PUBLIC-SECTOR PERSONNEL ECONOMICS: WAGES, PROMOTIONS, AND THE COMPETENCE-CONTROL TRADE-OFF

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ABSTRACT

We examine personnel policies and careers in public agencies, particularly how wages and promotion standards can partially offset a fundamental contracting problem: the inability of public-sector workers to contract on performance, and the inability of political masters to contract on forbearance from meddling. Despite the dual contracting problem, properly constructed personnel policies can encourage intrinsically motivated public-sector employees to invest in expertise, seek promotion, remain in the public sector, and work hard. To do so requires internal personnel policies that sort "slackers" from "zealots." Personnel policies that accomplish this task are quite different in agencies where acquired expertise has little value in the private sector, and agencies where acquired expertise commands a premium in the private sector. Even with well-designed personnel policies, an inescapable trade-off between political control and expertise acquisition remains.

INTRODUCTION

Over the past 50 years, there have been substantial advances in economics (e.g., Waldman, 2013), sociology (e.g., Edgell et al., 2015), and management (e.g., Gunz & Peiperl, 2007) in understanding intra-organizational mobility and

Employee Inter- and Intra-Firm Mobility
Advances in Strategic Management, Volume 41, 111–148

ISSN: 0742-3322/doi:10.1108/S0742-332220200000041007

promotions of private-sector employees (Doeringer & Piore, 1970, 1985; Shaw, 2009). However, these insights have not been as rapidly or comprehensively transmitted to public-sector labor markets. One reason is that until recently, large panel data on the public-sector employees' career trajectories were not available. Second, the public-sector faces more constraints, such as security of employment, and different characteristics, such as democratically elected leaders, that make it difficult to transport wholesale the private-sector theories of internal labor markets to the public-sector. In this chapter, we borrow from the literature on private-sector incentives and game theory to develop a theory of public-sector personnel economics that explains wages, promotions, and the timing and choices of political leaders to "meddle" in the civil service.

Public-sector bureaucracies play a vital role in democracies because they implement the programs and deliver the services desired by the electorate. Unfortunately, achieving high performance in public-sector agencies is notoriously difficult. The source of the difficulty is a dual contracting problem between the civil servants employed in public agencies and the politicians who run or oversee them. On the one hand, the parties can rarely contract on the effort or performance of the civil servants; on the other hand, the parties can never fully contract on the forbearance from self-interested meddling by the politicians. Together, these two contracting problems make high performance elusive in many agencies. They create what has been described as a competence-control trade-off (Aghion & Tirole, 1997; Lewis, 2008). Politicians wish to control bureaucratic policy outcomes and place their political agents at the top of the agency hierarchies to meet this objective. However, when such tight political control is effectuated, it chokes off the incentives of many lifetime civil service bureaucrats to invest in the expertise and knowledge critical to achieving high performing government. Hence, the politicians' desire for control sacrifices agency competence. Despite the trade-off, some agencies do achieve high performance. We argue that a key factor in their success is designing internal personnel policies – especially wage and promotion standards – that build cadres of highly motivated and capable managers. In this chapter we offer a model providing the microfoundations of the competence-control trade-off and suggest how to design government personnel policies to obtain higher performing agencies.

The bases of the two contracting problems in public agencies are well known (Wilson, 1989). First, performance contracting in public agencies is frequently problematic. The goals of national security agencies, prisons, schools, police forces, welfare agencies, the diplomatic corps, intergovernmental grant programs, and even park services and transportation departments are inherently multidimensional and imprecise. The tasks performed in the agencies are typically resistant to easy measurement and only tenuously connected to formal organizational missions. As is now well-understood, this cluster of characteristics makes performance contracting very difficult or even counterproductive (Baker, 2002; Holmstrom & Milgrom, 1991). In addition, self-binding efforts by politicians to protect employees from the grossest varieties of political meddling, in the form of civil service prohibitions on easy dismissal and salary manipulation, limit the use

of high-powered incentives in public agencies (Johnson & Leibcap, 1994; Maranto, 1998). So do public-sector unions, which adamantly oppose performance contracting (Moe, 2011).

Second, political meddling in public agencies is pervasive and unavoidable (McCarty, 2004; McCubbins et al., 1989; Moe, 1985). Citizens in democracies demand accountability and responsiveness from public agencies. Politicians, as agents of the electorate, become the principals of the agencies, either directly (when the agency is actually administered by a politician or political appointee) or indirectly (when politicians approve budgets and craft enabling legislation). As the effective "boss," the politician-principal can no more contract away her decision rights in the agency than a CEO can in a firm (Baker, Gibbons, & Murphy, 1999). And, inevitably the politician-principal will be tempted to use those decision rights to further her own objectives. Not only does this meddling subvert agency missions, it undercuts the motivation of employees in the agency and can dramatically degrade agency performance (Lewis, 2008).

There are solutions to the dual contracting problem. First, agencies like firms can build corporate cultures through relational contracts (Baker et al., 1999; MacLeod, 2007; Williamson 1985, 1996). In stable environments, these relational contracts can mitigate the performance contracting problem in public agencies (Kaufman, 1960). They can also reduce or offset the meddling problem (Carpenter, 2001, 2010). However, this solution requires the political principal and the public-sector agents to engage in long-term, repeated interactions. In public agencies, governments are short-lived and political appointees often even shorter-lived (Dull, Roberts, Keeney, & Choi, 2012; O'Connell, 2009). Short tenures render self-enforcing relational contracts nugatory.

A second alternative is to attract and then differentially promote or retain intrinsically motivated individuals ("zealots") who – in contrast with purely financially motivated "slackers" – find employment as public-sector managers inherently satisfying. Of course, reliance on intrinsic motivation is also possible in the private sector (Prendergast, 2008), but it plays a more prominent role in the public sector, as many have observed (Besley & Ghatak, 2005; Downs, 1967; Gailmard & Patty, 2007; Golden, 2000; Kaufman, 1981; Perry & Wise, 1990), where "mission-oriented" individuals who believe in the mission of government join the agencies. If public agencies are to mitigate the dual contracting problem by attracting and differentially promoting and retaining zealots, the agencies must have *properly designed personnel policies*. What do such personnel policies in public agencies look like and how do they operate? These are the questions we address in this chapter.

We are not the first to examine this problem. The fields of economics and sociology have been concerned with hiring, promotions, and employee mobility for some time, in particular, in the context of internal labor markets (ILMs). Doeringer and Piore (1970, 1985) introduced the concept of ILMs within the firm governed by rules and procedures, as contrasted with the external labor market in conventional economic theory governed by prices. In their seminal book they explain the role of internal labor markets in the promotion and mobility of workers within firms and the connections to the external labor markets through

"ports of entry or exit" through hiring and departures. The logic underlying the ILMs was further developed by these authors and others (e.g., Williamson, 1985) in focusing on the importance of firm-specific skills, expertise, and knowledge in supporting the development of internal promotion paths and wages commensurate with an individual's specialized, firm-specific skills.

Pfeffer and Cohen (1984) found that ILMs are more likely to be found in organizations where firm-specific skills and knowledge were required. They hypothesized that ILMs were likely to be important in governmental organizations for bureaucratic and institutional theoretic reasons (Meyer & Rowan, 1977). Baron, Davis-Blake, and Bielby (1986) argued that ILMs develop in response to characteristics of particular transactions or jobs, encompassing only some types of positions within organizations. They found that managerial occupations and more bureaucratic organizations are likely to have job ladders and ILMs. Bidwell (2001) extended this work, comparing external hiring with internal mobility. He found that workers hired into jobs from the outside had worse performance in the first two years of their hiring, compared to workers who were promoted internally, but that these external hires were initially paid more than internally promoted counterparts. Waldman (2013) provides a nice overview of more recent developments in the field of ILMs.

Related to ILMs are managerial tournaments. Tournament theory argues that managers at one level compete, as in a tournament, to become the boss at the higher level (Lazear & Rosen, 1981). This encourages workers at the lower level to work hard to win a prize, which is the much higher salary of the boss. There has been a substantial amount of empirical literature substantiating the predictions of tournament theory (see DeVaro, 2006, for an overview). However, tournament theory may not map directly onto public-sector jobs because one of the central predictions of tournament theory is that wages are convex in promotions. In the federal government, wages are actually concave in promotions (Bolton & de Figueiredo, 2018).

One particularly relevant model is developed by Huang and Cappelli (2006, 2010) examining the role of screening based on "work ethic." They predict those individuals with a higher work ethic should be paid more than those with a lower work ethic because the marketplace prizes high work ethic individuals. In their model, individuals are screened based on work ethic. Once her type is revealed, there is competition in the marketplace for this high-type person, raising wages. In our model, individuals are screened on effort, which, in some agencies, is induced by zealotry – that is, their interest and commitment to the public service mission. Whereas in the Huang and Cappelli (2006, 2010) papers, the work ethic is transferrable between the public and private sector, in our paper, we assume that the zealotry is non-transferrable. Thus, the zealot is willing to accept a lower wage to stay in the government provided she is given an outlet to exercise discretion in policymaking.

The starting place for our analysis of public-sector personnel policies is the following observation: Although politicians and employees cannot contract on agent effort or principal forbearance, they can contract on two other dimensions: public-sector wages and promotion standards. Indeed, civil service wage scales

are well-defined public information, and promotion standards are generally written and transparent. Moreover, courts have demonstrated a willingness to use labor and employment laws to enforce agreements on wages and promotion standards. This offers the possibility of using wage scales and promotion standards strategically to attract zealots and sort them internally from slackers, even in the face of the non-contractible meddling problem.

Following earlier scholars that differentiate between general skills and firm-specific skills, our analysis distinguishes two types of agencies or bureaus. "Type I" agencies are government organizations in which the skills of the professionals and managers have low value outside the agency. Type I civil servant positions include mail sort managers at the Post Office, conductors at Amtrak, office managers at the Department of Motor Vehicles, meat inspectors at the Department of Agriculture, some types of social workers in the Department of Human Services, auction managers at the Bureau of Public Debt, and air traffic controllers at the Federal Aviation Administration (FAA). In these agencies, employee skills acquired in the public sector are specific to the public sector and do not command a wage premium in the private sector. "Type II" agencies are those government organizations in which the skills of the professionals and managers have high value in the private sector. Examples of Type II agency public-sector positions include employment discrimination and antitrust attorneys in the Department of Justice (DOJ), securities regulators, procurement officers in the Defense Department, aerospace engineers at NASA, and bank examiners at the Office of the Comptroller of the Currency. In such agencies, the skills acquired in the public sector are highly valued by private-sector employers. The government is rife with Type I and Type II bureaus and positions within its bureaucracies.

We argue that personnel policies should differ dramatically in these two environments. In Type I agencies, employees that enter the agency cannot depart for higher paying jobs in the private sector. Consequently, most become public-sector "lifers." In this setting, the key problem is to motivate the zealots – and *only* the zealots – to seek promotion as agency managers, since their high motivation will lead them to work diligently in pursuit of the agency mission. We show that it is possible to craft a promotion standard and managerial wage that differentially induces zealots to invest in technical and policy expertise and become high-quality managers, even in the face of political meddling. Slackers remain in the lower tiers of the agency as "clerks." We call this sorting behavior "promotion screening." In contrast, in Type II agencies employees that invest in expertise develop a skill set that commands a premium in the private sector. Thus, both slackers and zealots have an incentive to invest in expertise. The challenge for the Type II agency is to differentially retain the zealots post-promotion. We show that appropriately constructed wage ladders and promotion standards can induce sorting, but in this case "managerial sorting" in which the slackers opportunistically depart the agency as "in-and-outers" while zealots remain as agency managers.

