The Persistence and Fragility of Bureaucratic Capacity*

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Political manipulation of bureaucratic agencies can undermine their performance. Yet the dynamic effects of political management on bureaucratic capacity are not well understood. To address this question we develop a formal model that represents bureaucratic output as a team production process, and considers self-selection into bureaucracy by overlapping generations of agents. The model reveals three fundamental results. First, transitory episodes of political manipulation can have a persistent effect on selection into an agency and, as a result, its performance. Second, high-capacity bureaucracies are especially vulnerable to long-term undermining through short-term political manipulation, whereas medium-capacity bureaucracies are more resistant. Third, effects of short-term political manipulation can be mitigated by increasing transferability of skills between agencies and other career options, though this will typically increase "revolving door" career paths.

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Presidents in the U.S. have potent tools to control management of bureaucratic agencies. If presidents harbor disagreements with the mission of a specific agency, or about the administrative state writ large, they may use these tools to undermine bureaucratic management. Former President Ronald Reagan famously appointed the conservative, pro-business lawmaker Anne Gorsuch to head the Environmental Protection Agency (EPA) and champion the administration's deregulatory agenda. What resulted was turmoil at the agency, culminating, ultimately, with Gorsuch's resignation in 1983. In testimony to investigators, an assistant administrator at the EPA claimed Gorsuch had exercised "no leadership at the top"[1] of the agency.

More recently, former President Donald Trump installed Scott Pruitt, a former Attorney General of Oklahoma, as his first head of the EPA to similarly oversee aggressive deregulatory efforts at the agency. As head of the EPA, Pruitt blocked or delayed pollution regulations, demanded uncritical compliance, and installed a $43,000 soundproof phone booth—actions that would elicit a telling response from career staff at the agency: "we've seen this movie."[2] While the specific circumstances may have been novel, the general tactic of poor management was not unusual.

As these anecdotes suggest, political intervention affects not just what or how much agencies do, but how well they do it. Scholars have argued that political manipulation of agency management can undermine performance (Golden 1992; Brehm and Gates 1999; Krause, Lewis and Douglas 2006; Miller and Whitford 2016; Wood and Lewis 2017). Further, performance effects are mediated by the skill and experience of an agency's workforce. Scholars have found that employee turnover intention increases directly as a result of agency politicization (Doherty, Lewis and Limbocker 2019; Bolton, De Figueiredo and Lewis 2021), and as a result of diminished influence over policy (Bertelli and Lewis 2012), which itself arises from politicization.

Importantly, political management and its effects on agencies are typically viewed in a *static* perspective. Strategies of political intervention in agencies rest on the president's unilateral powers such as appointment and centralization. Scholars typically investigate the connection between use of these strategies and agency performance under a specific presidential administration.

In this paper we argue that a full account of the political and normative implications of political intervention in the bureaucracy requires grappling with its *dynamic* effects. If subsequent presidents can restore the competence of bureaucratic agencies by the same

[1] *See* David Burnham, "2 High Officials at E.P.A. Resign, Reportedly at White House Urging," *New York Times* (February 24, 1983).

[2] https://www.wbur.org/hereandnow/2022/09/16/captured-episode-1-epa

unilateral processes through which earlier presidents can undermine it, then a static perspective does not seriously limit our understanding of presidential administration and bureaucratic performance. In this case, unilateral bureaucratic undermining may even be an appropriate mechanism for presidents to pursue policy objectives for which they claim an electoral mandate—just as immediate, unilateral restoration of administrative competence is a mechanism to pursue contrary objectives. But if political intervention in agency management has durable effects that outlast the administration inflicting them, these conclusions are suspect.

At issue is whether bureaucratic capacity is more like a "light switch" or an "old television." If capacity is like a light switch and one president turns it "off," a subsequent president can just as easily turn it back "on." When one president installs incompetent appointees to ill effect on public welfare, dissatisfied citizens need only vote for a responsible successor who will put "adults back in charge" to restore the benefits of bureaucratic competence. But if capacity is like an old TV, then once turned off it may require a significant lag to warm back up—if it turns on at all. In this case, undermining capacity through political intervention is not only retrenchment of bureaucratic action under the initiating president, it constrains bureaucratic action under successors.

Leading scholarship on bureaucratic capacity argues that it is more like the old television: it takes time to build or rebuild and, once built, bureaucratic capacity can be self-sustaining (Carpenter 2002; Huber and Ting 2021; McDonnell 2020; Benn 2023; Goldstein forthcoming). These claims imply that a given state of bureaucratic capacity, whether low or high, tends to be "sticky." Yet models of bureaucratic capacity typically assume stickiness rather than demonstrating it. For example, Huber and Ting assume that investments in bureaucratic capacity by political actors in one time period do not bear fruit until a succeeding period. Golstein takes an important step to modeling capacity as an endogenous function of bureaucratic culture. In his model agency culture is exogenous to any one bureaucrat's decision. We build on this by showing how culture, in the sense of shared expectations for continuing capacity, is jointly determined by individual actors.

We develop a formal model in which bureaucratic capacity is sticky due to endogenous strategic forces. The model rests on three core components. The first is *team production* within a bureaucratic agency (Gailmard 2024*a*). Formal models of bureaucratic capacity based on action of individual agents in the bureaucracy almost always assume there is just one strategic actor within the agency. In truth, accomplishing anything in a bureaucracy typically requires competent action by multiple actors, including a corps of careerists and a political appointee. Team production captures this aspect of bureaucracies. In our

model of team production, bureaucrats are more effective when managed by a competent appointee (Gailmard 2024*b*).

