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Specialization and Career Dynamics: Evidence from the Indian Administrative Service

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Abstract

In this article, we attempt to resolve the tension between two conflicting views on the role of specialization in workers' careers. Some scholars argue that specialization is a net benefit that allows workers to get ahead, while others argue that broad experience across several domains is the only way to be truly exceptional. We use rich longitudinal data from 1974 to 2008 on the careers of Indian Administrative Service officers, members of the Republic of India's elite bureaucratic service, to test both these hypotheses. We find that specialization benefits officers throughout their career. We distinguish between skill-based and signal-based mechanisms that relate specialization to promotion, by exploring the match (or lack thereof) between the skills officers acquire and the jobs to which they are promoted, and we find that both mechanisms operate, but at different points in the career. Specialization is rewarded later in officers' careers because of the skills they acquire by specializing. Earlier in their careers, skills are less important; it appears that specialization benefits officers because it is a signal of general ability. These results contradict studies that find that specialization helps early in careers but fades with experience, but they also call into question the idea that specialization always reflects accumulated skill. Our results support both types of theories but suggest important scope conditions for when one mechanism or the other is likely to dominate.

Keywords: specialization, skills, careers, government service, promotion

Organization theory provides conflicting career advice to workers about specialization. There are advantages to focusing on one thing. Whether it is because of skills that one learns on the job or because of the clearer signals of identity that one sends to potential employers, specializing can help an employee get ahead. Yet there are also advantages to broad experience. These might accrue from developing different skills or might be due to the ability to broker between different domains of expertise. In recent years there have been efforts to see

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which of these effects predominates (Acemoglu and Pischke, 1999a, 1999b; Autor, 2001; Booth, Francesconi, and Frank, 2002; Zuckerman et al., 2003), but such research faces two major hurdles. First, there are empirical difficulties of measuring the effects of specialization. These include unobserved differences in ability and self-selection, which can be correlated with specialization, and survivor bias, produced when getting new experience takes a person out of a dataset. Most studies find that specialization is a net benefit for workers. Yet, second, even if there is causal evidence for benefits from specializing, multiple theories predict this result, and we need to explore underlying mechanisms. In the simplest case, specialization can reflect real skills (Becker, 1962; Rosen, 1972; Mincer and Jovanovic, 1981). Sociological accounts emphasize instead that specialization can be a signal of general competence, divorced from the specific skills acquired (Zuckerman et al., 2003).

Overcoming these hurdles requires data with specific features. In this paper, we use a rich set of longitudinal data about the background, work experiences, and career outcomes of officers in the Indian Administrative Service (IAS) to parse the effect of specialization on career advancement. These data help us with both of these problems. First, the structure of the IAS minimizes variance in unobserved ability and rules out self-selection and survivor bias. This allows us to estimate more convincing, causal benefits of specialization on career advancement. Second, the IAS data include information about skills its officers acquire in each job, as well as the skill requirements of each job.

SPECIALIZATION AND CAREER DYNAMICS

Specialization has been an important topic both in labor economics (Rosen, 1983; Neal, 1998; Acemoglu and Pischke, 1999b; Autor, 2001) and in the sociology of work (Arthur and Rousseau, 1996; Cappelli, 1999; Osterman and Burton, 2004). It has been linked both to individual career outcomes and to aggregate outcomes such as labor-market inequality (Leahey, 2007). In studying specialization's role, scholars offer two main theoretical accounts for why it affects performance. The first account is based on skill: specializing gives employees more time to acquire job-specific skills (Parsons, 1972). The second account is based on signaling: staying in one job rather than moving between jobs signals to employers that the employee is sufficiently reliable to risk hiring (Zuckerman et al., 2003). These two accounts are often put forward as competing mechanisms, but there is no a priori reason that they cannot both affect a career, and they may even interact with one another.

The skill account stems from economic theories of human capital and training. People build skills on the job (Becker, 1962; Rosen, 1972). Specializing in one type of work gives a worker the chance to build more skills than a worker who moves between types of work. When an employer considers two workers who have the same tenure and differing specialization, the employer should prefer the more specialized worker, because he or she will be more productive. This idea has been proposed both by scholars studying promotion in internal labor markets (Doeringer and Piore, 1971; Wholey, 1985; Zuckerman, 2005) and by research on hiring in external labor markets (Autor, 2001). For this prediction to hold, though, the job in question should be one that uses the skills that the specialized employee has acquired.