The distinctively different personnel policies in the two types of agencies result in different wage structures, different promotion standards, different career paths,

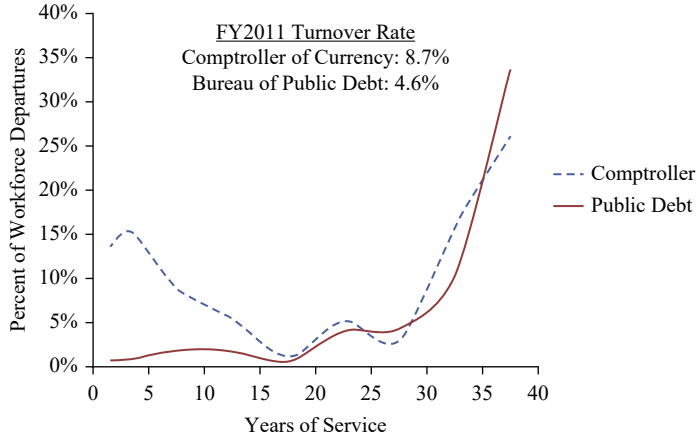
different politicization levels, and different rates of agency policy innovation. For example, Type II agencies will display substantially more turnover than Type I agencies. In Type II bureaus, the departures of slackers will tend to occur after investments in a level of expertise. In addition, wage schedules will be steeper, and managerial wages higher in Type II bureaus than in Type I bureaus.

In designing wage structures and promotion paths consistent with employee utility, the government can induce sorting by employees and screening by the government so as to promote zealots and either fail to promote slackers (in Type I agencies) or induce them to exit to the private sector (in Type II agencies). This employee mobility within and out of government, created by the careful design of personnel policies within the government, can promote higher agency performance. In fact, the model can help explain the micro-foundations of the competence-control trade-off. If political masters do not allow the zealot civil servants the ability to craft policy, these zealots will either not exert effort to learn and develop expertise (in Type I agencies) or they will throw up their hands in frustration and leave the government altogether (in Type II agencies). By melding the sociology and economics literatures on internal labor markets with the political science and public administration literatures on governmental bureaucracies, we hope to better understand the competence-control trade-off.

Illustrative Example

Two bureaus in the same agency, the Department of the Treasury, illustrate the two different internal labor markets (ILMs) in action. The first bureau, the Office of Public Debt (OPD), is responsible for designing and executing the US Treasury Bond auctions, operating direct bond sales to US citizens, and keeping accounting records for the US debt. Employees in this agency are promoted based on their ability to effectively execute and manage these tasks. The skills in this agency, while crucial to the effective financing of the US government, have limited value in the private sector. Hence, we categorize the Office of Public Debt as a Type I bureau. On the other hand, the Office of the Comptroller of the Currency (OCC) is a key player in bank regulation. Its bank examiners develop skills to assess regulatory compliance and the financial worthiness of the institutions under the OCC's control. Within the first few years of their career, the examiners are expected to pass a rigorous three-part Uniform Commissioned Examination. Thus, bank examiners develop a series of skills, including risk management, evaluation of asset safety and soundness, and how to manage a bank from a bank manager's perspective, all skills which have high value in the private sector. We categorize the OCC as a Type II bureau.

The employee turnover rate at the OCC is almost twice the turnover rate at OPD. In 2011, 4.6% of all employees from the OPD departed government service while 8.7% of all employees in the OCC departed. In Fig. 1, we disaggregate the FY2011 departures by years of service in the federal government for all employees with over one year of service. Fig. 1 shows the employee departures



Note: Data from Fedscope, Office of Personnel Management, FY2011; Includes GS-5 and above employees who have a minimum of 12 months of service; departures averaged across interval

Fig. 1. Turnover in Two Bureaus in the Treasury Department.

from each agency as a percentage of total employees at the agency with the same job tenure in FY 2011. The Figure illustrates two different patterns. First, OPD employees tend to be lifers. They have very low civil service departure rates in the first 20 years of their career. Between 20 and 30 years of service, there is a greater hazard of civil service exit as generous pension benefits vest. After 30 years of service, there are very high rates of departures as most of these employees end their working careers and enter retirement. At OCC, the pattern of departures is quite different. There is substantial churn in employment in the first 10 years of employment, a low level between 10 and 20 years of service, and similar pattern to the OPD after 20 years of service. It is precisely in the first few years of employment that OCC bank examiners sit for the Uniform Commissioned Examination and reveal to the private sector their expertise in skills that are valuable to the private sector – the same time that many of these individuals depart the OCC. Finally, 8% of employees at the OPD with 20–25 years of civil service tenure earn more than $150,000, while 38% of employees at the OCC with 20–25 years of civil service tenure at these same levels.

This example illustrates the different patterns of wages and turnover in Type I and Type II agencies. However, in both kinds of agencies, interference by a political appointee is also important and will alter agency performance by changing internal personnel policies. In equilibrium, politicization decreases the intensity of policymaking effort by civil servants, lowers the agency's promotion standards, decreases the acquisition of expertise by civil servants, flattens the agency's salary structure, and reduces the agency's policy activism.

The chapter is organized as follows. In the next section, we present a model of public-sector personnel policies in Type I and Type II agencies with slackers and

zealots. The section on Equilibrium details equilibria in the multistage game and describe how sorting and screening occurs. In the section on Microfoundations of the Competence-Control Trade-off, we examine the managerial competence-control trade-off. We offer a final discussion and conclusion in the last section. Appendix contains proofs.

THE MODEL

The model has three distinct components: (1) policymaking, (2) the internal labor market, and (3) agency design. The policymaking component of the model draws heavily on Gailmard and Patty (2007). However, that paper treats policymaking as setting a point in ideological space, as is standard in positive political theory (see, e.g., Huber & McCarty, 2004; Huber & Shipan, 2002). In contrast, our analysis of policymaking closely follows Baker et al. (1999) and other papers in organizational economics by focusing on decisions over "projects." We see this modeling technology as somewhat more descriptive of policymaking in bureaucracies; arguably, it is somewhat more flexible as well. The ILM component of the model draws on perspectives from personnel economics (Oyer & Lazear, 2013; Waldman, 2013). Investment in human capital for promotion is important in the model, as it is in Prendergast (1993). However, sorting slackers and zealots post-employment lies at the heart of our model of internal personnel policies. In that sense, the model addresses questions raised at the end of Prendergast (2008) and complements the initial employment sorting studied in Besley and Ghatak (2005). The agency design component is a relatively straightforward exercise in contract theory (Bolton & Dewatripont, 2004).

Table 1 provides a summary of the notation in the model. Table 2 indicates the exogenous and endogenous variables in the model.

Sequence of Play, Information, and Strategies

The players are the head of an agency (the Boss), assumed to be a political appointee, and a potential employee of the agency (the Subordinate). The Subordinate may be of two types denoted by $\theta \in \{0, 1\}$, a "slacker" ($\theta = 0$) or a "zealot" ($\theta = 1$). The significance of this distinction will become clearer momentarily, but while both value wages only zealots value policy. Subordinate type is private information for the Subordinate.

There are two jobs for Subordinates within the agency, the two forming a career ladder: an entry-level "clerk" position, and a policymaking "manager" position. In the former, the subordinate performs a routine task yielding benefit v to the Boss. In the latter position, the manager works to create a policy initiative, a "project," to recommend to the Boss. If accepted by the Boss, a policy project yields payoffs X to the Subordinate and Y to the Boss. For simplicity we assume that the benefits take only two values, positive or negative: $X_H > 0 > X_L$ and $Y_H > 0 > Y_L$. Importantly, the project payoffs may differ systematically between the two players, so there is a tension between the preferences of the Subordinate and those of the Boss. The probability of X_H is simply the Subordinate's work

Table 1. Model Notation.

Notation	Definition
s_c	Entry-level wage in the private sector
s_m	Second-period (expected) wage in the private sector
s_i	Private-sector wage for promoted public-sector employee, either s_c or s_o
s_o	Outside wage available post-promotion in Type II agencies, $s_o = s_c + \kappa e^2$
w_c	Entry-level wage in the public sector
w_m	Managerial wage for promoted public-sector employee
p	Policy agreement between public employee and Boss, $Pr(Y_H \mid X_H)$
X	Value to employee of project, either X_L or X_H
Y	Value to Boss of project, either Y_L or Y_H
π	Politicization level, probability Boss learns Y via central review, set by Boss
EY	Expected value of policymaking to Boss
r	Manager recommends the project $(r = 1)$ or does not $(r = 0)$
σ	Element of Boss's information set $\{Y_H, Y_L, \varnothing\}$ ($\varnothing$ connotes uninformative review)
d	Boss accepts project $(d = 1)$ or rejects project $(d = 0)$
e	Level of investment in expertise of public-sector employee
$\bar{e}$	Promotion standard in the public sector, set by Boss
a	Policymaking effort, probability of worker creating an X_H project
θ	Type of employee, either slacker $(\theta = 0)$ or zealot $(\theta = 1)$
v	Value to Boss of clerk services
β_1, β_2	Intrinsic motivation of zealots in high p and low p environments, from policymaking
$c(e;k)$	Cost of investment in expertise is $c(e) = ke^2$
$c(a;e)$	Cost policymaking action, $c(a;e) = \gamma a$ where $\gamma = 1/e$
λ	Proportion of employees entering Type II agencies who are zealots

Table 2. Exogenous and Endogenous Variables in the Model.

Exogenous	Endogenous
Agency Structure: 2 Level Job Ladder	Politicization by Boss
Boss-Worker Policy Disagreement	Expertise Acquisition by Workers
Private-Sector Wages	Promotion Standard
Size of Policy Wins/Losses	Public-Sector Wages
Cost Parameters (training, policy effort)	Policymaking Effort by Workers
Intrinsic Motivation of Zealots	Probability of Policy Innovations
	Stay/Exit Decisions by Workers
	Manager job satisfaction

effort a. The conditional probability that the Boss's payoff is Y_H when the Subordinate's payoff is X_H is $p = \Pr(Y_H \mid X_H)$; the conditional probability that the Boss's payoff is Y_H when the Subordinate's payoff is X_L is $q = \Pr(Y_H \mid X_L)$. Thus, p and $1 - q$ indicate the similarity between the interests of the two players ($1 - q$ will not play a major role in what follows but p is extremely important). Rejected proposals bring a zero policy payoff to both players, as does no recommendation.

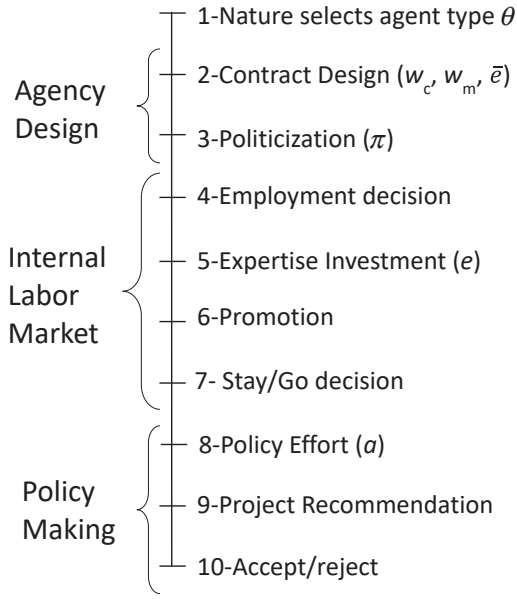


Fig. 2. The Sequence of Play in the Game.

The sequence of play in the model is shown in Fig. 2. Nature selects the Subordinate's type θ with common knowledge probability λ (the probability of being a zealot). The Boss offers an employment contract specifying wages in both the clerk and manager jobs (w_c and w_m, respectively) and a promotion standard $\bar{e}$ based on a promotion evaluation. In addition, the Boss decides upon a level of politicization π for the agency.[1] Politicization connotes a centralized capacity for independent review of a recommended project.[2] If the potential employee accepts employment, he enters the clerk-level job where he performs routine work and receives the wage w_c.[3] More importantly, though, as a clerk the Subordinate may invest in human capital or expertise $e \in [0, \infty]$ at cost $c(e)$. The clerk then undergoes a promotion evaluation, which effectively measures his agency-specific expertise e. If the clerk meets the promotion standard $\bar{e}$, he is promoted to manager; if not, he remains a clerk. In either case, the employee may then exit the agency in favor of employment in the private sector. If promoted to manager and

[1]Following the arguments in Baker et al. (1999), we do not regard politicization and meddling as contractable: a pledge not to politicize is not credible, and if the Boss has installed a centralized review capacity, he will use it.