The second core component is *self-selection into bureaucracy* (Gailmard and Patty 2007; Gailmard 2010; Gailmard and Patty 2012; Gibbs 2020; Forand, Ujhelyi and Ting 2023). Individuals have multiple career options, and they pursue careers in public service because they care about the results they can produce. Self-selection in our model captures the idea that when an agency is ineffective, skilled and competent individuals will tend not to select into it because their other options are more attractive.

The third core component is *overlapping generations* of bureaucrats. While bureaucratic agencies have long lives (but finite: see Carpenter and Lewis 2004), the individuals within them do not. The capacity of a bureaucratic agency as a whole is built from the skill and competence of multiple interacting agents at different stages of finite careers. Senior bureaucrats transmit the values, expectations, and culture of their agency to junior members, who in turn become senior members and transmit agency culture to their junior colleagues (McDonnell 2020). Our model of overlapping generations of individual actors captures this aspect of bureaucracies.

The principal message of our model is that sustaining a high capacity bureaucracy requires shared expectations for capacity by each component of the bureaucracy. Specifically, senior bureaucrats must expect that skilled juniors will enter in every period; junior bureaucrats must expect that skilled seniors will remain in every period; and all bureaucrats must expect that management will be competent in every period. These components are mutually reinforcing: neither seniors nor juniors nor management are the "most important," and each component is "good" only if the others are good. Shared expectations for high capacity is precisely what makes bureaucratic capacity persistent: when skilled bureaucrats expect management and other bureaucrats also to be good, they enter the bureaucracy and stay there.

Yet the centrality of shared expectations also makes bureaucratic capacity fragile. This is because shared expectations for high capacity can be broken by short periods of political manipulation or inept management. While sustaining bureaucratic capacity requires coordinated action by multiple agents in the team production process, undermining bureaucratic capacity requires only decentralized action by any one component of the team. The key results of our model illustrate this logic, by demonstrating that impact of poor management may persist even after competent leadership of an agency is restored.

1 A Model

We model the production of policy in an agency as a team production process with multiple bureaucrats in each period. In each period $t = 0, 1, 2 \ldots$, there are two cohorts of individual agents: junior and senior. Each agent lives for two periods, spends their first period in the junior cohort, and their second period in the senior cohort. In each cohort there is one skilled person who chooses their sector of employment, one unskilled person who starts out as a junior not in the bureaucracy, and one unskilled unemployed person. Conditional on skill and experience, agents from different cohorts are identical.

Agencies are staffed by two bureaucrats: one bureaucrat from the "junior" cohort j and one from the "senior" cohort s. They have commonly known, persistent skill levels with $\sigma_t^s \in \{0, \overline{\sigma}\}$ representing the skill of the senior employee in period t, and $\sigma_t^j \in \{0, \overline{\sigma}\}$ representing the skill of the junior employee in period t. In addition, a bureaucrat may gain experience on the job where $\xi_t^s \in \{0, 1\}$ is the experience of the senior employee in period t, reflecting whether or not this employee worked in the agency in period $t-1$. Bureaucrats maximize the sum of utility across periods and do not discount.

Bureaucratic output. In the model, bureaucratic output may be interpreted as the likelihood implementation succeeds. Three factors determine bureaucratic output in each period t: management quality; the quality of the senior bureaucrat; and the quality of the junior bureaucrat. In each period, management quality, $\sigma_t^m \in \{0, 1\}$, is either high or low. Similarly, the quality of the junior bureaucrat is the junior bureaucrat's skill $\sigma_t^j \in \{0, \overline{\sigma}\}$, which is either high or low.

The quality of the senior bureaucrat has two components. The first is the senior bureaucrat's skill, $\sigma_t^s \in \{0, \overline{\sigma}\}$, which is either high or low. The second component is the senior bureaucrat's experience in government, $\xi_t^s \in \{0, 1\}$. Experience is $\xi_t^s = 1$ if the senior bureaucrat also served in government as the junior bureaucrat in $t-1$, and $\xi_t^s = 0$ if the senior bureaucrat in period t did not serve in government in period $t-1$. If $\xi_t^s = 0$, then s was employed out of government in period $t-1$. A parameter $\tau^g \in [0, 1]$ captures the transferability to the bureaucracy of s's prior experience outside the bureaucracy. Altogether, the quality of the senior bureaucrat in period t is $\sigma_t^s + \xi_t^s(1-\overline{\sigma}) + \tau^g(1-\xi_t^s)(1-\overline{\sigma})$.

Bureaucratic output in period t is

$$y_t = \sigma_t^m \sigma_t^j (\sigma_t^s + \xi_t^s(1-\overline{\sigma}) + \tau^g(1-\xi_t^s)(1-\overline{\sigma})). \tag{1}$$

A crucial aspect of bureaucratic output is *team production*. Output requires interaction of multiple bureaucrats and support from a quality manager. Failure of any one of these components results in poor bureaucratic output (cf. Bendor 1985, Ting 2003).

Labor supply. In every period-cohort there is a pool of low-skill, inexperienced agents who can fill any role in the bureaucracy. A vacancy in the agency is filled by the most productive worker in the cohort willing to take the position. Therefore, the hiring protocol is described as: First, take junior bureaucrat for senior role if they want to stay. Second, for any open role, take a skilled and experienced person of the designated seniority level. Third, if not available, take an unskilled but experienced person of the designated seniority level. Fourth, take unskilled, inexperienced.

Agents also obtain a payoff $\mu \in [0, 1]$ for every period they serve in government. This term captures *public service motivation* as an exogenous factor (cf. Forand, Ujhelyi and Ting 2023). The total payoff to agent i from serving in government in period t is $u_t^i = y_t + \mu$. Note that, in this model, there is no spatial or ideological component of agents' utility.

Outside options. In period t, all potential bureaucrats can opt not to work in the bureaucracy and instead take an outside option. The value of an agent's outside option in period t is denoted v depends on their skill and their experience. If $\xi_t^s = 0$ in a period, then bureaucrat s worked outside of government and not in government.