Accounts based on skill accumulation also presume that employers have few problems assessing how much skill a given worker has. Yet research on promotion in firms, stemming, for example, from agency theory, suggests that separating workers' true performance from their own claims and others' evaluations of them is actually rather difficult. As Borland (2006: 252) explained, ''Ability is initially uncertain but is learnt by the manager and firms over time. . . . The manager, recognizing that performance acts as a signal of productivity, and hence will affect future compensation, will adjust her actions to influence the evaluation of her ability.'' Given that employees can and have incentive to ''game'' perceptions of their performance, being in an internal labor market by itself is not enough to remove uncertainty about workers' potential ability (Ishida, 2004, 2006). This skepticism about evaluating employees' ability within the firm dovetails with recent scholarship on hiring that highlights the problems employers have in assessing how much skill an applicant has: ''Employers may be unable to ascertain whether a worker actually possesses these skills, or in what amount or quality'' (Acemoglu and Pischke, 1999b: 556). To reduce uncertainty, employers often use career histories—the sets of jobs workers have held—to help them decide about hiring and promotion (Wholey, 1985; Neal, 1998). Career histories give signals about how much general and specific skill a worker has (Autor, 2001; Booth, Francesconi, and Frank, 2002). A career history containing many diverse jobs implies a worker with less skill and ability than a career history with longer stretches of one type of work. Thus employers prefer to hire and promote employees with more specialized work histories, meaning those who have done fewer different types of work in a given amount of labor-market tenure (Neal, 1998). Prospective employees with more specialized career histories receive higher-wage offers than employees with more diverse career histories (Acemoglu and Pischke, 1999a), and specialized employees are more likely to be retained and better compensated (Simmons and Berri, 2006).

The skill approach thus assumes that career histories unproblematically reflect accumulated skill. This assumption can produce anomalies. A history of performing many jobs could reflect prodigious skill, but several studies have found that employers often discount this possibility. When studying temporary work agencies, for example, Ward et al. (2001) found that the agency had reservations about placing highly skilled workers on project teams across multiple organizations because the resulting placement record might make the worker less appealing to future clients. Bidwell and Fernandez-Mateo's (2010) study of a large staffing firm found that workers and clients needed considerable time to gauge the fit of the worker to the job and to negotiate pay accordingly, which suggests that the quality signal sent by career specialization is a noisy one at best.

The signaling approach does not assume that career histories unproblematically reflect ability. An employee could be a high-ability worker and thus excel at different types of jobs, but if employers interpret career histories in the way economists suggest, then the employee's movement between jobs could easily be mistaken for incompetence. There could be observed rewards for career specialization not because specialization clearly signals ability but because diversification unclearly signals ability. This approach departs from Spence's (1973) theory of job-market signaling by arguing that the best signal of high quality is hard to distinguish from the signal of low quality, which breaks the

relationship between signal and skill and limits the usefulness of such signals in producing efficient outcomes. The general idea is that it is hard for market participants to make sense of actors with more diffuse identities (Zuckerman, 1999, 2000; Hsu, 2006). This approach assumes that hiring specialized workers is a satisficing rather than an optimizing tactic by employers (Zuckerman et al., 2003). Employers would rather hire workers who are skilled at many things, but a varied work history is an ambiguous signal: a worker with a diverse history could be multi-talented or untalented. Better, then, to hire a worker with specialized experience.

Both the skill and the signaling account make the same prediction: specialization should lead to faster career progress. This makes it impossible to distinguish between the two accounts based on that relationship alone. One way to distinguish them would be to leverage the fact that these mechanisms should apply more at different times in a worker's career. Most human-capital research has found that skills are accumulated relatively slowly, and skill accumulation should differentiate workers more later in their careers, when they have had time to develop more and different skills (Parsons, 1972). It is harder to argue that specific skills should distinguish early-career workers, because early-career workers do not have many specific skills (Zuckerman et al., 2003). Furthermore, employers have less information about newer workers than more senior ones. Signals about general ability should be more important for less-experienced workers. These two mechanisms can also interact with one another. Novice workers might specialize to show general reliability, but in so doing they acquire more specific skill, and that skill in turn is an incentive toward further specialization based on substantive experience. This integration suggests that specialization should matter both early and later in a worker's career. It also suggests, though, that there should be weak matches between what workers specialize in and the jobs to which they are promoted early in their careers, and strong matches later.

Testing this prediction is a non-trivial task. Doing so requires data on the types of work people do throughout their careers and whether they clear comparable career hurdles. Crucially, the variance in their specialization should not be correlated with their unobservable levels of innate ability, the type of work that they do, or their own preference for or against specializing. The setting should also be one in which there are no organizational or other norms against diversification, lest the deck be stacked against one result. We have data from such an environment in which to test our predictions: the careers of officers in the Indian Administrative Service.