[2]In contrast with Aghion and Tirole (1997), we do not allow the Boss to independently craft his own policy projects. Although such a degree of centralizaition sometimes occurs, it simply reproduces the same principal-agent tensions we study. Instead we closely follow Baker et al. (1999).

[3]For simplicity we assume w_c is net of effort costs in the clerk job.

deciding to stay in public employment, the subordinate (now a manager) decides upon a level of work effort $a \in [0,1]$ at cost $c(a;e)$, crafting a policy project. We define the Subordinate's work intensity as the probability of discovering a good project, so that $a = \Pr(X_H)$.

The effort cost of crafting a good project $c(a;e)$ depends on the manager's expertise, so that more expert managers can undertake the same level of work effort at a lower cost to themselves. Given the results of his work, the manager may recommend the project to the Boss, or may decline to do so.[4] If the manager recommends the project, the Boss probabilistically learns the payoffs from the project, depending on the level π of politicization in the agency. Hence, increased "politicization" boosts the likelihood of an informed policy review under the independent control of the Boss. The Boss then accepts or rejects the manager's recommendation. Payoffs subsequently accrue.

Because promoted managers can exit for private-sector employment, we must specify the wages that they can earn in the private sector. Indeed this outside wage, s_i, plays an important role in the analysis. We specify private-sector wages parametrically, focusing on two polar cases.[5] In the first, the human capital acquired by the agency employee is of little value to private-sector employees. For instance, the skills of policymakers in a Department of Motor Vehicles are not likely to be valued by private-sector employers. In this case s_i is not increasing in e. We assume $s_i = s_c$, the clerk-level wage in the private sector (an extreme assumption but one that captures the essential wage dynamic). We call agencies like this "Type I" agencies. In the second case, the skills, knowledge, and contacts acquired by agency managers are very valuable to private-sector employers, who hire the exiting public-sector manager at an "in-and-outer" wage s_o. For instance, the knowledge of antitrust policymakers in the DOJ may command a considerable premium in the private sector. Here $s_i = s_o(e)$ is increasing in e. We call agencies like this "Type II" agencies. To complete the public–private comparison, we assume there is a mature second period private-sector wage s_m for career private-sector employees. For employees of Type I agencies, $s_i = s_c < s_m$. For employees of Type II agencies, $s_c < s_m$ but $s_i = s_o(e) \geq s_m$ for sufficiently high e: a highly skilled in-and-outer may command as high or higher private-sector wage than a career private-sector manager.

The game has 10 distinct stages that can be grouped into three broad modules. Module 1 concerns *agency design*, and involves designing the "contract" offered employees and the selection of a level of politicization by the political appointee heading the agency. Module 2 addresses the agency's *internal labor market*, and details the workers' initial employment decision, employees' investment in

[4]Although we use the word "recommendation," the game structure is not equivalent to cheap talk. The failure to recommend a project constrains the Boss's action space: he cannot opt for any project.

[5]We treat private-sector wages as exogenous and characterize them parametrically because we do not model the private-sector labor market. The private sector sets wages so as to induce departures of high ability slacker-managers from the Type II agencies.

expertise, the agency's promotion decision, and employee's decision to remain with the agency or depart for the private section. Module 3 examines *policy-making* in the agency, focusing on the policymaking effort of managers, their recommendations, and the agency head's response. We divide the game into periods 1 and 2. The first period includes the first two modules, the second period module and the third module.

The following are common knowledge: outside wages (s_c, s_m, and s_i [either s_c or s_o]), the extent of policy agreement between the Boss and Subordinate (p, $1-q$), the value of projects (X_L, X_H, Y_L, Y_H), and the cost functions $c(e)$ and $c(a;e)$. The promotion standard $\bar{e}$, the wages w_c and w_m, and the chosen level of politicization π are observed by potential employees, and are common knowledge. The promotion evaluation reveals the employee's human capital e to the Boss but a potential outside employer can only observe whether the employee was promoted or not. The subordinate's policy effort a is not observed by the Boss (otherwise, managerial wages could be contractible in policy effort).

For the Subordinate, strategies include (1) a contract acceptance strategy; (2) an expertise investment strategy e; (3) an exit or stay strategy following the outcome of the promotion evaluation; (4) a policy effort strategy a (for promoted employees who remain with the agency); and (5) a policy recommendation strategy r. For the Boss strategies include (1) a clerk wage strategy setting w_c; (2) a manager wage strategy setting w_m; (3) a promotion standard strategy setting $\bar{e}$; (4) a politicization strategy setting π, and (5) a decision strategy d for policy recommendations.

Utilities

The payoffs to the Boss and Subordinate are the sum of the payoffs accruing in Periods 1 and 2.

For the Boss, the period 1 payoff is

$$u_1^B = \begin{cases} v - w_c & \text{if the worker accepts the contract} \\ 0 & \text{if the worker rejects the contract} \end{cases}$$

where v is the value to the Boss of clerk services. The Boss's period 2 payoff is

$$u_2^B = \begin{cases} 0 & \text{if the worker accepted the contract but leaves} \\ v - w_c & \text{if the worker accepted, was not promoted and stays} \\ rdY - w_m & \text{if the worker accepted, was promoted and stays} \end{cases}$$

where r is the manager's project recommendation (either 0 or 1), d is the Boss's decision on the recommendation (either 0 or 1), and Y is the value to the Boss of the project (either Y_L or Y_H).[6]

[6]The Boss may not really suffer disutility from paying wages to the Subordinate as government agencies do not get to retain earnings (for a discussion see Wilson, 1989). But at least for agency design, we imagine the Boss trying to conserve on wages, perhaps due to congressional pressure.

For the Subordinate, the period 1 payoff is

$$u_1^s = \begin{cases} w_c - c(e) & \text{if the worker accepts the contract} \\ s_c & \text{if the worker rejects the contract} \end{cases}$$

The period 2 payoff is

$$u_2^s = \begin{cases} s_m & \text{if contract rejected in period 1} \\ s_c & \text{if contract accepted, not promoted, and left} \\ w_c & \text{if contract accepted, not promoted, and stayed} \\ s_i & \text{if contract accepted, promoted, and left} \\ w_m + \theta r d X - c(a;e) & \text{if contract accepted, promoted, and stayed} \end{cases} \tag{1}$$

where again r is the recommendation and d is the Boss's decision on the recommendation.

In what follows, we impose structure on the two cost functions and the outside wages. We assume that the cost of expertise investment $c(e) = ke^2$ (so $c(0) = 0$, $c' > 0$, and $c'' > 0$ when $e > 0$), and we assume the cost of work effort $c(a;e) = \gamma a^2$ where $\gamma = 1/e$. For Type I agencies, we assume outside wage $s_i = s_c$ so investment in policy expertise brings no increase in outside wages. For Type II agencies, we assume $s_i = s_o(e) = s_c + \kappa e^2$ so that $s_o(0) = s_c$ but (demonstrated) policy expertise boosts outside wages. Both are polar assumptions but distinguish clearly between two wage dynamics.

Intrinsic Motivation

The utility function in Equation 1 embeds a distinct notion of non-pecuniary motivation: some public-sector employees – zealots ($\theta = 1$) – internalize a sense of organizational mission and receive satisfaction from furthering that mission in the decisions over which they bear responsibility. Thus, they "take ownership" of agency decisions in their bailiwick.[7] In contrast, slackers ($\theta = 0$) do not internalize the agency's mission and do not take ownership of the decisions in their domain of responsibility; their motivation is purely pecuniary. Hence, in Equation 1, a promoted zealot with policy responsibility has a term in his utility function, rdX, that a similarly positioned slacker does not. We further assume zealots do not take ownership of decisions over which they have no responsibility, for example, if they are never employed by an agency they do not internalize its mission. Consequently, a zealot who pursues a purely private-sector career does not have the term rdX in his utility function, and a promoted zealot who leaves the agency does not have this term in his utility function once he becomes a private-sector employee. This

[7]In the language of typical Human Resources personnel evaluations, the employee "Takes collective responsibility for total organization's successes and failures within the scope of influence."

may be rationalized in two ways. First, the feeling of ownership of agency decisions, even in one's former bureau, is likely to decay over time given separation from the agency. In a two-period model, we capture this decline in stylized form with very fast discounting. Second, the vacancy in the management position prevents the agency from implementing a project, so that $X = 0$.[8]

This form of non-pecuniary motivation – "decision ownership" – is somewhat novel (however, see Vlaicu & Whalley, 2012). But it is very closely related to "mission satisfaction" which arises from project success when a worker is employed by an agency with a valued mission (Besley & Ghatak, 2005). However, decision ownership allows for a degree of policy conflict between the manager and an agency head. Formally, decision ownership is quite similar to standard non-pecuniary aspects of a job, such as flexible hours or on-site day care, that are valued by some employees but not others (Lazear, 1998, Chapter 14) and may be analyzed in a similar way. The assumption that zealots internalize agency missions, rather than arrive with their own sense of mission, has ties with the literature on identity and organizations (Akerlof & Kranton, 2005). This assumption allows us to sidestep ideological sorting across agencies by committed ideologues, but this is clearly an avenue for future research.

Career Paths and Wage Ladders

Figs. 3 and 4 trace possible career paths and facilitating comparisons of wages.

The critical feature of the Type I environment is that a promoted public-sector manager cannot depart the agency for a well-paying job in the private sector, as his investment in expertise has little outside value. In the extreme, his only outside option is an entry-level position in the private sector.

The critical feature of career paths in the Type II environment is that a promoted public-sector manager can exit as an in-and-outer into a lucrative job in the private sector that abundantly rewards his investment in expertise.

EQUILIBRIUM

Although the construction of equilibria is somewhat involved, the following points may clarify the basic logic. With respect to policymaking, the Boss will adopt either a credulous or skeptical stance to the manager's recommendations, depending on whether there is low or high conflict between them. Politicization in the former case creates an Aghion-Tirole effect, that is, it

[8]If an "in-and-outer" zealot felt some residual or discounted decision ownership, then this feeling could affect his exit decision. In particular, if his position were immediately filled with another capable manager, then exit would appear more attractive. However, if he were likely to be replaced by a poor decision-maker, exit would be less attractive.

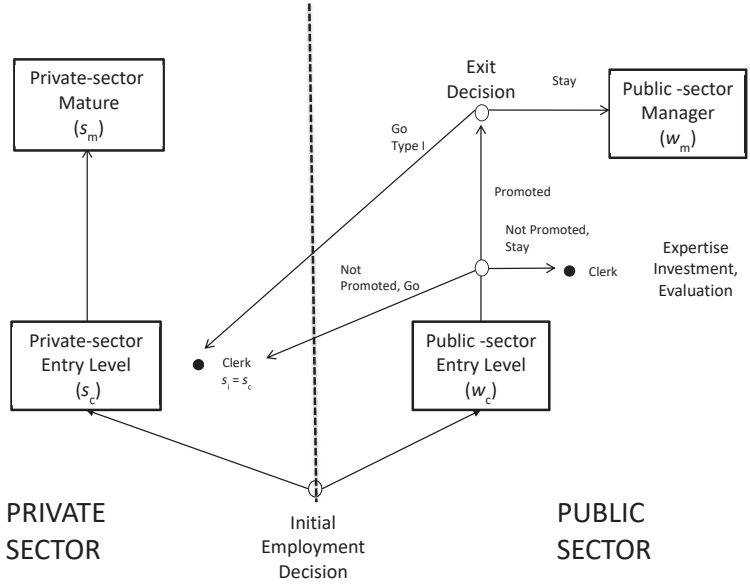


Fig. 3. Career Paths in the Type I Environment.