The outside option for agent s in period t is

$$v_t^s = \pi(\sigma^s + (1 - \xi_t^s)(1 - \overline{\sigma}) + \tau^o \xi_t^s (1 - \overline{\sigma})),$$

where $\tau^o \in [0, 1]$ reflects the transferability of service in government to the outside option, and $\pi > 0$ is a private sector skill factor. We assume $\pi > 1$, which means that a given skill level obtains greater compensation outside the bureaucracy than in it (cf. Gibbs 2020). The outside option for agent j in period t is $v_t^j = \pi\sigma^j$.

Notice that $\pi > 1$ implies that high skilled agents ($\sigma = 1$) obtain strictly greater utility from the outside option than low skilled agents ($\sigma = 0$), whether junior or senior. Given this, and the lack of spatial policy ideology in this model, it is clear that agents with high enough skill always select out of government service.

Timing and Selection protocol. Our model of bureaucratic selection reflects two features of contemporary civil service: bureaucrats who enter in junior roles can typically

		Outside Option, v_t^i
Junior Cohort	low skill	0
	high skill	$\pi\overline{\sigma}$
Senior Cohort	low skill, $\xi = 0$	$\pi(1-\overline{\sigma})$
	low skill, $\xi = 1$	$\pi\tau^o(1-\overline{\sigma})$
	high skill, $\xi = 0$	π
	high skill, $\xi = 1$	$\pi(\overline{\sigma}+\tau^o(1-\overline{\sigma}))$

Table 1: Outside Options by Cohort, Skill Level, and Employment in Government

progress through the ranks if they wish; and agencies select for skill and, when possible, experience. Specifically, the bureaucracy in any period t uses the following selection protocol to select candidates for each role.

- The senior position in time t is filled in the following order of priority: (1) by the junior agent from time $t-1$; (2) by a skilled agent from cohort s who worked in $t-1$ outside the bureaucracy; (3) by an unskilled agent from cohort s who worked in $t-1$ outside the bureaucracy; (4) by an unskilled agent from cohort s who did not work in $t-1$.

- The junior position in time t is filled in the following order of priority: (1) by a skilled agent from cohort j; (2) by an unskilled agent from cohort j.

The selection protocol for a position stops at the first priority tier with an agent willing to accept the position, and that agent takes the position.

The within-period game is as follows:

1. σ_t^m is exogenously determined and revealed to all players.

2. Positions s and j are filled and σ_t^s, σ_t^j are determined as described above

3. Agency output y_t is produced

2 Analysis

We focus on subgame perfect Nash equilibrium (SPNE) of the game. We first assess the incentives of the senior cohort, identifying conditions under which senior government employees will remain in government service or exit and conditions under which senior non-government employees will choose to enter. Then, we assess the incentives of junior employees to enter government or opt for private sector employment. Table 2 provides a useful reference of bureaucratic output based on the skill and experience of government

		Government Experience	
		$\xi_t^s = 0$	$\xi_t^s = 1$
Skill	$\sigma_t^s = 0$	$\tau^g\overline{\sigma}(1-\overline{\sigma})$	$\overline{\sigma}(1-\overline{\sigma})$
	$\sigma_t^s = \overline{\sigma}$	$\tau^g\overline{\sigma}(1-\overline{\sigma}) + \overline{\sigma}^2$	$\overline{\sigma}$

Table 2: Bureaucratic Output if $\sigma_t^j = \overline{\sigma}$ and $\sigma_t^m = 1$

employees of each cohort and the management skill of the political leadership in the agency.

2.1 Senior Cohort

Already in the bureaucracy: Stay or leave? Consider a senior bureaucrat in period t who worked in the bureaucracy in $t-1$. This bureaucrat should stay in the bureaucracy if and only if $u_t^s \geqslant v_t^s \Leftrightarrow \sigma_t^m\sigma_t^j(\sigma^s + 1 - \overline{\sigma}) + \mu \geqslant \pi(\sigma^s + \tau^o(1-\overline{\sigma}))$ or

$$\sigma^s \leqslant \frac{\mu - (\pi\tau^o - \sigma_t^m\sigma^j)(1-\overline{\sigma})}{\pi - \sigma_t^m\sigma_t^j}. \tag{2}$$

Notice if $\sigma_t^m = 0$ or $\sigma_t^j = 0$, condition 2 reduces to $\sigma^s \leqslant \frac{\mu}{\pi} - \tau^o(1-\overline{\sigma})$: the ratio of public service motivation to the private sector skill premium, less transferability of government experience. Given $\pi > 1$ and $\mu, \tau^o \in [0,1]$, this condition is met for $\sigma^s = \overline{\sigma}$ only if $\mu \geqslant \pi(\overline{\sigma} + \tau^o(1-\overline{\sigma}))$. It is met for $\sigma^s = 0$ if and only if $\mu \geqslant \pi\tau^o(1-\overline{\sigma})$.