Careers in the Indian Administrative Service

Indian Administrative Service (IAS) officers are federal employees who are tasked with running a variety of government organizations—they are managers of managers, in effect. Officers are assigned to states (''cadres,'' in IAS parlance) but can fill postings either in those states or with the central government in New Delhi. Since its formation in 1946, the IAS has been considered one of the most prestigious careers in India. According to Krishna (2010: 435), ''The IAS remains, at the present time, very likely the largest cadre of generalist managers anywhere in the world . . . the IAS officials continue doing a

generalist's job, just as they did 30 years ago and earlier. Theirs is hardly a narrow groove, except on rare occasions.''

Recruitment and early career. IAS officers are recruited through a highly competitive selection process: ''More than 200,000 people take the first phase of the examinations, a number that is winnowed down to some 12,000 when the final exam is held six months later. Of those, only 2,000 or so will be invited to an interview, and then only about 80 people will be offered posts with the service . . .'' (Gargan, 1993). Once admitted, officers enjoy life tenure. Most receive some initial training at the National Academy of Administration in Massoorie. Officers are then assigned to a cadre. Most cadres correspond to Indian states; some of the very small northeastern states and union territories are grouped in single cadres. Virtually all officers start as a sub-magistrate, managing the taxes and other affairs of a small district. A junior IAS officer's work includes enforcing laws or managing local development projects. Once they are promoted to the senior pay scale, officers are posted to sundry positions within their cadre that include managing districts, public enterprises, and government ministries. In each post, officers gain experience in substantive areas such as finance, rural development, or human resource management.

The specialization of an IAS officer's experience can vary widely. Most officers enter the service with little substantive preparation (Krishna, 2010: 435). Because the IAS is a general-management service, officers are rotated through many organizations. During each posting, officers acquire one of several dozen ''major experiences,'' such as rural development, finance, or forestry. A distinctive feature of the IAS's career-tracking system is that it records the major experience type of each job. This is useful for our study design because it allows us to track officers' movement between different types of work separately from their movement between different jobs.

Changes in postings occur at fixed intervals, and most officers switch experiences frequently (Potter, 1986; Krishna, 2010). Qualitative evidence suggests that senior officers rotate junior ones with little concern for any emerging specialty, particularly early in the junior officers' careers. Postings are primarily made according to the needs of the bureaucracy, the officers' location on the seniority scale, and the availability of vacancies at that level. Therefore junior IAS officers have little control over where their next posting will be (Jayapalan, 2001: 381).

The IAS's basic pattern of recruiting and cross-training rising stars is not unique to the Indian government but is comparable to managerial rotation systems used by large corporations. An IAS officer working in finance is not a financier. His or her job is to integrate the operations of the finance group with the larger operations and goals of the state, as much as it is to run his or her department well.

Rising through the ranks. Most IAS promotions are nearly automatic. Officers receive regular raises and titular promotions based on their tenure. By default, such promotions take place in an officer's assigned cadre. There are two types of postings, though, that convey exceptional status and greatly increase an officer's prospects of advancing into the highest echelons of the

service. It is these postings, known as Centre postings and empanelment, on which we focus.

After their fourth year in the service, officers may begin to compete for posting to a central-government post in New Delhi, known as ''the Centre.'' Officers who are on central posting join ministries' senior staffs and play a larger role in formulating policy (Shurmer-Smith, 1998). About two-thirds of all IAS officers receive such a posting in their careers. Centre postings are voluntary, and a few officers prefer never to leave their state-level posts. There is nonetheless little doubt that Centre postings are a goal for most IAS officers: ''The greatest attraction lies with appointments within the central government'' (Singh and Srinivasan, 2006: 315).

Empanelment as joint secretary in the central government is the next milestone. Empanelment is a prerequisite for becoming a secretary to the Government of India, the highest bureaucratic position in the country. High performance in previous postings is a necessary but by no means sufficient condition for empanelment. An empanelment selection committee is required by statute to evaluate all officers who are eligible for empanelment, and there is no self-selection into bidding for these positions.

All of these institutional features guide our identification strategy. First, the IAS itself reduces the variability of officers' ability through its rigorous selection system. Second, IAS officers exhibit significant exogenous variation in the accumulation of major experiences, especially at the earlier stages of their career. The variation results more from the idiosyncratic vacancies in the bureaucracy than from their own desire to specialize. Yet most IAS officers have common career goals: Centre postings, then empanelment as joint secretaries. A final important feature is that exits from the service except for retirement are extremely rare. Unlike many other labor markets, survivor bias is not a significant issue here.

For our purposes, the IAS can be thought of as a system that sifts through the population to identify individuals with comparable high ability, assigns those individuals careers that vary in the diversity of the constituent experiences, and evaluates those individuals for a common set of rewards. A key feature behind our strategy is that the diversity of an IAS officer's experience can be thought of as exogenously assigned, conditional on other observed characteristics. This maximizes the likelihood that any effects of specialization that we do observe in this labor market come from the mechanisms we theorize rather than from self-selection or survivor bias. Furthermore, the IAS's two comparable career hurdles give us an excellent setting in which to evaluate the relative importance of skill in determining the outcomes of early- and late-career milestones.