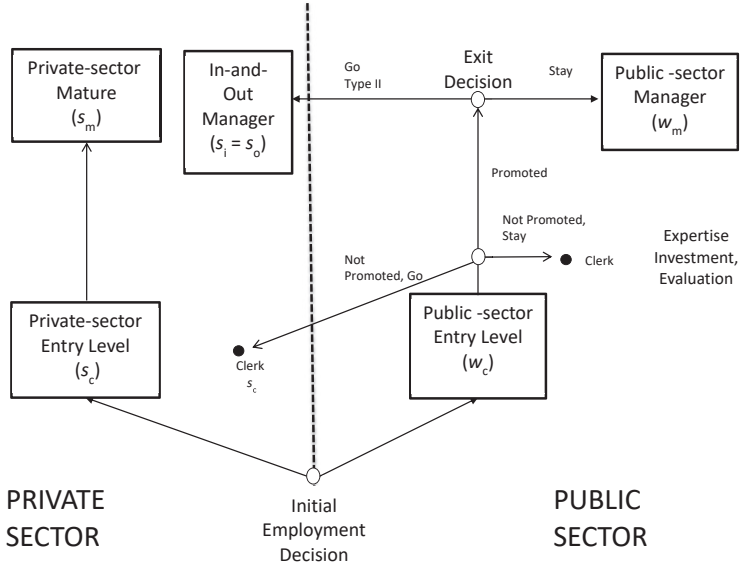


Fig. 4. Career Paths in the Type II Environment.

undermines the manager's motivation to work hard. But in the latter case, politicization creates a reverse Aghion-Tirole effect, inducing greater motivation to work hard. Both politicization and the degree of interest convergence or conflict between the manager and Boss have powerful effects on the manager's job satisfaction, with profound implications for the operation of personnel policies.

With respect to personnel policies, in Type I agencies outside wages are unresponsive to expertise acquired in the agency. Consequently, the agency must set managerial wages to compensate an employee for her investment costs if she is to acquire expertise. Critically, zealots receive job satisfaction from occupying a policymaking billet, and this utility wedge between them and slackers allows the agency to set managerial wages that motivate zealots to seek promotion but fail to motivate slackers, hence, expertise screening. Thus, in an expertise screening equilibrium, slackers do not invest in expertise and are not promoted while zealots do invest, are promoted, and remain in the agency.

In Type II agencies, outside wages are highly responsive to expertise acquired in the agency. The agency must respond to these outside opportunities as it sets managerial wages if it is to retain employees. But again, the utility wedge between zealots and slackers allows the agency to set wages that will motivate zealots to remain with the agency but will fail to do so for slackers, hence, managerial sorting. In a managerial sorting equilibrium, both slackers and zealots invest in expertise and are promoted, but slackers then leave the agency for greener pastures in the private sector. In contrast, zealots remain in the agency.

With respect to the Boss's design decisions, the following points may be helpful. For a given promotion standard and a given politicization level, the wage structure in the agency is tied down by the outside wages, the expertise screening and managerial sorting conditions, participation constraints for employees, and economizing behavior by the Boss. Consequently, for a contract impelling the desired behavior by the employee, the Boss sets the promotion standard and politicization levels, adjusting wages accordingly, so as to maximize her utility.

Policymaking

Manager Recommendations and Boss Decisions

We begin by analyzing the play of the game after a manager (a promoted Subordinate) has undertaken his work effort a (which may be zero). One of four states then prevails, and the manager knows which one: (X_H, Y_H), (X_H, Y_L), (X_L, Y_H), and (X_L, X_L). The Boss does not know which state exists. A recommendation strategy r maps the type of the manager (slacker or zealot) and these four states into a positive or negative recommendation. (That is, the manager recommends the project he has uncovered, if any, or he does not.) The manager's objective is to set this recommendation strategy to maximize θrdX (see Equation 1).

Following a positive recommendation, with probability π the Boss becomes informed and learns which state prevails. If he is informed, a decision strategy d maps the four states into an accept/reject decision. If he is not informed, the Boss can condition his decision only on the facts that the manager passed the civil service exam and has now made a positive recommendation. Let $\sigma \in \{Y_{\mathrm{H}},\ Y_{\mathrm{L}},\ \varnothing\}$ (the Boss's information set) where $\varnothing$ connotes the uninformed state for the Boss.

Lemma 1. *Project Recommendations and Decisions. For the manager:*

$$r^*(X, Y; \theta) = \begin{cases} 1\ (recommend) & if\ \theta = 1\ (zealot)\ and\ X = X_H \\ 0\ (don't\ recommend) & otherwise \end{cases}$$

For the Boss: If $p \geq p^*$

$$d^*(\sigma; p) = \begin{cases} 0\ (reject) & if\ informed\ and\ \sigma = Y_L \\ 1\ (accept) & if\ \sigma = Y_H\ or\ \varnothing \end{cases}$$

If $p < p^*$

$$d^*(\sigma; p) = \begin{cases} 1\ (accept) & if\ informed\ and\ \sigma = Y_H \\ 0\ (reject) & if\ \sigma = Y_L\ or\ \varnothing \end{cases}$$

where $p^* \equiv -\frac{Y_{\mathrm{L}}}{Y_{\mathrm{H}} - Y_{\mathrm{L}}}$.

The Lemma indicates that a zealot-type manager recommends only projects he favors, and always does so. The Boss's acceptance strategy varies radically between the low conflict environment ($p \geq p^*$) and the high conflict environment ($p < p^*$). In the low conflict environment, the Boss always accepts the manager's recommendation unless the Boss receives independent adverse information from his own centralized review. Hence, this is a credulous acceptance strategy. In the high conflict environment, the Boss always rejects the manager's recommendation unless the Boss receives independent favorable information from his own centralized review. So, if his independent review reveals nothing, the Boss rejects the manager's "pig in the poke." This is a skeptical acceptance strategy.

Manager's Policymaking Effort

In deciding on a level of work a, the manager takes as given the level of politicization π and the cost-of-effort parameter $\gamma = 1/e$. From his perspective, the *ex ante* probability of each (X, Y) state is:

$$\begin{aligned} \Pr(X_{\mathrm{H}}, Y_{\mathrm{H}}) &= ap \\ \Pr(X_{\mathrm{H}}, Y_{\mathrm{L}}) &= a(1-p) \\ \Pr(X_{\mathrm{L}}, Y_{\mathrm{H}}) &= (1-a)q \\ \Pr(X_{\mathrm{L}}, Y_{\mathrm{L}}) &= (1-a)(1-q) \end{aligned}$$

Given the strategies in Lemma 1, if $p \geq p^*$ the manager seeks to maximize

$$\begin{aligned} & w_{\mathrm{m}} + \theta[\pi(apX_{\mathrm{H}}) + (1-\pi)(ap + a(1-p))X_{\mathrm{H}}] - \gamma a^2 \\ & = w_{\mathrm{m}} + \theta a(1-(1-p)\pi)X_{\mathrm{H}} - \gamma a^2 \end{aligned} \tag{2}$$

However, if $p < p^*$ the manager seeks to maximize

$$w_{\mathrm{m}} + \theta\,[\pi(apX_{\mathrm{H}}) + (1-\pi)0] - \gamma a^2 \tag{3}$$

Lemma 2. *Policymaking Effort. For a promoted Subordinate optimal policymaking effort is:*

$$a^*(\pi, \gamma; \theta) = \begin{cases} \theta\left(\dfrac{(1-(1-p)\pi)X_H}{2\gamma}\right) & \text{if} \quad p \geq p^* \\ \theta\left(\dfrac{p\pi X_H}{2\gamma}\right) & \text{if} \quad p < p^* \end{cases} \tag{4}$$

where $p^* \equiv -\frac{Y_L}{Y_H - Y_L}$.

Note that a slacker undertakes no effort, while a zealot undertakes positive effort for any level of politicization in both regimes (except $\pi = 0$ in the high conflict environment).

It is worth noting the partial equilibrium effects of an increase in politicization, π, on work effort a. From inspection of Equation 4, in the low conflict environment ($p \geq p^*$) the manager works less as politicization increases. This is an example of the well-known *Aghion-Tirole effect* in which meddling by the Boss reduces work effort by the agent (Aghion & Tirole, 1997). However, the situation is quite different in the high conflict environment ($p < p^*$). There, increased politicization brings *greater* effort by the manager, a *reverse* Aghion-Tirole effect. The explanation is simple. In the high conflict environment, the Boss employs a skeptical acceptance strategy, in which he rejects all recommendations unless he receives corroboration that the recommended project is a good one ($Y = Y_{\mathrm{H}}$). Consequently, politicization (the probability of independent corroboration) increases the marginal return to the manager from policy work.

The Internal Labor Market

We now turn to the decision of subordinates to join the agency, the decision to remain employed there rather than exit for the private sector, the agency's promotion decision, and subordinates' acquisition of human capital.

The Exit or Stay Decision Following the Promotion Evaluation

After the promotion evaluation, the Subordinate must decide whether to stay in the agency or leave for the private sector (reference to Figs. 2 and 3 may be helpful). There are four potential classes of employees: a promoted zealot, a

nonpromoted zealot, a promoted slacker, and a nonpromoted slacker. That is, a zealot-type manager, a zealot-type clerk, a slacker-type manager, and a slacker-type clerk.[9] Each compares the expected value of remaining in the agency, with exiting and receiving the outside wage. For a newly promoted manager, the outside wage is s_i (whose value is either s_c in a Type I agency or $s_o = s_c + \kappa e^2$ in a Type II agency). For a non-promoted clerk, the outside wage is s_c.

The expected utility of staying is easily calculated. First consider a zealot-type manager ($\theta = 1$). Substituting Equation 4 into Equations 2 and 3 yields the expected utility of staying

$$Eu_2^s|(\text{stay}, \theta = 1) = \begin{cases} w_m + \dfrac{(1-(1-p)\pi)^2}{4\gamma}(X_H)^2 & \text{if} \quad p \geq p^* \\ w_m + \dfrac{p^2\pi^2}{4\gamma}(X_H)^2 & \text{if} \quad p < p^* \end{cases} \tag{5}$$

It proves convenient to define:

$$\beta(\pi; p, X_H) = \begin{cases} \beta_1 = \dfrac{(1-(1-p)\pi)^2}{4}(X_H)^2 & \text{if} \quad p \geq p^* \\ \beta_2 = \dfrac{(p\pi)^2}{4}(X_H)^2 & \text{if} \quad p < p^* \end{cases} \tag{6}$$

So Equation 5 becomes

$$Eu_2^s|(\text{stay}, \theta = 1) = w_m + \frac{\beta}{\gamma} = w_m + \beta e$$

The term $\frac{\beta}{\gamma}$ indicates the nonwage job satisfaction (intrinsic motivation) received by a zealot who holds a policymaking position. Note that $\frac{\beta}{\gamma}$ must be nonnegative.

Now consider a slacker-type manager ($\theta = 0$). Such a subordinate does not value policy. Moreover, via Lemma 2 he undertakes no policy work and consequently would not find an X_H project in any case. Given this, his expected utility from staying is simply his wage, w_m. Similarly, a passed-over slacker-type clerk will not undertake any investment in expertise since there is no opportunity for promotion. Hence, his expected utility is simply his wage, w_c. Finally, consider a zealot-type clerk. Because he was not promoted, the manager job remains unfilled so no manager recommends a project. Hence the expected policy value of agency action is zero. And without the prospect of promotion, the passed-over zealot-type clerk will not invest in human capital.

[9] In equilibrium, in Type I agencies the zealots will be promoted and become managers while the slackers will remain clerks. In Type II agencies, both will be promoted.