Lemma 1 *Suppose $\sigma_t^m = 0$ or $\sigma_t^j = 0$. If $\sigma^s = \overline{\sigma}$, the senior agent s remains in the bureaucracy if and only if $\mu \geqslant \pi(\overline{\sigma} + \tau^o(1-\overline{\sigma})) \equiv \mu_{01}^s$. If $\sigma^s = 0$, the senior agent remains if and only if $\mu \geqslant \pi\tau^o(1-\overline{\sigma}) \equiv \mu_{00}^s$.*

If $\sigma_t^m = 1$ and $\sigma_t^j = \overline{\sigma}$, condition 2 reduces to

$$\sigma^s \leqslant \frac{\mu - (\pi\tau^o - \overline{\sigma})(1-\overline{\sigma})}{\pi - \overline{\sigma}}.$$

If $\mu < (\pi\tau^o - \overline{\sigma})(1-\overline{\sigma})$, the condition does not hold for any σ^s. If $0 < \mu - (\pi\tau^o - \overline{\sigma})(1-\overline{\sigma}) < (\pi - \sigma)\overline{\sigma}$, the condition holds for $\sigma^s = 0$ but not $\sigma^s = \overline{\sigma}$. If $\mu \geqslant \overline{\sigma}(\pi - \overline{\sigma}) + (\pi\tau^o - \overline{\sigma})(1-\overline{\sigma}) \equiv \mu_{11}^s$, the condition holds for $\sigma^s = \overline{\sigma}$ and $\sigma^s = 0$. We assume that this condition holds. In turn, this requires $\pi < \frac{1+\overline{\sigma}}{\overline{\sigma} + \tau^o(1-\overline{\sigma})}$.

Lemma 2 *Suppose $\sigma_t^m = 1$ and $\sigma_t^j = \overline{\sigma}$. The senior agent s remains in the bureaucracy for any σ^s if and only if $\mu \geqslant \pi(\overline{\sigma} + \tau^o(1-\overline{\sigma})) - \overline{\sigma} \equiv \mu_{11}^s$.*

Notice that $\mu^s_{11} < \mu^s_{01}$: there are strictly more public service motivation levels that induce the skilled senior government agents s to remain in bureaucracy when it is effective than when it is ineffective.

Not in the bureaucracy: Enter or not? If the bureaucracy has an open senior position, s should take it if $u^s_t \geqslant v^s_t$, or

$$\sigma^s \leqslant \frac{\mu - (\pi - \tau^g \sigma^m_t \sigma^j_t)(1-\overline{\sigma})}{\pi - \sigma^m_t \sigma^j_t} \tag{3}$$

Notice if $\sigma^m_t = 0$ or $\sigma^j_t = 0$, this reduces to $\sigma^s \leqslant \frac{\mu}{\pi} - (1-\overline{\sigma})$, i.e., s definitely does not enter an unproductive agency from the outside for any σ^s provided $\mu < \pi(1-\overline{\sigma})$. In this case, a senior agent s is better off remaining in private sector employment.

Instead, if $\sigma^m_t = 1$ and $\sigma^j_t = \overline{\sigma}$, the condition is $\sigma^s \leqslant \frac{\mu-(\pi-\tau^g\overline{\sigma})(1-\overline{\sigma})}{\pi-\overline{\sigma}}$. This is at least $\overline{\sigma}$ (so both skilled and unskilled seniors enter bureaucracy from outside, if the role is available) if and only if $\mu \geqslant \overline{\sigma}(\pi-\overline{\sigma}) + (\pi - \tau^g\overline{\sigma})(1-\overline{\sigma})$. In this case, low skilled but not high skilled types enter from outside bureaucracy if $(\pi - \tau^g\overline{\sigma})(1-\overline{\sigma}) \leqslant \mu < \overline{\sigma}(\pi-\overline{\sigma}) + (\pi-\tau^g\overline{\sigma})(1-\overline{\sigma})$.

Lemma 3 *If s does not remain in the bureaucracy given σ^m_t, σ^j_t, and π, then s does not enter the bureaucracy from the outside in a senior role given σ^m_t, σ^j_t, and π.*

2.2 Junior Cohort

Now consider the calculus of a junior employee deciding whether or not to enter government employment. His decision depends not only on his own skill and the current political leadership in an agency, but also on his expectations of future government capacity.

Agent j entering the bureaucracy at time t obtains lifetime utility

$$\begin{aligned} U^t =& \sigma^m_t \sigma^j (\sigma^s_t + (\xi^s_t + \tau^g(1-\xi^s_t))(1-\overline{\sigma})) + \mu \\ &+ \max\{\sigma^m_{t+1}\sigma^j_{t+1}(\sigma^s + 1 - \overline{\sigma}) + \mu, \pi(\sigma^s + \tau^o(1-\overline{\sigma}))\}. \end{aligned} \tag{4}$$

Agent j not entering the bureaucracy at time t obtains lifetime utility

$$U^t = \pi\sigma^j + \max\{\sigma^m_{t+1}\sigma^j_{t+1}(\sigma^s + \tau^g(1-\overline{\sigma})) + \mu, \pi(\sigma^s + (1-\overline{\sigma}))\} \tag{5}$$

if a position is available in the bureaucracy in period $t+1$, and

$$U^t = \pi\sigma^j + \pi(\sigma^s + (1-\overline{\sigma})) \tag{6}$$

if a position is not available in the bureaucracy in $t+1$.

2.3 Equilibrium Capacity

Suppose $\sigma_t^m = 1$ and $\sigma_t^s = \overline{\sigma}$. Suppose it is a subgame perfect Nash equilibrium for skilled juniors to enter whenever there is a skilled senior bureaucrat and manager, and for skilled senior bureaucrats to stay whenever there is a skilled manager and skilled junior enters. Then a skilled junior obtains $U = \pi(1+\overline{\sigma})$ from not entering the bureaucracy, and $U = 2\overline{\sigma} + 2\mu$ from entering. Consistent with the conjectured equilibrium, the skilled junior enters whenever

$$\mu \geqslant \frac{\pi(1+\overline{\sigma})}{2} - \overline{\sigma} \equiv \mu_{11}^j. \tag{7}$$

Proposition 1 *Suppose $\sigma_t^m = 1$ for all periods t. If public service motivation is sufficiently high,*[3] *then there is a subgame perfect equilibrium in which skilled juniors enter the the bureaucracy and skilled seniors remain for all t. Bureaucratic output is $y = \overline{\sigma}$ in every period.*

Proposition 1 describes bureaucratic output under competent political leadership and the conditions under which high-capacity is self-sustaining. The key point is that two general attributes of bureaucracy are fundamental to support high capacity over time: first, a sufficient degree of public service motivation to counteract the private sector skill premium; second, a belief held by each agent in the bureaucracy that all other agents in the bureaucracy are effective. The second attribute is embedded in the equilibrium described in the proposition. If either of these attributes is missing, the bureaucracy cannot sustain high capacity in equilibrium. In particular, if senior agents do not expect skilled junior agents to enter, they will leave; and if skilled junior agents do not expect senior skilled agents to remain, they will not enter. Indeed, even when parameters support a high capacity equilibrium, a low capacity equilibrium always exists in which skilled agents never enter the bureaucracy, and leave after one period if they do enter.