METHOD

Data

We assembled data from the administrative records of the 4,259 Indian administrative officers who began their careers between 1974 and 2008. Individuals can enter the IAS through two different routes. Regular recruits, 73 percent of our sample, began their careers in their mid- to late-twenties. The remaining 37 percent entered via promotion from a state civil service.

Promotees enter the IAS much later in their career, usually work in one area, and do not become joint secretaries. We therefore excluded promotees from our analysis.

The risk set for posting to New Delhi consists of 3,122 officers who entered through regular recruitment, contributing 420,676 monthly observations. When we modeled empanelment, we considered only the eligible officers, those who received a Centre posting (Department of Personnel and Training, 2011: A1). These 1,220 officers contribute 139,075 post-promotion, pre-empanelment monthly observations.

We wanted to examine the effects of specialization on clearing early- and late-career milestones and the match between the skills accumulated and the job attained. We began our analysis by modeling postings to the Centre and examining matches between early-career experience and the types of work that those posted get in New Delhi. We then modeled empanelments and examined the match between late-career experience and the jobs that joint secretaries have.

Dependent Variables

Centre posting. We modeled posting to the Centre as the first transition from a state-level posting to a posting in New Delhi. In our data, we observed 2,083 transitions to the Centre by regular-recruitment officers, for a promotion rate of 66.7 percent.

Empanelment. We examined whether officers promoted to the Centre were later empaneled. We focus on the 1,220 officers who entered the IAS between 1974 and 1989 and were ever promoted to the Centre (no officer who entered after 1989 had yet been empaneled by 2008). Of these, 407 were empaneled.

Independent Variable

We observed each officer's complete career history since his or her entry into the IAS. Each posting includes information on whether the officer was employed in the Centre or in the states, his or her seniority level, the start and end dates for the posting and the ''major experience'' that the officer acquired during the spell. Our main independent variable, the *degree of specialization*, was calculated using a Herfindahl index. For each individual i in time t, we observed the number of months he or she previously worked in one of 40 experiences m. These experiences and the distribution of monthly experience, from most to least frequent, are described in table 1. First, we calculated the individual's experience at each period. We denoted S_{imt} as the total months an officer i has in experience m in month t of their tenure. The Herfindahl score H_{it} was then calculated by summing the squared shares of all major experiences through the time period for each individual:

$$H_{it} = \sum_{m} \left(\frac{s_{imt}}{s_{it}} \right)^2$$

Table 1. Distribution of Monthly Experience by Type for IAS Officers, 1974–2008

Experience	Frequency	Percent	Cumulative
Land revenue mgmt. and district admin.	230314	38.38	38.38
Personnel and general admin.	46060	7.67	46.05
Finance	42840	7.14	53.19
Industries	32878	5.48	58.66
Agriculture and cooperation	27136	4.52	63.19
Urban development	24282	4.05	67.23
Human resource development	18279	3.05	70.28
Rural development	16623	2.77	73.05
Social justice and empowerment	15086	2.51	75.56
Home	14294	2.38	77.94
Health and family welfare	12246	2.04	79.98
Energy	10915	1.82	81.8
Consumer affairs and food	10757	1.79	83.59
Commerce	9941	1.66	85.25
Transport	9322	1.55	86.8
Planning and prog. Implementation	7365	1.23	88.03
Textiles	6401	1.07	89.1
Water resources	6005	1	90.1
Tourism	5359	0.89	90.99
Labour and employment	5095	0.85	91.84
Local self-government	5091	0.85	92.69
Environment and forests	5074	0.85	93.53
Law and justice	4848	0.81	94.34
Women and child development	4446	0.74	95.08
Information and broadcasting	3992	0.67	95.75
Communications and info. tech.	3459	0.58	96.32
Mines and minerals	3411	0.57	96.89
Defence	3404	0.57	97.46
Culture	3168	0.53	97.99
Science and technology	2892	0.48	98.47
Youth affairs and sports	2572	0.43	98.9
Public works	2388	0.4	99.29
Petroleum and natural gas	1581	0.26	99.56
Staff officers	1150	0.19	99.75
Chemicals and fertilizers	569	0.09	99.84
Parliamentary affairs	467	0.08	99.92
External affairs	241	0.04	99.96
Corporate management	193	0.03	99.99
Development of North Eastern Region	35	0.01	100

Herfindahl indices can range from 0 to 1; larger scores imply increased specialization. We postulate that there will be a positive relationship between specialization and posting to New Delhi. To avert any bias introduced by the skewness of the Herfindahl, our estimations use the natural log of the index.