Hence, his expected utility in the second period is also simply the wage, w_c. Thus we have:

$$Eu_2^{\delta}|(\text{stay}) = \begin{cases} w_m + \theta\dfrac{\beta_1}{\gamma} & \text{if promoted and } p \geq p^* \\ w_m + \theta\dfrac{\beta_2}{\gamma} & \text{if promoted and } p < p^* \\ w_c & \text{if not promoted} \end{cases} \tag{7}$$

Lemma 3. *Exit or Stay Decision after Promotion Evaluation. (1) If $p \geq p^*$ (low conflict environment) a zealot-type manager will remain with the agency if and only if $\frac{\beta_1}{\gamma} \geq s_i - w_m$. (2) If $p < p^*$ (high conflict environment) a zealot-type manager will remain with the agency if and only if $\frac{\beta_2}{\gamma} \geq s_i - w_m$. (3) A slacker-type manager will exit the agency if and only if $s_i \geq w_m$. (4) Nonpromoted subordinates will remain with the agency if and only if $w_c \geq s_c$.*

An implication of the Lemma is that *managerial sorting* will occur if

$$w_m < s_i \leq w_m + \frac{\beta(\pi; p)}{\gamma} \tag{8}$$

If this managerial sorting condition holds, promoted zealots will stay in the agency but promoted slackers will exit. Conversely, if the post-promotion outside wage $s_i < w_m$ sorting cannot work since both slackers and zealots, if promoted, will remain with the agency. The managerial sorting condition will also fail if $w_m + \frac{\beta}{\gamma} < s_i$, since then both slackers and zealots will leave the agency for the private sector. Note that in a Type II agency, where $s_i = s_o = s_c + \kappa e$, the minimum wage that induces managerial sorting is $w_m = s_c + \kappa\bar{e} - \beta e$. Retention of nonpromoted subordinates requires that the agency pay clerks at least as well as the private sector $w_c \geq s_c$.

Fig. 5 provides some intuition about managerial sorting in Type II agencies. As shown, the outside wage is s_o, the horizontal dashed line in the figure, which is the utility of employment in the private sector for both the slacker and the zealot. If a promoted zealot remains in the agency her utility, $w_m + \beta e$, increases in the agency's managerial wage w_m. If w_m is less than w'_m, the utility from private-sector employment is greater than that from public-sector employment so the zealot leaves the agency. But, for higher w_m, she remains. A similar calculation holds for the slacker, but the switch-over wage is w''_m. Critically, $w'_m < w''_m$, so that wages in the interval (w'_m, w''_m) will induce the zealot to remain with the agency but the slacker to exit for the private sector. Straightforwardly, $w'_m = s_o - \beta e$.

Expertise Acquisition and Promotion

In order to be promoted, a clerk must acquire expertise at least as great as the promotion standard $\bar{e}$. How much expertise to acquire depends on the agency's

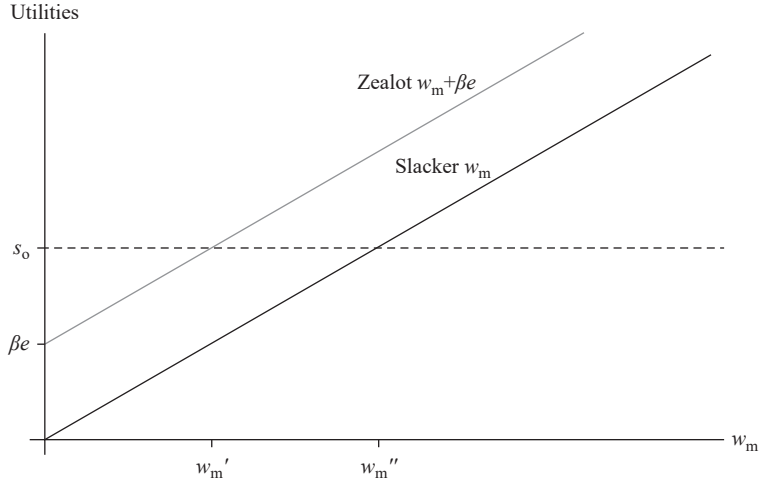


Fig. 5. The Post-Promotion Decision to Stay or Go (Type II agencies).

wage structure, promotion standard, and politicization of decision-making, as well as on the outside wage opportunity after promotion.

It is straightforward to find the optimal level of investment, given a contract $(w_c, w_m, \bar{e})$, outside wages, a level of politicization π, and degree of conflict p. In doing so, several facts are useful. First, in both Type I and Type II agencies, prior to investment, the expected value to a zealot of investing, being promoted, and remaining in the agency is $w_m + \beta(p)e - ke^2$ while that of a slacker is $w_m - ke^2$. Second, in a Type II agency if a promoted manager departs for the private sector her outside wage will be set assuming $e = \bar{e}$. This follows from the assumption that the private employer can only observe the fact of promotion, not the employee's actual evaluation or investment. Hence, prior to investment, in a Type II agency the expected value of investing, being promoted, and departing is $s_o(\bar{e}) - k\bar{e}$ for both a slacker and zealot.

Lemma 4. *Strategies for Investment in expertise are: (1) In a Type I agency*

$$e^*(\theta = 0) = \begin{cases} \bar{e} & \text{if } w_m - k\bar{e}^2 \geq \max\{s_c, w_c\} \\ 0 & \text{otherwise} \end{cases}$$

$$e^*(\theta = 1) = \begin{cases} \bar{e} & \text{if } w_m + \beta\bar{e} - k\bar{e}^2 \geq \max\{s_c, w_c\} \text{ and } \bar{e} \geq \dfrac{\beta}{2k} \\ \dfrac{\beta}{2k} & \text{if } w_m + \dfrac{1}{4}\dfrac{\beta^2}{k} \geq \max\{s_c, w_c\} \text{ and } \bar{e} < \dfrac{\beta}{2k} \\ 0 & \text{otherwise} \end{cases}$$

(2) In a Type II agency

$$e^*(\theta = 0) = \begin{cases} \bar{e} & \text{if } \max\{w_m, s_o\} - k\bar{e}^2 \geq \max\{s_c, w_c\} \\ 0 & \text{otherwise} \end{cases}$$

$$e^*(\theta = 1) = \begin{cases} \bar{e} \text{ if } \begin{cases} \max\{w_m + \beta\bar{e}, s_o\} - k\bar{e}^2 \geq \max\{s_c, w_c\} \text{ and } \bar{e} \geq \dfrac{\beta}{2k} \\ s_o - k\bar{e}^2 > w_m + \dfrac{1}{4}\dfrac{\beta^2}{k}, \max\{s_c, w_c\} \text{ and } \bar{e} < \dfrac{\beta}{2k} \end{cases} \\ \dfrac{\beta}{2k} \text{ if } w_m + \dfrac{1}{4}\dfrac{\beta^2}{k} \geq s_o - k\bar{e}^2, \max\{s_c, w_c\} \text{ and } \bar{e} < \dfrac{\beta}{2k} \\ 0 \quad \text{otherwise} \end{cases}$$

The lemma has an important implication in Type I agencies. If a Type I agency sets managerial wages properly, only zealots will invest. The following Corollary identifies the level of this "promotion screening" wage.

Corollary 5. *In a Type I agency if*

$$\left.\begin{array}{ll} \max\{w_c, s_c\} + k\bar{e}^2 - \beta\bar{e} & \text{if } \bar{e} \geq \dfrac{\beta}{2k} \\ \max\{w_c, s_c\} - \dfrac{1}{4}\dfrac{\beta^2}{k} & \text{if } \bar{e} < \dfrac{\beta}{2k} \end{array}\right\} \leq w_m < \max\{w_c, s_c\} + k\bar{e}^2 \qquad (9)$$

then zealots acquire expertise, are promoted, and remain in the agency while slackers do not acquire expertise and are not promoted.

Equation 9 indicates a set of managerial wages that will induce a zealot in a Type I agency to invest in expertise up to or beyond the promotion standard and then remain in the agency, but will not do so for the slacker. Equation 9 thus provides the *promotion screening condition* for Type I agencies. If this condition holds, zealots will invest in expertise and be promoted but slackers will not. The condition exploits the fact that zealots receive job satisfaction from the policy-making job while slackers to not. Hence, one can pay a wage that compensates zealots for their efforts, but will not compensate slackers for theirs.

Fig. 6 provides some intuition about investment decisions in Type II agencies. A slacker compares the wage from investment, promotion, and exit ($s_o - k\bar{e}^2$, the horizontal dashed line in the figure) with the wage from not investing ($\max\{s_c, s_m\}$, the gray horizontal line in the figure). If $s_o - k\bar{e}^2 \geq \max\{s_c, s_m\}$ (the dashed line is above the horizontal line in the figure), this option is attractive. But the slacker must also compare the expected utility of investing and exiting with the utility from investing and staying, that is, $s_o - k\bar{e}^2$ with $w_m - k\bar{e}^2$. The slacker will invest, be promoted, and exit if $w_m < w'_m = s_o$. The wage w'_m is not shown in the figure, but note that it is the same wage shown in Fig. 5. The zealot's expected utility from investing, being

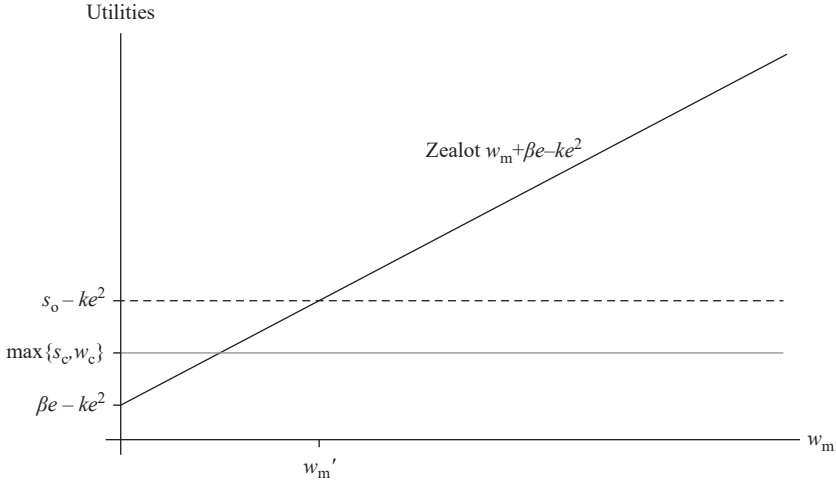


Fig. 6. The Investment Decision in Type II Agencies.

promoted, and remaining in the agency is shown by the upward sloping line in Fig. 6. If $w_m < w_m'$ the zealot will invest, be promoted, and exit the agency. If $w_m \geq w_m'$, the zealot will invest, be promoted, and remain in the agency. Note that this wage is, again, exactly that shown in Fig. 5.

Initial Employment Decision

A potential employee compares his expected utility from employment in the government agency, with his expected utility from employment in the private sector. If he is to accept employment with the agency, the return from the ensuing public career must be at least as good as that from a private-sector career – there must be incentive compatibility. (Note that we do not allow Type I agencies to compete with Type II agencies over employees. For example, the market for potential meat inspectors (say) is distinct from the market for potential antitrust lawyers.) The expected utility of a private-sector career is $s_c + s_m$. Hence, it must be the case that a public career yields at payoff of at least $s_c + s_m$.

The expected utility of a public career depends on whether the employee invests in human capital and receives promotion, or doesn't invest and isn't promoted (as indicated by Lemma 4), and whether the employee exits or remains in the agency after the promotion/no-promotion event (as indicated by Lemma 3). There are thus four possible public-sector careers, each with a specific utility. These possible careers and associated utilities are shown in Tables 3 and 4, the first table for slackers, and the second for zealots. In any equilibrium in which one of these eight careers occurs, *the payoff from that career must yield at least* $s_c + s_m$ if the potential employee is to enter the public sector.