It is possible to have skilled enter as junior but leave as senior in steady state equilibrium. This is the only way to get persistent non-zero but low bureaucratic output

[3]Formally, $\mu \geqslant \max\{\mu_{11}^s, \mu_{11}^j\}$.

in equilibrium. The skilled junior will be willing to enter if the utility of entering and exiting as a senior is greater than the utility of private sector employment for both periods: $\tau^g\overline{\sigma}(1-\overline{\sigma}) + \mu + \pi(\overline{\sigma} + \tau^o(1-\overline{\sigma})) \geqslant \pi(1+\overline{\sigma})$. Rearranging for μ gives the condition:

$$\mu \geqslant \pi(1-\tau^o(1-\overline{\sigma})) - \tau^g\overline{\sigma}(1-\overline{\sigma}) \tag{8}$$

Similarly, a skilled senior bureaucrat will leave if the benefit of private sector employment is greater than the benefit of public sector employment, given the junior bureaucrat is skill and the bureaucracy is competently managed: $\pi(\overline{\sigma} + \tau^o(1-\overline{\sigma})) > \overline{\sigma} + \mu$, or $\mu < \pi(\overline{\sigma} + \tau^o(1-\overline{\sigma})) - \overline{\sigma} \equiv \mu^s_{11}$. Note condition for skilled senior exit precludes the high capacity equilibrium of the previous result. Also need unskilled, experienced outsider to enter laterally to the open senior role: $\mu > (\pi - \tau^g\overline{\sigma})(1-\overline{\sigma})$.

Proposition 2 *Suppose $\sigma^m_t = 1$ for all periods t. If public service motivation is not too low but not high enough to sustain a high capacity equilibrium,*[4] *skilled juniors enter the bureaucracy, skilled seniors leave, and experienced but unskilled seniors enter for all t. Bureaucratic output is $y = \tau^g\overline{\sigma}(1-\overline{\sigma})$ in every period.*

3 The Persistent Effects of Bad Management

Unfortunately, today's politics of public bureaucracy do not allow a presumption that all components of bureaucratic team production will in general be effective. President Donald Trump's approach to administrative management frequently aimed at undermining bureaucratic agencies, or making them less effective at their tasks as career staff understood them. For example, appointees with no managerial skill who harbor hostility to agency missions can be understood to have this effect.

It is easy for any president to undermine management of an agency in their own administration, owing to potent and inherent controls that presidents possess over the executive branch. An important question is whether these acts of short-term undermining have longer-run effects—and if so, why. If one president undermines agency management, and their successor can just as easily restore it, then the effects of undermining administrative capacity are limited to one administration—and in principle can be judged by voters at the next election.

In this section we assume that there is one "surprise" period of bad management followed by an infinite stream of good management. The purpose is to analyze how the

[4]Formally, $\mu^s_{11} > \mu \geqslant (\pi - \tau^g\overline{\sigma})(1-\overline{\sigma})$.

effect of just one period of bad management on agency capacity propagates through time. Our analysis shows that the effects of bad management shocks depend on whether the bureaucracy is "high" or "medium" capacity, so we consider these cases in turn.[5]

3.1 High Capacity Bureaucracies

First consider a high capacity bureaucracy as described in proposition 1. Assume $\sigma_t^m = 1$ in every period except t', when $\sigma_{t'}^m = 0$. Assume $\sigma_{t-1}^m = 1$ and $\sigma_{t-1}^s = \sigma_{t-1}^j = \overline{\sigma}$.

As shown in lemma 1, $\sigma_{t'}^m = 0$ induces the senior bureaucrat to leave in period t'. Assume that there is no exit and re-entry from the bureaucracy in equilibrium. Then if a skilled junior enters the bureaucracy in t', and expects other skilled juniors to do so in subsequent periods, they obtain utility $U = (0 + \mu) + (\overline{\sigma} + \mu)$. If a skilled junior does not enter the bureaucracy in t', they obtain $U = \pi(1 + \overline{\sigma})$. Thus if $\mu \geqslant \frac{\pi(1+\overline{\sigma})-\overline{\sigma}}{2}$, the skilled junior employee enters and "rides out" the period of bad management. The effect of mismanagement lasts only one period. Bureaucratic output is 0 in period t, but returns to high output $\overline{\sigma}$ in each subsequent period.