By construction, the Herfindahl index tracks both the absolute number of different types of experience as well as the number of months (as a share of the total) spent in each, but it does not track how many moves between jobs were made in accumulating those shares. Our goal was to interpret the Herfindahl index as as pure a measure of non-systematic variation as possible. Accordingly, while we focus on the coefficients estimated for the index, we also included and discuss variables that track the number of moves officers

have made, their depth of experience in specific types of work, and other elements of the IAS officer's career.

Control Variables

We included a substantial set of controls to account for other sources of heterogeneity among the officers that may affect their first transition into a Centre posting and their empanelment. First, we controlled for the number of academic degrees that an officer held, his or her college major, the count of the different subjects he or she studied across various degrees, and academic performance as indicated by graduating in the first division.

To measure experience, we controlled for an officer's number of prior postings, its square and an officer's tenure in the IAS, in months. To take into account officers' ability to leverage their in-group membership to increase their chances of a Centre posting, our models include variables indicating whether officers speak Hindi, Bengali, Telugu, Marathi, and Tamil—dominant Indian languages. Finally, we also controlled for officers' age and gender.

To control for any unobserved heterogeneity between cohorts, states, and years, we included indicators for the five-year cohort to which the IAS officers belonged (e.g., 1970–1974 or 1985–1989), the cadre to which they were allocated, and the calendar year.

To capture the effects of political interference, we gathered data on chief-ministerial turnover (the chief minister is the equivalent of a state governor in the U.S.) and changes in party control in each state from 1970 to 2008 and created an indicator variable for any change in government or party and in the month following the change. Windows of up to four months produce comparable results.

We also considered the role that favoritism plays by examining homophily (McPherson, Smith-Lovin, and Cook, 2001) in the central government. Specifically, if a ministry in New Delhi already has several staffers from an IAS officer's cadre or several of his fellow cohort-recruits, then that officer might be more likely to be promoted. To test this possibility, we calculated each cadre's and cohort's share of ministerial positions in each month (Barnett, Baron, and Stuart, 2000).

Finally, we estimated individual fixed-effect models that account for any time-invariant but unobserved officer characteristics as well as predilections to bid for Centre postings. Summary statistics are presented in table 2.

RESULTS

Promotion to the Centre

Table 3 presents the estimated discrete-time event-history models of the first posting to the Centre. In addition to career specialization, we included the control variables described above and clustered standard errors at the officer level. Column 1 includes the number of moves an officer has made, age, and tenure in the IAS. As expected, both the number of postings and age have inverted U-shaped relationships to the risk of a Centre posting. Posting probability peaks at age 46. Column 1 also includes specialization, which is positive, as expected, and significant. The coefficient of 0.942 suggests that between two officers who have the same tenure, are the same age, and have had as many distinct

Table 2. Summary Statistics for Analysis of First Posting to Central Government (N = 428,439)

Variable	Count	Mean	S.D.
Promotion to Centre	428439	0.003	0.06
Postings	428439	4.084	4.26
Age	428439	34.500	6.88
Female	428439	0.134	0.34
Hindi	428439	0.521	0.5
Bengali	428439	0.036	0.19
Telugu	428439	0.070	0.26
Marathi	428439	0.033	0.18
Tamil	428439	0.075	0.26
First division	428439	0.667	0.47
Engineering	428439	0.230	0.42
Humanities	428439	0.317	0.47
Medicine	428439	0.045	0.21
Professional	428439	0.141	0.35
Science	428439	0.321	0.47
Business	428439	0.186	0.39
Law	428439	0.077	0.27
No. of subjects	428439	1.710	0.84
Two degrees	428439	0.435	0.5
Three degrees	428439	0.192	0.39
Four degrees	428439	0.092	0.29
Cadre share in Centre	312365	0.017	0.11
Cohort share in Centre	316838	0.017	0.11
New chief minister	428439	0.068	0.25
Specialization	428439	-1.688	0.53

jobs in the IAS, the officer whose logged specialization score is one standard deviation above the mean is approximately 36 percent more likely to receive a posting to the Centre in the next time period.

Column 2 introduces three sets of fixed effects. First, cadre effects are included to take into account differences in the size of the state bureaucracy, patterns of association among the state's bureaucrats, and so on. Second, cohort effects control for any idiosyncrasies of different cohorts, which one might expect, for example, if the favored college majors for IAS officers had changed over time or if the incoming quality of IAS applicants has systematically varied. Third, calendar-year effects control for year-specific shocks that may affect promotion chances; these include political changes in the central government, the creation or removal of offices in New Delhi, and any reforms, such as India's economic liberalization in the 1990s. The estimated effect of specialization is robust to their inclusion. Unless otherwise noted, all the following models include these fixed effects.

