A^{10}}{\partial x}$ is simply the sign of $\frac{\partial FOC}{\partial x}$.

Consider $\frac{\partial FOC}{\partial w_B}$. Since FOC is a function of Ω_A and Ω_A is a function of w_B, we can write $\frac{\partial FOC}{\partial w_B}$ as $\frac{\partial FOC(\Omega_A)}{\partial w_B} + \frac{\partial FOC(\Omega_A)}{\partial \Omega_A}\frac{\partial \Omega_A}{\partial w_B}$, where $c_i^{10}(\Omega_A)$ includes the Ω_A term (as in eq **??**). Note that $\frac{\partial FOC(\Omega_A)}{\partial w_B} = 0$, so the sign of the derivative is given by $\frac{\partial FOC(\Omega_A)}{\partial \Omega_A}\frac{\partial \Omega_A}{\partial w_B}$. Since $\frac{\partial FOC(\Omega_A)}{\partial \Omega_A} = 1 + (2c_A^{10} - 1)m - \gamma_A > 0$, the sign of $\frac{\partial c_A^{10}}{\partial w_B}$ is the sign of $\frac{\partial \Omega_A}{\partial w_B}$, which is

$$\frac{w_A(-96w_B(\gamma_A-1)-3w_Aw_B^2(\gamma_A-1)^2\gamma_A+4(3w_A^2\gamma_A^2-4\alpha_Ab(\gamma_A-1)(4+w_A\gamma_A)+8(7+2\alpha_A\gamma_A)+2w_A\gamma_A(7+2\alpha_A\gamma_A))}{2(16+w_Aw_B(\gamma_A-1)\gamma_A)^2)}.$$

This derivative is clearly positive given that $-96w_B(\gamma_A - 1) - 3w_Aw_B^2(\gamma_A - 1)^2\gamma_A > 0$ and all other terms are positive. Similarly, since $\frac{\partial FOC(\Omega_A)}{\partial \beta_B} = 0$, the sign of $\frac{\partial c_A^{10}}{\partial \beta_B} = \frac{\partial \Omega_A}{\partial \beta_B} = \frac{2w_A(\gamma_A-5))}{16+w_A(\gamma_A-1)\gamma_A} < 0$.

Since Ω_A is the value to A of the public goods produced by B if B wins and the bureaucracy is good, when A inherits a good bureaucracy, the sign of $\frac{\partial c_A^{11}}{\partial w_B}$ is the sign of $\frac{\partial \Omega_A}{\partial w_B}$, which we have shown is positive, and the sign of $\frac{\partial c_A^{11}}{\partial \beta_B}$ is $\frac{\partial \Omega_A}{\partial \beta_B}$, which we have shown is negative. Thus, whether the bureaucracy is good or bad, A's civil service investment is increasing in w_B and decreasing in β_B. ∎

Proof of Proposition 3.

Proposition 2 shows that civil service investment is increasing for A as w_B increases. Thus, to show that civil service investment is increasing in $w = w_A = w_B$, it is sufficient to show that civil service investment is increasing in w_A.

First consider when A inherit's a bad bureaucracy:

$$\frac{\partial FOC}{\partial w_A} = \frac{1}{2(\alpha_A + \beta_A)}(2\alpha_A - 2c_A^{10}m(3w_A + 2\alpha_A - 1) + 2\beta_A + 2m(w_A + \alpha_A + \beta_A) + 3w_A\gamma_A + 2\alpha_A\gamma_A - \gamma_A).$$

Given $\alpha_A + \beta_A = 2$, this partial deriviative is positive if $z = 4 + 2c_A^{10}m - (3w_A + 2\alpha_A)(2c_A^{10}m - \gamma_A + 2m(w_A + 2) - \gamma_A > 0$. Since z is linear in m, it is sufficient to check that the expression is positive a $m = 0$ and $m = \gamma_A$. At $m = 0$, $z = 4 - \gamma_A + (3w_A + 2\alpha_A)\gamma_A > 0$. At $m = \gamma_A$, $z = 4 + (3 + 5w_A + c_A^{10}(2 - 6w_A - 4\alpha_A) + 2\alpha_A)\gamma_A > 0$ for all $c_A^{10} \in [0,1]$.

Next consider when A inherits a good bureaucracy.

$\frac{\partial c_A^{11}}{\partial w_A} = \frac{12w_B^2(\gamma_A - 1)^2 + 32(7 - 2\alpha_B(\gamma_A - 1) + 3w\gamma_A + 2\alpha\gamma_A) + w_B(\gamma_A - 1)(-56 + 16\alpha_B(\gamma_A - 1) - 16\alpha\gamma_A + 3w^2\gamma_A^2)}{2(16 + ww_B(\gamma_A - 1)\gamma_A)^2}$. Each term is clearly positive. Thus, A's investment in civil service is increasing in w_A and w_B, regardless of whether A inherits a good or bad bureaucracy, and A's investment in civil service is increasing in w. ∎

Proof of Proposition 4.