If $\mu < \frac{\pi(1+\overline{\sigma})-\overline{\sigma}}{2}$, then one period of bad management causes both the skilled senior agent to leave and skilled junior agent not to enter in period t'. An unskilled agent enters in period t'. In period $t' + 1$, the new senior agent stays only if management is competent ($\sigma_{t'+1}^m = 1$) and junior bureaucrats are skilled ($\sigma_{t+1}^j = \overline{\sigma}$). Suppose this condition holds, a skilled junior enters in $t' + 1$, and expects skilled juniors to enter after $t' + 1$. Then a skilled junior entering the bureaucracy at $t' + 1$ obtains lifetime utility $U = \overline{\sigma}(1 - \overline{\sigma}) + \mu + (\overline{\sigma} + \mu) = \overline{\sigma}(2 - \overline{\sigma}) + 2\mu$. A skilled junior agent obtains utility $U = \pi(1 + \overline{\sigma})$ outside the bureaucracy. So if $\frac{\pi(1+\overline{\sigma})-\overline{\sigma}}{2} > \mu \geqslant \frac{\pi(1+\overline{\sigma})-\overline{\sigma}(2-\overline{\sigma})}{2}$, the skilled junior agent enters in the second period after the management shock. The sequence of bureaucratic output is $0, \overline{\sigma}(1 - \overline{\sigma}), \overline{\sigma}, \overline{\sigma}, \ldots$.

However, if $\mu < \frac{\pi(1+\overline{\sigma})-\overline{\sigma}(2-\overline{\sigma})}{2}$, a skilled junior does not enter in period $t' + 1$, given an experienced but unskilled senior bureaucrat in $t' + 1$. Therefore an unskilled junior bureaucrat enters, and in turn, the experienced senior bureaucrat leaves. Then period $t'+2$ looks exactly like $t' + 1$: an experienced but unskilled senior, which does not induce entry by a skilled junior, and in turn induces exit from the experienced senior. Bureaucratic output remains low in each period ($y = 0$).

In short, proposition 1 shows that $\mu \geqslant \frac{\pi(1+\overline{\sigma})-2\overline{\sigma}}{2}$ is necessary to *sustain* a high-skilled bureaucracy that exists exogenously. However, the analysis above shows that

[5] We do not consider the effects of bad management on low-capacity because they cannot be undermined further.

even greater public service motivation, or $\mu \geqslant \frac{\pi(1+\overline{\sigma})-\overline{\sigma}}{2}$, is necessary to *rebuild* a high-skilled bureaucracy after a 1-period "surprise" shock of bad management. Specifically, if $\mu \geqslant \frac{\pi(1+\overline{\sigma})-\overline{\sigma}}{2}$, then one period of bad management causes only one period of low bureaucratic output. But if $\frac{\pi(1+\overline{\sigma})-\overline{\sigma}(2-\overline{\sigma})}{2} < \mu < \frac{\pi(1+\overline{\sigma})-\overline{\sigma}}{2}$, rebuilding bureaucratic capacity takes two periods, so one period of bad management has a prolonged effect on bureaucratic capacity. Further, if $\mu < \frac{\pi(1+\overline{\sigma})-\overline{\sigma}(2-\overline{\sigma})}{2}$, then one period of bad management destroys agency capacity for every subsequent period.

Proposition 3 *High capacity agencies are vulnerable to undermining. If public service motivation is very high, bad management matters only for the duration of the management shock. If public service motivation is moderately high, bad management matters beyond the management shock, then capacity eventually returns to its pre-shock level. If public service motivation is moderate, bad management destroys agency capacity forever.*

High capacity agencies are vulnerable because they depend on a steady flow of skilled agents. Due to the skill premium in the outside option, those agents are most inclined to select out of a poorly managed bureaucracy.

Note that proposition 3 takes bureaucratic output as given in equation 1. It implies that a single period management shock destroys bureaucratic capacity forever only if this production process remains in operation. In truth, an agency's production process is itself a response to its workforce. The process could be adjusted by, for example, minimizing the team production aspect. Though we have not modeled that adjustment, it seems reasonable to expect that in time it would limit the negative effect of the management shock. On the other hand, if team production is optimal for a well-managed agency with a capable workforce, it is also reasonable that any such adjustment in the agency's process would result in lower steady-state output than the team process from equation 1.

3.2 Medium Capacity Bureaucracies

Next consider a medium capacity bureaucracy as described in proposition 2. In every period, skilled juniors enter the bureaucracy, skilled seniors leave, and experienced unskilled outsiders take the senior role. When $\sigma^m_{t'} = 0$, all skilled bureaucrats leave and none enter. Then in $t'+1$, $\sigma^m_{t'+1} = 1$. The unskilled new senior stays provided a skilled junior enters, and vice versa. Notice that the pre-shock equilibrium entails that skilled juniors enter *even if* the senior is unskilled and only has outside experience; their utility is strictly greater when the senior has inside experience. So skilled juniors indeed enter in period $t'+1$, provided the mid-capacity equilibrium holds pre-shock. Then in $t'+2$, the

agency is in exactly its pre-shock position: a rising skilled senior who leaves, an unskilled experienced senior who enters from outside, and a skilled junior entering. Notice that agency output starting at the management shock is $0, \overline{\sigma}(1-\overline{\sigma}), \tau^g\overline{\sigma}(1-\overline{\sigma}), \tau^g\overline{\sigma}(1-\overline{\sigma}), \ldots$: it first rebounds *above* its steady state level, but then returns to the steady state in the following period.

Proposition 4 *Middle capacity and low capacity agencies are not vulnerable to undermining. The effect of bad management lasts only for the duration of the management shock, then the agency immediately produces at or above its steady state capacity.*

4 Tamper-Proof Bureaucratic Capacity

Our model suggests that bureaucratic capacity can be made tamper-proof. This is accomplished by separating the team production elements of bureaucratic output into individual components. If an individual agent can accomplish a public mission on their own, then agents will not get stuck in a self reinforcing pattern of entry only by low quality types. By the same token, team production that helps bureaucracies work better, when staffed by high quality types, also makes them more appealing relative to non-public outside options. This implies there is a limit on tampering-proofness of public agencies. If selection into government by high quality types under non-team production requires extraordinarily high public service motivation, then it will often not occur and state capacity will again suffer as a result.