Column 3 adds basic demographic controls to the model. We find that female IAS officers are more likely to be posted to the Centre, as are officers from some of the major linguistic groups. Column 4 introduces controls for human capital. As would be expected, we find strong and positive effects of graduating in the first division of one's undergraduate class and having multiple academic degrees.

Table 3. Logistic Regressions of First Posting to Central Government*

Variable	(1)	(2)	(3)	(4)	(5)
Postings	0.513•••	0.57•••	0.58•••	0.572•••	0.547•••
	(0.035)	(0.037)	(0.037)	(0.037)	(0.037)
$(\text{Postings})^2$	–0.017•••	–0.017•••	–0.017•••	–0.017•••	–0.015•••
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Age	0.555•••	0.803•••	0.801•••	0.82•••	0.715•••
	(0.073)	(0.086)	(0.086)	(0.087)	(0.087)
$(\text{Age})^2$	–0.006•••	–0.009•••	–0.008•••	–0.008•••	–0.007•••
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
IAS tenure	–0.016•••	–0.017•••	–0.017•••	–0.019•••	–0.02•••
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Specialization	0.942•••	1.179•••	1.286•••	1.301•••	1.491•••
	(0.091)	(0.106)	(0.109)	(0.110)	(0.115)
Female			0.41•••	0.435•••	0.352•••
			(0.101)	(0.106)	(0.107)
Hindi			0.579•••	0.551•••	0.543•••
			(0.093)	(0.094)	(0.095)
Bengali			0.578•••	0.548••	0.498••
			(0.173)	(0.017)	(0.179)
Telugu			0.222	0.169	0.13
			(0.150)	(0.150)	(0.150)
Marathi			0.0449	0.072	0.002
			(0.238)	(0.244)	(0.260)
Tamil			0.502•••	0.48•••	0.468••
			(0.142)	(0.145)	(0.148)
First division				0.278•••	0.254•••
				(0.077)	(0.077)
Engineering				–0.018	–0.024
				(0.112)	(0.113)
Humanities				–0.227	–0.224
				(0.119)	(0.120)
Medicine				–0.665••	–0.685••
				(0.209)	(0.208)
Professional				0.172	0.18
				(0.119)	(0.121)
Science				–0.279••	–0.262••
				(0.096)	(0.097)
Business				0.071	0.041
				(0.105)	(0.106)
Law				–0.323•	–0.376••
				(0.141)	(0.143)
No. of subjects				0.118	0.135
				(0.082)	(0.083)
Two degrees				0.151	0.134
				(0.106)	(0.106)
Three degrees				0.257	0.223
				(0.133)	(0.133)
Four degrees				0.319	0.315
				(0.172)	(0.170)
Cadre share in Centre					–0.46
					(0.363)
Cohort share in Centre					–0.895••
					(0.277)
New chief minister					–0.297•
					(0.126)

(continued)

Table 3. (continued)

Variable	(1)	(2)	(3)	(4)	(5)
Observations	434438	423672	420676	420676	308570
Log-likelihood	–8534.3	–8196.9	–8100.2	–8047.3	–7571.2

• $p < .05$; •• $p < .01$; ••• $p < .001$.
* Standard errors are in parentheses. Fixed effects for cadre, cohort, and year are included in all models except model 1.

Column 5 adds controls for political change and favoritism. The number of observations is smaller in this model because, for early entrants to our data set, we have less information about the senior IAS officers in New Delhi when they were at risk for Centre posting. To minimize bias, we estimated this model excluding those officers who entered the IAS in the 1970s. We find no evidence that favoritism by cadre or cohort takes place. If anything, we find evidence of crowding out: having more people from one's cadre or cohort already in New Delhi reduces one's chances of getting a posting. The coefficient for a new chief minister, which tracks exceptional opportunities for political interference, is negative and significant. Immediately after political changes in a state, officers are less likely to be posted to New Delhi, but this does not significantly alter our coefficient on specialization.

The results in table 3 support our prediction that, early in their careers, officers who receive specialized work experience are more likely to be posted to the Centre. In table 4, we show several checks on the robustness of these results. Column 1 of table 4 restricts the risk set for Centre postings to those officers who have twelve or fewer years of tenure in the IAS in order to estimate our models on a more conservative risk set. The coefficient on specialization remains significant in this model.

Column 2 includes our first test for whether it matters what type of work an IAS officer specialized in or whether the fact of specialization alone explains Centre postings. Specialization could be favored for a variety of reasons. It could be because the worker has required a specific set of skills that is useful for his or her future posting. It is also plausible that specialization has improved past work performance, which in turn improves chances of a posting to the central government. Alternatively, specialization could produce better relationships with supervisors or simply give the latter better opportunities to observe the worker's performance. In column 2, we include a set of 39 variables that count, for each officer in each month, the number of months that he or she has worked in each of the IAS's major experiences. If our measure of specialization only reflects preference for those who have acquired specific skills, then including these skill profiles should mediate the effect on specialization. It does not. This result also holds in column 3, where we estimate individual fixed-effects models. Including these fixed effects lets us control for officers' caste, any remaining differences in unobserved ability, and for any variance in their propensity to bid for Centre postings. The effect of specialization still holds.