We now consider the implications of this fact in two candidate equilibria. In a *promotion screening equilibrium*, we conjecture that slackers do not invest in

Table 3. EU of Slacker-type Upon Joining the Agency.

	Stay	Exit
Invest	$w_c + w_m - k\bar{e}^2$	$w_c + s_i - k\bar{e}^2$
Don't Invest	$2w_c$	$w_c + s_c$

Table 4. EU of Zealot-type Upon Joining the Agency.

	Stay	Exit
Invest	$w_c + w_m + \beta\bar{e} - k\bar{e}^2$	$w_c + s_i - k\bar{e}^2$
Don't Invest	$2w_c$	$w_c + s_c$

expertise to the promotion standard and are not promoted, but remain with the agency. In contrast, zealots do invest, are promoted, and remain with the agency. In a *managerial sorting equilibrium*, both slackers and zealots invest and are promoted. But then, the slackers exit while the zealots remain.

Lemma 6. *(1) In the conjectured promotion screening equilibrium, (a)* $w_c \geq \frac{s_c + s_m}{2}$ *and (b) if the entry wage is set so slackers are indifferent between a public and private career, then* $w_m + \beta\bar{e} - k\bar{e}^2 \geq w_c$. *(2) In the conjectured managerial sorting equilibrium, if employees are indifferent between a public and private career then (a)* $w_m + \beta\bar{e} = s_i$ *and (b) if* $s_i - k\bar{e}^2$ *rises (falls) in* $\bar{e}$ *then* w_c *must fall (rise) in* $\bar{e}$.

Agency Design

We now turn to the Boss's design of the agency. We examine Type I and Type II agencies separately, though the two analyses parallel one another closely. Broadly speaking, in Type I agencies a contract that induces promotion screening is very attractive to the Boss. This contract is not feasible in Type II agencies, so a contract that induces managerial sorting becomes very attractive. In both cases, the need to efficiently induce screening or sorting ties down the managerial wage function, given levels of politicization and a promotion standard. Given this, the Boss sets the politicization level and promotion standard to maximize his utility, taking into account the effects on policymaking.

Type I Agencies

In the first period, the Boss receives a payoff $v - w_c$ (conditional on an employee accepting employment in the agency). Table 5 indicates the payoffs to the Boss in the second period from possible second period careers of a slacker and zealot. (The first payoff in the parenthesis occurs when the employee is a slacker, the second if he is a zealot, and EY indicates the expected policy payoff from a zealot's work efforts.) Without a formal proof, we assert that the best payoff for the Boss comes from a contract inducing a

Table 5. The Boss's Second Period Payoffs from the Second Period Careers (Type I Agency).

	Zealot		
Slacker	Public manager	Public clerk	Private clerk
Public manager	$(-w_m, EY - w_m)$	$(-w_m, v - w_c)$	$(-w_m, 0)$
Public clerk	$(v - w_c, EY - w_m)$	$(v - w_c, v - w_c)$	$(v - w_c, 0)$
Private clerk	$(0,\ EY - w_m)$	$(0, v - w_c)$	$(0, 0)$

slacker to remain a public clerk, but inducing a zealot to become a public-sector manager and remain in the agency. (Note that screening avoids paying slackers to invest in expertise, a pointless endeavor since they will not engage in policy work if promoted. Moreover, the least-cost screening wage is actually lower than the least-cost non-screening wage (that is, one that induces slackers to invest as well as zealots)).

We now derive the Boss's expected utility in the design variables. In a screening equilibrium in a Type I agency, if the employee is a zealot then the Boss's expected utility in the second period is, if $p \geq p^*$

$$\begin{aligned} Eu_2^B|(\theta = 1) &= EY - w_m \\ &= \pi(a^* p Y_H) + (1-\pi)(a^* p Y_H + a^*(1-p) Y_L) - w_m \\ &= a^*(p Y_H + (1-\pi)(1-p) Y_L) - w_m \end{aligned}$$

If $p < p^*$ then it is

$$\begin{aligned} Eu_2^B|(\theta = 1) &= EY - w_m \\ &= \pi(a^* p Y_H) + (1-\pi)(0) - w_m \end{aligned}$$

so that

$$Eu_2^B|(\theta = 1) = \begin{cases} a^*(p Y_H + (1-\pi)(1-p) Y_L) - w_m \text{ if } p \geq p^* \\ \pi(a^* p Y_H) - w_m \text{ if } p < p^* \end{cases} \tag{10}$$

Let λ denote the proportion of zealots in the employment pool. Then the Boss's expected utility at the design stage is just the first period utility plus the expected second period utility:

$$\begin{aligned} Eu^B &= v - w_c + (1-\lambda)(v - w_c) + \lambda\left(Eu_2^B|(\theta = 1)\right) \\ &= (2-\lambda)(v - w_c) + \lambda\left(Eu_2^B|(\theta = 1)\right) \end{aligned}$$

Clearly the values of π and $\bar{e}$ that maximize Eu_2^B also maximize $Eu_2^B|(\theta = 1)$ (provided w_c is not affected by the values of those variables, a point we return to below). Returning then to Equation 10, recall the definition of a^* from Lemma 2 (Equation 4), recall that $\gamma = 1/e$, and recall the definition of β (Equation 6). Further

recall that the least-cost promotion screening wage is $w_m = w_c + k\bar{e}^2 - \beta\bar{e}$. Combining these with the definition of the least-cost screening wage yields:

$$Eu_2^B|\theta = 1 = \begin{cases} \left(\dfrac{1-(1-p)\pi}{2}X_H\bar{e}\right)(pY_H + (1-\pi)(1-p)Y_L) - k\bar{e}^2 \\ \quad + \left(\dfrac{(1-(1-p)\pi)^2(X_h)^2}{4}\right)\bar{e} - w_c \text{ if } p \geq p^* \\ \left(\dfrac{p^2\pi^2(X_H + 2Y_H)}{4}\right)\bar{e} - k\bar{e}^2 - w_c \text{ if } p < p^* \end{cases} \tag{11}$$

Optimal values of π and $\bar{e}$ may now be found straightforwardly and are indicated in the following lemma.

Lemma 7. *In a Type I agency the optimal level of politicization and optimal promotion standard are:*

$$\pi^*(p, Y_H, Y_L, X_H) = \begin{cases} 1 \quad if \quad p < p^* \\ \dfrac{X_H + 2Y_L + p(Y_H - Y_L)}{(1-p)(X_H + 2Y_L)} \quad if \quad p^* \leq p \leq p^{**} \\ 0 \quad if \quad p > p^{**} \end{cases}$$

$$\bar{e}^*(p, Y_H, Y_L, X_H, k) = \begin{cases} \dfrac{p^2 X_H(X_H + 2Y_H)}{8k} \quad if \quad p < p^* \\ -\dfrac{p^2 X_H(Y_H - Y_L)^2}{(X_H + 2Y_L)8k} \quad if \quad p^* \leq p \leq p^{**} \\ \dfrac{X_H(X_H + 2(p(Y_H - Y_L) + Y_L))}{8k} \quad if \quad p > p^{**} \end{cases}$$

where $p^* = -\frac{Y_L}{Y_H - Y_L}$ *and* $p^{**} \equiv -\frac{X_H + 2Y_L}{Y_H - Y_L}$.

The lemma introduces a new condition, $p^{**} \equiv -\frac{X_H + 2Y_L}{Y_H - Y_L}$. At this level of interest convergence, the optimal level of politicization goes to zero.

Now consider the entry-level wage, w_c, and recall s_m, the net expected payoff in the second period from pursuing a private-sector career. This value reflects promotion probabilities, the effort costs of investment in human capital, and so on.

Lemma 8. *Type I Agency Entry-Level Wage. In a Type I agency where* π^* *and* $\bar{e}^*$ *are set according to Lemma 7, then* $w_c = \frac{s_c + s_m}{2}$ *assures both slackers and zealots accept initial employment with the agency.*

If the average private-sector wage profile is increasing, the lemma implies that entry-level wages in the public sector will be somewhat higher than entry-level wages in the private sector.

We can now combine results to indicate the promotion screening equilibrium in Type I agencies.

Proposition 9. *In a Type I agency the following is an equilibrium. The Boss offers the contract* $(w_c, w_m, \bar{e}^*)$ *and then chooses a level of politicization* π^*, *where* $w_c = \frac{s_c + s_m}{2}$, $w_m = k\bar{e}^2 - \beta(p)\bar{e} + w_c$ *and* $\bar{e}^*$ *and* π^* *are defined in Lemma 8. Both slackers and zealots accept the contract; zealots invest in expertise level* $\bar{e}^*$ *and are promoted while stackers do not invest and are not promoted. Zealots then undertake policymaking effort* a^* *defined in Lemma 2 and recommend a project if and only if they discover* $X > 0$. *If central review reveals* $Y > 0$ *the Boss accepts the project. Otherwise he accepts the recommendation if and only if* $p \geq p^*$.

Type II Agencies

In a Type II agency, where the post-promotion outside wage s_i is highly responsive to demonstrated expertise, the managerial wage must track the available outside wage after promotion; otherwise promoted employees will exit for the private sector. And, it is highly desirable to set the managerial wage to induce sorting, so that both slackers and zealots acquire expertise and are promoted but only zealots choose to remain with agency. Sorting avoids paying the managerial wage to slackers who will not engage in policy work if promoted. Moreover, the least-cost sorting wage is actually lower than the least-cost non-sorting age (that is, one that induces slackers to remain in the agency as well as zealots). Examination of Equation 8 indicates that the least-cost sorting wage is

$$w_m = s_i - \beta(p)\bar{e} = w_c + \kappa\bar{e}^2 - \beta(p)\bar{e}$$

Recall from Lemma 7 that if $s_i - k\bar{e}^2$ varies in $\bar{e}$ then w_c must adjust. The required relation is that $w_c \geq s_c + s_m - s_i + k\bar{e}^2$ and the least-cost entry wage is then

$$w_c = \frac{s_c + s_m - \bar{e}^2(\kappa - k)}{2}$$

As we assume $\kappa \geq k$, entry wages fall in the promotion standard $\bar{e}$.

The Boss's expected second period utility, given a promoted zealot, remains that shown in Equation 10:

$$Eu_2^B|\theta = 1 = \begin{cases} a^*(pY_H + (1-\pi)(1-p)Y_L) - w_m & \text{if} \quad p \geq p^* \\ \pi(a^* pY_H) - w_m & \text{if} \quad p < p^* \end{cases}$$

However, the Boss's expected utility at the design stage is now:

$$\begin{aligned} Eu^B &= v - w_c + (1-\lambda)(0) + \lambda\left(Eu_2^B|\theta = 1\right) \\ &= v - w_c + \lambda\left(Eu_2^B|\theta = 1\right) \end{aligned}$$

Table 6. The Boss's Second Period Payoffs from Second Period Careers (Type II Agency).