5 Conclusion

Political commitment to bureaucratic quality is under threat in the US. This threat manifests as appointing incompetent political managers in agencies or leaving them vacant, rescinding civil service protections for career bureaucrats, and other channels.

It is important to know the potential effects of this threat. If rebuilding bureaucratic capacity is as simple as reappointing competent managers and bringing back experienced and skilled senior staff, then damage to bureaucratic capacity need not outlast the tenure of the president inflicting it. But if bureaucratic capacity or incapacity are "sticky," then damage to it will outlast the president inflicting it, and will undermine capacity even under a president wishing to restore it. In short, the implications of the threat to bureaucratic capacity require answering whether the capacity of bureaucratic agencies is more like a light switch or an old TV.

In this paper we have developed a formal model of bureaucratic output in which an agency's capacity is self-sustaining or "sticky." The model depends on three important features: team production of bureaucratic output; self-selection into bureaucracy that is correlated with skill; and overlapping generations of careerists. The key effect of this structure is that sustaining bureaucratic capacity requires coordinated decisions by multiple agents to enter and remain in the bureaucracy; but undermining bureaucratic capacity requires only uncoordinated and decentralized decisions of any of those agents to exit. That exit can be engineered by even a single incompetent administration, which damages the career prospects of agents who remain. Moreover, once capacity is undermined, rebuilding it requires that new entrants into government service reestablish experience that sustains a skilled and capable work force. This can take time, and it may be impossible. In short, team production builds in complementarity that can enhance bureaucratic output under optimal conditions, but also make bureaucratic capacity fragile.

The results take a step toward explaining the stickiness of bureaucratic capacity or incapacity. This stickiness is normatively important but is assumed in previous models of capacity development without providing microfoundations. The results also suggest a number of directions for future research. These include the role of policy ideology in sustaining and rebuilding bureaucratic capacity, and the optimal design of agency production processes to make them "undermining-proof."

A Formal Proofs

Proof of Lemma 1. Consider a senior bureaucrat in period t who worked in the bureaucracy in $t-1$. This bureaucrat should stay in the bureaucracy if and only if $u_t^s \geqslant v_t^s \Leftrightarrow \sigma_t^m \sigma_t^j (\sigma^s + 1 - \overline{\sigma}) + \mu \geqslant \pi(\sigma^s + \tau^o(1-\overline{\sigma}))$ or rearranging for σ^s

$$\sigma^s \leqslant \frac{\mu - (\pi\tau^o - \sigma_t^m \sigma^j)(1-\overline{\sigma})}{\pi - \sigma_t^m \sigma_t^j}.$$

Substituting into the expression for $\sigma_t^m = 0$ or $\sigma_t^j = 0$ gives

$$\sigma^s \leqslant \frac{\mu}{\pi} - \tau^o(1-\overline{\sigma}).$$

In this case, a skilled senior bureaucrat ($\sigma^s = \overline{\sigma}$) will remain only if

$$\frac{\mu}{\pi} - \tau^o(1-\overline{\sigma}) \geqslant \overline{\sigma} \Rightarrow \mu \geqslant \pi(\overline{\sigma} + \tau^o(1-\overline{\sigma})) \equiv \mu_{01}^s,$$

whereas a low skill senior bureaucrat ($\sigma^s = 0$) will remain only if

$$\frac{\mu}{\pi} - \tau^o(1-\overline{\sigma}) \geqslant 0 \Rightarrow \mu \geqslant \pi\tau^o(1-\overline{\sigma}) \equiv \mu_{00}^s.$$

■

Proof of Lemma 2. Let $\sigma_t^m = 1$ and $\sigma_t^j = \overline{\sigma}$. From the proof of Lemma 1, the senior bureaucrat will stay in government if

$$\sigma^s \leqslant \frac{\mu - (\pi\tau^o - \sigma_t^m \sigma^j)(1-\overline{\sigma})}{\pi - \sigma_t^m \sigma_t^j}.$$

Substituting into the expression for $\sigma_t^m = 1$ and $\sigma_t^j = \overline{\sigma}$ gives

$$\sigma^s \leqslant \frac{\mu - (\pi\tau^o - \overline{\sigma})(1-\overline{\sigma})}{\pi - \overline{\sigma}}.$$

This holds for every senior employee provided the righthand side is greater than $\overline{\sigma}$. Rearranging this condition for μ gives

$$\mu \geqslant \overline{\sigma}(\pi - \overline{\sigma}) + (\pi\tau^o - \overline{\sigma})(1-\overline{\sigma}) = \pi(\overline{\sigma} + \tau^o(1-\overline{\sigma})) - \overline{\sigma} \equiv \mu_{11}^s.$$

■

Proof of Lemma 3. Consider a senior agent that had been employed in the private

sector in the previous period deciding whether to enter government. If the bureaucracy has an open senior position, s should take it if $u_t^s \geqslant v_t^s$, or

$$\sigma^s \leqslant \frac{\mu - (\pi - \tau^g \sigma_t^m \sigma_t^j)(1 - \overline{\sigma})}{\pi - \sigma_t^m \sigma_t^j}.$$

First, we consider conditions for a senior agent to enter government, given σ_t^m and σ_t^j. Then, we compare those conditions to the conditions described in Lemma **??** and **??**, characterizing when senior government employees choose to remain in government.