We further tested this idea by estimating multinomial logistic regressions to examine, among those who have received Centre postings, whether there is a match between their accumulated experience and the postings they

Table 4. Logistic Regressions of First Posting to Central Government: Robustness Checks*

Variable	(1)	(2)	(3)
Postings	0.785•••	0.527•••	0.568•••
	(0.071)	(0.037)	(0.040)
$(\text{Postings})^2$	–0.034•••	–0.014•••	–0.016•••
	(0.006)	(0.002)	(0.002)
Age	1.502•••	0.684•••	0.658•••
	(0.231)	(0.087)	(0.089)
$(\text{Age})^2$	–0.018•••	–0.007•••	–0.006•••
	(0.003)	(0.001)	(0.001)
IAS tenure	–0.018•••	–0.02•••	–0.015•••
	(0.003)	(0.002)	(0.003)
Specialization	1.721•••	1.566•••	2.197•••
	(0.156)	(0.116)	(0.186)
Female	0.335••	0.322••	0.289•
	(0.127)	(0.109)	(0.112)
Hindi	0.55•••	0.57•••	0.578•••
	(0.117)	(0.098)	(0.099)
Bengali	0.733•••	0.55••	0.618•••
	(0.211)	(0.177)	(0.172)
Telugu	0.003	0.141	0.087
	(0.199)	(0.156)	(0.163)
Marathi	0.146	–0.022	–0.06
	(0.319)	(0.260)	(0.268)
Tamil	0.509••	0.49••	0.457••
	(0.166)	(0.153)	(0.152)
First division	0.107	0.254••	0.239••
	(0.093)	(0.078)	(0.079)
Engineering	–0.078	–0.062	–0.042
	(0.135)	(0.113)	(0.116)
Humanities	–0.209	–0.266•	–0.237
	(0.146)	(0.122)	(0.122)
Medicine	–0.824••	–0.756•••	–0.689••
	(0.264)	(0.221)	(0.219)
Professional	0.15	0.138	0.183
	(0.150)	(0.123)	(0.122)
Science	–0.208	–0.299••	–0.273••
	(0.116)	(0.099)	(0.100)
Business	0.022	0.00722	0.002
	(0.129)	(0.108)	(0.109)
Law	–0.448•	–0.415••	–0.382••
	(0.184)	(0.145)	(0.147)
No. of subjects	0.14	0.186•	0.177•
	(0.103)	(0.084)	(0.084)
Two degrees	0.024	0.1	0.134
	(0.125)	(0.105)	(0.107)
Three degrees	0.055	0.206	0.206
	(0.160)	(0.133)	(0.136)
Four degrees	0.222	0.232	0.264
	(0.208)	(0.172)	–0.174
Cadre share in Centre	–0.82	–0.648	–0.675
	(0.489)	(0.383)	(0.396)
Cohort share in Centre	–0.881••	–1.153•••	–1.111•••
	(0.304)	(0.295)	(0.292)
New chief minister	–0.443••	–0.298•	–0.296•

(continued)

Table 4. (continued)

Variable	(1)	(2)	(3)
	(0.166)	(0.126)	(0.126)
Observations	209042	308570	308551
Log-likelihood	–4683.9	–7400	–7325.8

• $p < .05$; •• $p < .01$; ••• $p < .001$.

* Standard errors are in parentheses. Models 1 and 2 include fixed effects for cadre and cohort, and all models include fixed effects for year. Models 2 and 3 include depth of experience, and model 3 includes individual fixed effects.

subsequently received. We hypothesized that there would be no systematic match between amassed experience and next job early in officers' careers. Table 5 presents these results for the five most common fields of specialization. The most important coefficients, which are in bold, are those that show the likelihood of such a match. Thus the way to interpret the coefficients in table 5 is as follows: an officer who specialized in personnel and who was promoted was no more likely to work in personnel in the Centre than to work in any other area in the Centre, an officer who specialized in commerce and who was promoted was less likely to work in commerce in the Centre than in other areas, and so on. There is no systematic relationship, and including more fields of specialization does not change the result. Save for finance, an officer's specializing in a field does not raise the likelihood of his or her being posted to work in that field in the Centre. Taken together, the results from tables 4 and 5 support our proposition that, early in a career, specialization is not rewarded because of the particular work the officer has done. This leaves open two other mechanisms, which are admittedly difficult to tease apart: that specialization helps evaluators reduce their uncertainty about an officer's ability, or that specialization gives an officer a better chance to develop positive working relations with his or her supervisor and thus receive stronger evaluations.