	Zealot			
Slacker	Public manager	Private manager	Public clerk	Private clerk
Public manager	$(-w_m, EY - w_m)$	$(-w_m, 0)$	$(-w_m, v - w_c)$	$(-w_m, 0)$
Private manager	$(0, EY - w_m)$	$(0, 0)$	$(0, v - w_c)$	$(0, 0)$
Public clerk	$(v - w_c, EY - w_m)$	$(v - w_c, 0)$	$(v - w_c, v - w_c)$	$(v - w_c, 0)$
Private clerk	$(0, EY - w_m)$	$(0, 0)$	$(0, v - w_c)$	$(0, 0)$

Employing the definitions for w_c, a^*, w_m, and $\beta(p)$ yields the following maximand when $p \geq p^*$

$$\frac{1}{2}\left[\bar{e}^2(\kappa - k) - s_c - s_m\right] + v + \frac{1}{4}\lambda\left[-4\kappa\bar{e}^2 - 2\left(\bar{e}^2(k - \kappa) + s_c + s_m\right) + 2\bar{e}X_H(pY_H + (1-p)(1-\pi)Y_L)(1-(1-p)\pi) + \bar{e}X_H^2(1-(1-p)\pi)^2\right]$$

However, when $p < p^*$ the Boss's maximand is

$$v + \frac{1}{4}\left[-2(\bar{e}(k - \kappa) + s_c + s_m)(1 + \lambda) + \bar{e}\lambda\left(-4\kappa\bar{e} + p^2X_H(X_H + 2Y_H)\pi^2\right)\right]$$

Table 6 summarizes the Boss's second period payoffs from second period, Type II Careers.
The following results follow straightforwardly:

Lemma 10. *In a Type II agency, the optimal level of politicization and optimal promotion standard are:*

$$\pi^*(p, Y_H, Y_L, X_H) = \begin{cases} 1 & \text{if} \quad p < p^* \\ \dfrac{X_H + 2Y_L + p(Y_H - Y_L)}{(1-p)(X_H + 2Y_L)} & \text{if} \quad p^* \leq p \leq p^{**} \\ 0 & \text{if} \quad p > p^{**} \end{cases}$$

$$\bar{e}^*(p, Y_H, Y_L, X_H, k) = \begin{cases} \dfrac{\lambda p^2 X_H(X_H + 2Y_H)}{4[(1+3\lambda)k - (1+\lambda)\kappa]} & \text{if} \quad p < p^* \\ -\dfrac{\lambda p^2 X_H(Y_H - Y_L)^2}{(X_H + 2Y_L)4[(1+3\lambda)k - (1+\lambda)\kappa]} & \text{if} \quad p^* \leq p \leq p^{**} \\ \dfrac{X_H(X_H + 2(p(Y_H - Y_L) + Y_L))\lambda}{4[(1+3\lambda)k - (1+\lambda)\kappa]} & \text{if} \quad p > p^{**} \end{cases}$$

where $p^* = -\frac{Y_L}{Y_H - Y_L}$ *and* $p^{**} \equiv -\frac{X_H + 2Y_L}{Y_H - Y_L}$.

The results for politicization are the same as for Type I agencies; however, those for the promotion standard differ slightly.

Proposition 11. *In a Type II agency the following is an equilibrium. The Boss offers the contract* $(w_c, w_m, \bar{e}^*)$ *and then chooses a level of politicization* π^*, *where* $w_c = \frac{s_c + s_m - \bar{e}^2(\kappa - k)}{2}$, $w_m = s_i - \beta(p)\bar{e} = w_c + \kappa\bar{e}^2 - \beta(p)\bar{e}$ *and* $\bar{e}^*$ and π^* *are defined in Lemma 10. Both slackers and zealots accept the contract and both invest in expertise to the promotion standard* $\bar{e}^*$ *and are promoted. Slackers then exit the agency while zealots remain and undertake policymaking effort* a^* *defined in Lemma 2. Promoted zealots recommend a project if and only if they discover* $X > 0$. *If central review reveals* $Y > 0$ *the Boss accepts the project. Otherwise he accepts the recommendation if and only if* $p \geq p^*$.

MICROFOUNDATIONS OF THE COMPETENCE-CONTROL TRADE-OFF

There are many comparative statics we could examine in this model including the effects of outside wages on government employee effort and thus promotion. We believe that most of these comparative statics will be clear from an examination of the section "Equilibrium". Here we focus on what we believe are the most interesting comparative statics from a public-sector personnel economics perspective – the microfoundations of the competence-control trade-off in government.

In the economics, political science, and public administration literatures, the competence-control trade-off has been highlighted. Lewis (2008), for example, employs a measure of bureau performance and finds lower performance in bureaus with many political appointees. The model we propose in this chapter provides an explanatory mechanism for the competence-control trade-off.

First consider the effect of policy agreement p on politicization π. Using the results in the two propositions, lower levels of policy agreement p lead to higher levels of politicization. This effect is shown in Fig. 7.[10] As shown there, politicization decreases (weakly) monotonically as policy agreement (p) increases. The three politicization regimes are clear in the figure: when the likelihood of disagreement is high (the high conflict environment), the Boss fully politicizes so that he audits every recommendation of the subordinate; when disagreement is moderate, levels of politicization are moderate; and when the likelihood of disagreement is low, the Boss does not politicize at all.

Now consider the effect of policy agreement on the promotion standard, as shown in Fig. 8 for a Type II agency. In both Type I and Type II agencies, expertise increases monotonically as the likelihood of policy agreement increases.

[10]The figures in this section assume $Y_H = 1$, $Y_L = -1$, $X_H = \frac{1}{4}$, $k = \frac{1}{36}$, and $\kappa = \frac{1}{25}$. Thus $p^* = \frac{1}{2}$ and $p^{**} = \frac{7}{8}$.

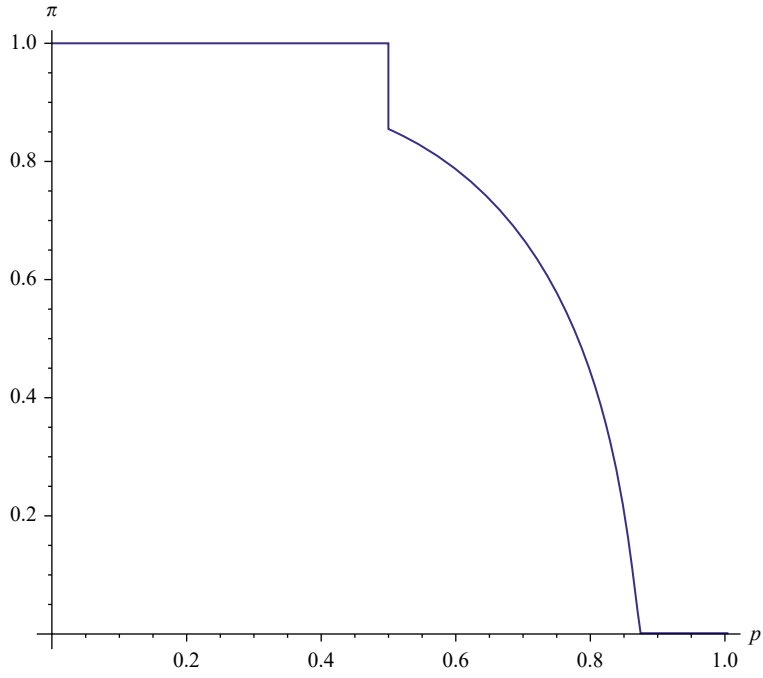


Fig. 7. Policy Agreement and Politicization.

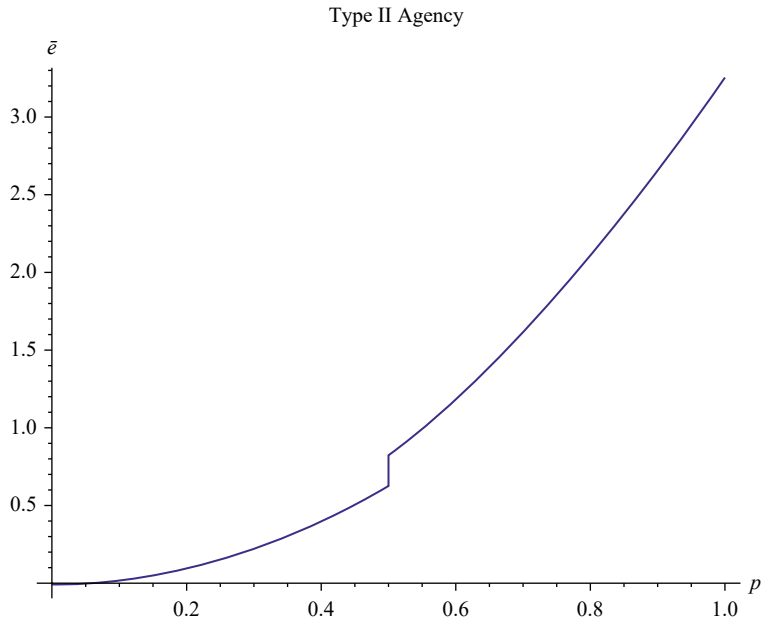


Fig. 8. Policy Agreement and the Promotion Standard.

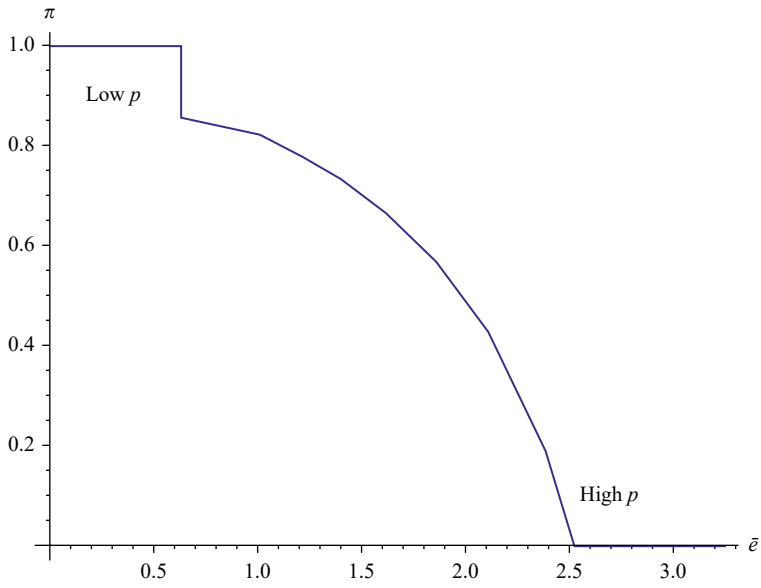


Fig. 9. The Competence-Control Tradeoff.

The effect of the jump at the cross-over from a high conflict environment to a low conflict environment is clear in the figure; it occurs in both types of agencies.

One can combine both figures to show the politicization-expertise frontier. This is done in Fig. 9 for a Type II agency. The figure shows the $(\bar{e}, \pi)$- tuple for various values of p ranging from 0 to 1. As shown, high values of agreement result in low politicization and a high promotion standard, leading to public-sector managers with high levels of human capital. In contrast, low levels of policy agreement lead to high levels of politicization and a low promotion standard, hence, poorly skilled public managers.

The logic underlying the frontier shown in Fig. 9 is fairly straightforward. First, high conflict (low p) drives the Boss to politicize decision-making, to protect himself from policy recommendations with which he disagrees. This degrades job satisfaction for intrinsically motivated managers so the Boss must increase the managerial wage, if he maintains the same promotion standard. But in addition, the low level of policy agreement between the Boss and the manager makes the work effort of the manager less valuable to the Boss, so he is unwilling to pay highly for their work. Consequently, the Boss lowers the promotion standard.

DISCUSSION AND CONCLUSION

Adapting the literature on private-sector contracting and careers, we have argued that public agencies face a pervasive dual-contracting problem: It is difficult for

agency leaders and civil servants to contract on worker performance, and hard for politicians to refrain from self-interested meddling in agency policymaking. Both problems influence the ability of public agencies to recruit, train, motivate, and retain expert employees, employees whose performance affects public agency performance. We have explored how wage structures and promotion standards respond to, and partially mitigate, the dual contracting problem by sorting "slackers" from "zealots." The analysis highlights the differences between what we have called Type I agencies, where managers have few attractive outside opportunities, and Type II agencies, where high-level managers have lucrative opportunities in the private sector. The analysis also provides microfoundations for the trade-off between political control and agency competence.

Although the model contains many stages it makes a series of integrated predictions not only about wage structures and promotion standards, but human capital acquisition, career paths, politicization levels, employee work effect, and agency performance including rates of agency policy innovation. The model provides a framework for exploring how changes in outside wages, shocks to policy disagreement between political overseers and career managers due to changes in party control of government, and shocks to agency wages from wage freezes have systematic impacts on the operation of public agencies, and different impacts across Type I and Type II agencies. These rich predictions might well be taken to data, especially data from agencies' internal personnel records.