It can easily be shown (see Figure **??**, for example) that there are cases where $\frac{\partial c_A^{10}}{\partial \gamma} > 0$ and cases where $\frac{\partial c_A^{10}}{\partial \gamma} < 0$. We therefore show that $\frac{\partial^2 c_A^{10}}{\partial \gamma \partial w_B} < 0$ and $\frac{\partial^2 c_A^{10}}{\partial \gamma \partial \beta_B} > 0$

(a) $\frac{\partial c_A^{10}}{\partial \gamma} < 0$:

Evaluating $\frac{\partial^2 c_A^{10}}{\partial \gamma \partial w_B}$ shows that this cross-partial is monotonic in $q = (-1 + 2c_A^{10})m$. Since q is bounded by $\gamma - 1$ and γ, $\frac{\partial^2 c_A^{10}}{\partial \gamma \partial w_B} < 0$ if it is negative at $q = \gamma - 1$ and at $q = \gamma$. We check each in turn.

If $q = \gamma - 1$, then $\frac{\partial^2 c_A^{10}}{\partial \gamma \partial w_B} < 0$ if

$$-96w_b(\gamma - 1) - 3w_Aw_B^2(\gamma - 1)^2\gamma$$
$$+ 4(3w_A^2\gamma^2 - 4\alpha_B(\gamma - 1)(4 + w_A\gamma) + 8(7 + 2\alpha_A\gamma) + 2w_A\gamma(7 + 2\alpha_A\gamma)) > 0.$$

This must be true given that $-96w_b(\gamma - 1) - 3w_Aw_B^2(\gamma - 1)^2\gamma > 0$ and each term in the

second line of the expression is positive.

If $q = \gamma$, then $\frac{\partial^2 c_A^{10}}{\partial \gamma \partial w_B} < 0$ if the following expression is negative:

$$-(16 + w_A w_B(-1 + \gamma)\gamma)^2(-24w_B(-1 + \gamma) - 16\alpha_B(-1 + \gamma)+$$
$$3w_A^2\gamma^2 + 8(7 + 2\alpha\gamma) + 2w_A\gamma(8 + (-1 + 2\alpha)\gamma))$$
$$-w_B(16 + w_A w_B(-1 + \gamma)\gamma)(192 + 3w_A^3\gamma^2 + 2w_A^2(7 + 2\alpha)\gamma^2 - 8w_A(7 + 3w_B(-1 + \gamma)^2+$$
$$2\alpha_B(-1 + \gamma)^2 - 14\gamma - 2\alpha\gamma^2))$$
$$w_A(-1 + \gamma)\gamma(16 + w_A w_B(-1 + \gamma)\gamma)(-32 + 64\alpha_B - 12w_B^2(-1 + \gamma)+$$
$$w_B(-16\alpha_B(-1 + \gamma) + 3w_A^2\gamma^2 + 8(7 + 2\alpha\gamma) + 2w_A\gamma(8 - \gamma + 2\alpha\gamma)))$$
$$-16 + w_A(-1 + \gamma)\gamma)(64(3w_B - 4\alpha + 4\alpha_B) + 3w_A^3 w_B\gamma^2 + 2w_A^2\gamma(-48 + w_B(7 + 2\alpha)\gamma) - 4w_A(3w_B^2(-1 + \gamma)^2+$$
$$8(7 + \alpha_B(2 - 4\gamma) + 4\alpha\gamma) + 2w_B(7 + 2\alpha_B(-1 + \gamma)^2 - 14\gamma - 2\alpha\gamma^2))$$

Of the four terms in this exprssion, only the last can be positive. The sum of the first and last term is montononic in α_B, and thus the entire expression is negative of this sum is negative at $\alpha_B = \frac{1}{2}$ and at $\alpha_B = \frac{3}{2}$, which is true for all possible parameter values. Thus, across the range of q, $\frac{\partial^2 c_A^{10}}{\partial \gamma \partial w_B} < 0$.

(b) $\frac{\partial^2 c_A^{10}}{\partial \gamma \partial \beta_B} > 0$: Note that

$$\frac{\partial^2 c_A^{10}}{\partial \gamma \partial \beta_B} = \frac{-(2w(-64 + (1 + mc)w_A w_B^2(\gamma - 1)^2 - 4w_B((-8 - w_A(\gamma - 1))(\gamma - 1) + q(4 + w(-1 + 2\gamma))))))}{(16 + w_A w_B(\gamma - 1)\gamma)^2},$$

which is clearly positive for all values of q. ■

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