Let $\sigma_t^m = 0$ or $\sigma_t^j = 0$, then s will enter government if $\sigma^s \leqslant \frac{\mu}{\pi} - 1$, which does not hold for either high-skilled or low-skilled agents. Instead, let $\sigma_t^m = 1$ and $\sigma_t^j = \overline{\sigma}$, then s will enter government if

$$\sigma^s \leqslant \frac{\mu - (\pi - \tau^g \overline{\sigma})(1 - \overline{\sigma})}{\pi - \overline{\sigma}}.$$

Both high and low skilled agents will be willing to enter if the righthand side is greater than $\overline{\sigma}$, or

$$\mu \geqslant \overline{\sigma}(\pi - \overline{\sigma}) + (\pi - \tau^g \overline{\sigma})(1 - \overline{\sigma}),$$

whereas only low skilled will be willing to enter if

$$\overline{\sigma}(\pi - \overline{\sigma}) + (\pi - \tau^g \overline{\sigma})(1 - \overline{\sigma}) > \mu \geqslant (\pi - \tau^g \overline{\sigma})(1 - \overline{\sigma}).$$

Then, we have that

$$\mu_{11}^s \equiv \overline{\sigma}(\pi - \overline{\sigma}) + (\pi\tau^o - \overline{\sigma})(1 - \overline{\sigma}) \leqslant \overline{\sigma}(\pi - \overline{\sigma}) + (\pi - \tau^g \overline{\sigma})(1 - \overline{\sigma}),$$

which holds given $\tau^o, \tau^g \in [0, 1]$. Similarly, we have that

$$\mu_{00}^* \equiv \pi\tau^o(1 - \overline{\sigma}) \leqslant \pi(1 - \overline{\sigma})$$

which holds given $\tau^o \in [0, 1]$. ■

Proof of Proposition 1. Suppose $\sigma_t^m = 1$ for all t. Then, skilled senior bureaucrats will remain in government only if

$$\mu \geqslant \overline{\sigma}(\pi - \overline{\sigma}) + (\pi\tau^o - \overline{\sigma})(1 - \overline{\sigma}) \equiv \mu_{11}^s.$$

from Lemma 2. For skilled junior agents to enter in government, then

$$2\overline{\sigma} + 2\mu \geqslant \pi(1+\overline{\sigma}) \Rightarrow \mu \geqslant \frac{\pi(1+\overline{\sigma}) - 2\overline{\sigma}}{2} \equiv \mu_{11}^{j}.$$

Then, μ $geq \max\{\mu_{11}^{j}, \mu_{11}^{s}\}$ guarantees both conditions hold: skilled senior bureaucrats remain in government and skilled junior agents enter in each period. ■

Proof of Proposition 2. Suppose $\sigma_t^m = 1$ for all periods t. Then, if $\mu < \mu_{11}^{s}$, skilled senior bureaucrats exit government even if $\sigma_t^m = 1$ and $\sigma_1^j = 1$ (from Proposition **??**). This will mean that the senior bureaucrat does not have government experience.

For a skilled junior agent to be willing to enter as a junior bureaucrat in period t, before exiting in $t+1$ requires:

$$\tau^g\overline{\sigma}(1-\overline{\sigma}) + \mu + \pi(\overline{\sigma} + \tau^o(1-\overline{\sigma})) \geqslant \pi(1+\overline{\sigma}).$$

Rearranging for μ gives the condition:

$$\mu \geqslant \pi(1-\tau^o(1-\overline{\sigma})) - \tau^g\overline{\sigma}(1-\overline{\sigma}) \equiv \overline{\mu}.$$

Finally, experienced low skilled senior agents will need to be willing to enter government:

$$\mu + \tau^g(1-\overline{\sigma})\overline{\sigma} \geqslant \pi(1-\overline{\sigma}) \Rightarrow \mu \geqslant (\pi - \tau^g\overline{\sigma})(1-\overline{\sigma}) \equiv \underline{\mu}.$$

Note that $\overline{\mu} < \underline{\mu}$. Then, this equilibrium exists if and only if

$$\mu_{11}^{s} > \mu \geqslant (\pi - \tau^g\overline{\sigma})(1-\overline{\sigma}).$$

■

Proof of Proposition 3. First, consider when skilled juniors are willing to remain in government even under poor management in period a single period t'. For a skilled junior to be willing to enter requires,

$$2\mu + \overline{\sigma} \geqslant \pi(1+\overline{\sigma}) \Rightarrow \mu \geqslant \frac{\pi(1+\overline{\sigma}) - \overline{\sigma}}{2}.$$

However, if $\mu < \frac{\pi(1+\overline{\sigma})-\overline{\sigma}}{2}$, then the skilled junior will not enter in t'. The position will be filled by an unskilled agent, that will remain in government in period $t'+1$ only if

$$\mu + \overline{\sigma}(1-\overline{\sigma}) \geqslant \pi\tau^o(1-\overline{\sigma}) \Rightarrow \mu \geqslant (\pi\tau^o - \overline{\sigma})(1-\overline{\sigma}).$$

Now consider conditions under which a skilled junior will enter in period $t' + 1$. A skilled junior will enter if and only if

$$\overline{\sigma}(1 - \overline{\sigma}) + 2\mu + \overline{\sigma} \geqslant \pi(1 + \overline{\sigma}) \Rightarrow \mu \geqslant \frac{\pi(1 + \overline{\sigma}) - \overline{\sigma}(2 - \overline{\sigma})}{2}.$$

Then, there exists an equilibrium in which a skilled junior enters in $t' + 1$, but not in t' if

$$\frac{\pi(1 + \overline{\sigma}) - \overline{\sigma}}{2} > \mu \geqslant \frac{\pi(1 + \overline{\sigma}) - \overline{\sigma}(2 - \overline{\sigma})}{2}$$

Now suppose $\mu < \frac{\pi(1+\overline{\sigma}-\overline{\sigma}(2-\overline{\sigma})}{2}$. Then, a skilled junior will not enter in t' or $t' + 1$. In this case, a skilled senior will not enter with $\sigma_t^j = 0$ (see Lemma 3). Period $t' + 2$ is identical to $t' + 1$: experienced, but unskilled seniors exit and skilled junior agents do not enter. This holds for all $t > t'$. ■

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