The model has implications for efforts to reform public agencies. Disappointment with public agency performance has led elected officials world-wide to pursue fundamental reorganizations of public agencies. Elected officials typically seek measures that facilitate greater political control of the bureaucracy, modifying public-sector personnel systems (Suleiman, 2003). The model suggests that efforts to enhance political control can have perverse consequences for agency performance. The prospect of increased meddling will lead to reduced worker effort and ultimately lower promotion standards. Lower promotion standards imply less expert managers, a flatter salary structure, and fewer high-quality projects. Reform programs targeting personnel systems – entry and managerial pay, benefits, promotion standards, and so on – thus have strong implications for the ability of the agency to cultivate cadres of top quality managers.

In addition to fleshing out additional policy implications, the model, we believe, could be extended to include additional features. One path is to consider slackers and zealots where motivation and ability are correlated, where zealots have inherently steeper (shallower) learning or effort curves than slackers. Another path is to follow Besley and Ghatak (2005) and consider a unified game where initial sorting occurs between the private sector, Type I and Type II agencies. In these types of games, slackers and zealots might sort between agencies and their outside opportunities. This could have interesting implications for wage structures in the government. Finally, one could follow Cameron and de Figueiredo (2020) and break the modules of the game into their component parts, introduce political ideology into the game, and consider how this might affect the competence-control trade-off. All provide interesting paths for future research.

ACKNOWLEDGMENTS

We thank Alex Bolton, Ernesto Dal Bo, Bob Gibbons, Bob Powell, Ken Shepsle, Pablo Spiller, Steve Tadelis, Oliver Williamson, seminar participants at the Institute for Advanced Study, the Haas/Sloan Conference on the Law and Economics of Organizations at the University of California Berkeley, and the Vanderbilt Conference on Political Institutions. We gratefully acknowledge the financial support of the National Science Foundation (SES 1262230, SES 1061512, SES 1061600, ACI 1443014) and the Smith Richardson Foundation, de Figueiredo completed much of the work reported here while at Member at the Institute for Advanced Study. None of the authors has a conflict of interest with respect to the research reported here.

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APPENDIX

Lemma 1

Proof. First consider the manager's recommendation strategy $r()$. In light of Equation 1, any deviation from the indicated strategy brings a loss to a zealot-type manager given the indicated decision strategy $d^*(\sigma)$, and in fact would do so whenever there is a positive probability the Boss accepts the proposed project. Because a slacker-type manager is indifferent between X_L and X_H, he has no incentive to deviate to "recommend" if either $X = X_L$ or $X = X_H$. (As will become clear in the next Lemma, $X = X_H$ is actually off the equilibrium path if the manager is a slacker.) If one assumes an ϵ cost to the manager from a positive recommendation, then a slacker has a disincentive to deviate from the indicated strategy regardless of X. Now consider the Boss's decision strategy. Clearly, if informed the Boss will reject the recommended project if $Y = Y_L$ and accept if $Y = Y_H$. If uninformed, the Boss will accept if $\mu Y_H + (1-\mu) Y_L > 0$, where μ denotes Boss's posterior belief that $Y = Y_H$ given being uninformed and the manager's recommendation strategy. From Bayes' Rule conditional on a positive recommendation, given the manager's recommendation strategy and that θ is independent of the state (X, Y), $\mu = p$. The Boss will accept when uninformed if $pY_H + (1-p)Y_L > 0 \Rightarrow p \geq -\frac{Y_L}{Y_H - Y_L}$. If $p < -\frac{Y_L}{Y_H - Y_L}$ Boss will reject when uninformed. QED

Lemma 2

Proof. (1) A slacker $(\theta = 0)$ clearly undertakes no policy effort as it brings no utility gain and an effort loss. (2) For a zealot $(\theta = 1)$, the indicated results follow immediately from the first-order condition for the manager's optimization programs Equations 2 and 3. Comment: A corner solution $a^* = 1$ is possible. Using Lemma 4 and Equation 6, one can verify that as long as the following conditions hold, a^* is an interior solution even when γ is determined endogenously by e^*: $\bar{e} X_H \leq 2$ and $X_H^3 \leq 16\kappa$. QED

Lemma 3

Proof. Follows from comparison of the expected utilities in Equation 7 with the outside wages for clerks and managers (s_c and s_i, respectively). QED

Lemma 4

Proof. First consider slackers ($\theta = 0$). A slacker invests only to be promoted since he receives no satisfaction from policymaking *per se*. Consequently, if he invests at all, he invests the minimum to be promoted, $\bar{e}$. Promotion will be worthwhile only if the best post-promotion opportunity is sufficiently remunerative to offset training costs; otherwise the slacker will remain a clerk, either in the public or private sectors, depending on which clerkship pays more. The investment strategy of slackers follows immediately. Second, consider zealots ($\theta = 1$). A zealot's expected utility from being promoted and remaining with the agency is $w_m + \beta e - ke^2$, which is concave in e and reaches a maximum of $w_m + \frac{1}{4}\frac{\beta^2}{k}$ at $e = \frac{\beta}{2k}$. Given this, behavior in a Type I agency is straightforward: If $\bar{e} > \frac{\beta}{2k}$ and promotion is better than nonpromotion, the zealot will invest to $\bar{e}$. If $\bar{e} < \frac{\beta}{2k}$ and if promotion is better than non-promotion, the zealot will invest to $\frac{\beta}{2k}$. If nonpromotion is better than promotion, the zealot will not invest at all as doing so gains him nothing and is costly. Behavior in a Type II agency is somewhat more complex. If $\bar{e} > \frac{\beta}{2k}$ and promotion is better than non-promotion, then whether staying or going is the better post-promotion option, the zealot only invests to $\bar{e}$ as further investment only hurts him. If $\bar{e} < \frac{\beta}{2k}$ a zealot will invest in expertise beyond $\bar{e}$ to $e = \frac{\beta}{2k}$ – but only if doing so and remaining with the agency is better than investing just to the promotion standard and leaving for the private sector (that is, if $w_m + \frac{1}{4}\frac{\beta^2}{k} \geq s_o(\bar{e}) - k\bar{e}^2$) and such an investment is better than remaining as clerk either in the public or private sectors $\left(w_m + \frac{1}{4}\frac{\beta^2}{k} \geq \max\{s_c, w_c\}\right)$. However, if the outside wage is sufficiently high, then the zealot invests just to the promotion standard and departs (again, if doing so is better than remaining a clerk). Finally, if remaining a clerk is better than the best post-promotion option, the zealot remains a clerk. QED

Corollary 5

Proof. Using the Lemma, if a slacker is not to invest in expertise, in a Type I agency it must be the case that $w_m - k\bar{e}^2 < \max\{s_c, w_c\}$. Conversely, if a zealot is to invest in expertise and remain with the agency it must be the case that $w_m + \beta\bar{e} - k\bar{e}^2 \geq \max\{s_c, w_c\}$ when $\bar{e} \geq \frac{\beta}{2k}$, and $w_m + \frac{1}{4}\frac{\beta^2}{k} \geq \max\{s_c, w_c\}$ when $\bar{e} < \frac{\beta}{2k}$. Equation 9 simply re-states these conditions. QED

Lemma 6

Proof. (1a). The conjectured equilibrium requires for slackers $2w_c \geq s_c + s_m$, which implies $w_c \geq \frac{s_c + s_m}{2}$. (1b). If slackers are indifferent then $w_c = \frac{s_c + s_m}{2}$ and $s_c + s_m = 2w_c$. The conjectured equilibrium requires for zealots $w_c + w_m + \beta\bar{e} - k\bar{e}^2 \geq s_c + s_m$, and the result follows immediately. (2a). Given indifference, the conjectured equilibrium requires both $w_c + w_m + \beta\bar{e} - k\bar{e}^2 = s_c + s_m$ and

$w_c + s_i - k\bar{e}^2 = s_c + s_m$. Hence $w_c + w_m + \beta\bar{e} - k\bar{e}^2 = w_c + s_i - k\bar{e}^2$, or $w_m + \beta\bar{e} = s_i$. (2b). The conjectured equilibrium requires that $w_c + s_i - k\bar{e}^2 = s_c + s_m$. Clearly if $s_i - k\bar{e}^2$ varies in $\bar{e}$ then w_c must adjust to maintain the equality. QED

Lemma 7 Optimal Promotion Standard and Politicization in Type I Agencies.

Proof. First, note that because π is a probability it is bounded by 0 and 1, while e must be non-negative. Hence it is necessary to consider corner solutions where $\pi = 1$ or 0 and $e = 0$. However, for interior solutions one need only examine the first-order conditions for maximizing Equation 11 (where $p \in [-\frac{Y_L}{Y_H - Y_L}, 1]$ and where $p \in [0, -\frac{Y_L}{Y_H - Y_L}]$). For the former, the relevant partial derivatives are:

$$\frac{\partial}{\partial \pi} Eu_2^B(\cdot) = -\frac{X_H \bar{e}}{2}(1-p)[(1-p)(X_H + 2Y_L)\pi - (p(Y_H - Y_L) + (X_H + 2Y_L))]$$

$$\frac{\partial}{\partial e} Eu_2^B(\cdot) = \frac{X_H(1-(1-p)\pi)}{2}\left[(pY_H + (1-\pi)(1-p)Y_L) + \frac{1}{2}X_H(1-(1-p)\pi)\right] - 2k\bar{e}$$

Setting both to zero and solving simultaneously yields $\pi^*(p, Y_H, Y_L, X_H) = \frac{X_H + 2Y_L + p(Y_H - Y_L)}{(1-p)(X_H + 2Y_L)}$ and $\bar{e}^*(p, Y_H, Y_L, X_H, k) = -\frac{p^2 X_H (Y_H - Y_L)^2}{(X_H + 2Y_L)8k}$, respectively. Note that these solutions require $X_H + 2Y_L < 0$. In addition, $\pi = \frac{X_H + 2Y_L + p(Y_H - Y_L)}{(1-p)(X_H + 2Y_L)} = 0$ at $p = -\frac{X_H + 2Y_L}{Y_H - Y_L} \equiv p^{**}$, implying $\pi = 0$ for values of $p > p^{**}$. But, given $\pi = 0$ $\frac{\partial}{\partial e} Eu_2^B(\cdot) = \frac{-8ek + X_H[X_H + 2(p(Y_H - Y_L) + Y_L]}{4}$ implying $e = \frac{X_H(X_H + 2(p(Y_H - Y_L) + Y_L))}{8k}$. Now consider Equation 11 when $p < p^*$. In this case the relevant partial derivatives are:

$$\frac{\partial}{\partial \pi} Eu_2^B(\cdot) = \frac{ep^2 X_H(X_H + 2Y_H)\pi}{2}$$

$$\frac{\partial}{\partial e} Eu_2^B(\cdot) = \frac{-8ek + p^2 X_H(X_H + 2Y_H)\pi^2}{4}$$

Note that the first of these is positive, implying a corner solution $\pi = 1$. Given this, $e = \frac{p^2 X_H(X_H + 2Y_H)}{8k}$. QED

Lemma 8

Proof. Slackers employed in the agency do not seek promotion and thus receive $2w_c$. The relevant participation constraint is thus $2w_c \geq s_c + s_m$ and the least-cost entry wage satisfying this $w_c = \frac{s_s + s_m}{2}$. For zealots, the equilibrium is constructed so that a zealot employed by the agency is just indifferent between investing in expertise and being promoted, and not investing. Hence the same participation constraint applies. QED

Proposition 9

Proof. Follows from above Lemmata. QED

Lemma 10 Optimal Promotion Standard and Politicization in Type II Agencies.

Proof. The Boss's maximand is indicated in the body of the paper. The proof is virtually identical to that of Lemma 7, and is omitted for brevity.

Proposition 11

Proof. Follows from above Lemmata. QED