Empanelment as Joint Secretary

The second analysis we conducted examines whether an officer who was promoted to the Centre is eventually empaneled as a joint secretary. As in the first stage, we estimated discrete-time event-history models of empanelment. The estimated models, presented in table 6, include the same controls as the models for first promotion to the Centre, although the effect of specialization is robust to the exclusion of these controls (a larger table breaking out these groups of controls is available on request).

Column 1 presents the control variables. The results are similar to those for the Centre-posting analysis. We find inverted U-shaped relationships between the number of postings, age, and the probability of empanelment. Save for Hindi-language speakers, the ascriptive variables have no significant effect on the probability of empanelment. Officers who graduated from college in the first division are 66 percent more likely to be empaneled than others. We also find some effect of having a larger number of degrees, but the effects are not as large as having graduated in the first division. Even with these controls, we

Table 5. Multinomial Logistic Regression Predicting Experience Match upon Posting to Centre (N = 1350)*

Variable	Personnel	Commerce	Finance	Industries	Home
Age	–0.03	0.031	0.051	0.016	–0.016
	(0.021)	(0.018)	(0.034)	(0.040)	(0.040)
Postings	–0.013	–0.041	–0.096	–0.043	0.034
	(0.016)	(0.037)	(0.057)	(0.080)	(0.063)
Female	–0.617••	–0.49	–0.261	–0.227	–0.626•
	(0.202)	(0.463)	(0.237)	(0.544)	(0.262)
First division	0.248•	0.126	0.659•	0.284••	–0.384
	(0.116)	(0.233)	(0.256)	(0.098)	(0.198)
Specialization	0.213	0.068	–0.583•	0.066	0.312
	(0.185)	(0.331)	(0.228)	(0.372)	(0.380)
Personnel	**–0.127**	1.111•	–0.569	–13.99•••	1.29•
	(0.521)	(0.503)	(1.056)	(0.544)	(0.522)
Commerce	1.137•••	**–13.68•••**	–13.74•••	–13.89•••	–14.05•••
	(0.200)	**(1.113)**	(1.149)	(1.170)	(1.062)
Finance	0.179	0.61	**1.011••**	0.032	–0.836
	(0.262)	(0.350)	**(0.357)**	(0.919)	(0.744)
Industries	–0.006	0.27	0.869••	**0.406**	–0.15
	(0.229)	(0.596)	(0.314)	**(0.403)**	(0.843)
Home	–14.63•••	–14.45•••	0.361	–14.62•••	**0.748**
	(0.716)	(0.652)	(1.372)	(0.758)	**(0.579)**
P(promotion to Centre)	–8.528	7.068	–10.62•	–17.67•••	4.69
	(7.150)	(4.855)	(4.559)	(4.911)	(2.951)
Constant	0.764	–2.708••	–4.447•••	–2.152	–0.905
	(1.071)	(0.845)	(1.132)	(1.571)	(1.579)

• $p < .05$; •• $p < .01$; ••• $p < .001$.

* Standard errors, in parentheses, are clustered for all models at the cadre level. Statistics in bold show the likelihood of a match between skills and next job.

find that an officer with a level of specialization one standard deviation above the mean for those in the risk set is 43 percent more likely to be empaneled.

One reservation about the results in column 1 is that, while we observe multiple measures of human capital and work experience, we cannot observe more job- and organization-specific measures of individual potential and fit with the organization (Jovanovic, 1979, 1984). Officers may be promoted to Delhi because they are expected to do well there and, more importantly, may not be promoted when their superiors think that their prospects for further career advancement are poor. One way to model this potential endogeneity is to include for each individual who was promoted his or her predicted probability of promotion from the first-stage model. The logic behind this is straightforward: someone who is posted to New Delhi because he or she has potential that our first-stage model did not capture will have a large residual in that first stage, and thus a low predicted probability of promotion. More ''typical'' candidates will have a higher predicted probability, and a smaller residual, because they have less exceptional potential net of observables. The predicted probability of a Centre posting should thus be negatively correlated with empanelment. Our estimation in column 2 includes this predicted probability. It is indeed

Table 6. Logistic Regression Predicting Empanelment as Joint Secretary*

Variable	(1)	(2)	(3)	(4)
Postings	0.285••	0.324•••	0.324•••	0.273••
	(0.095)	(0.095)	(0.095)	(0.095)
$(Postings)^2$	–0.008•	–0.008•	–0.008•	–0.006
	(0.004)	(0.004)	(0.004)	(0.004)
Age	4.959•••	5.012•••	5.014•••	5.149•••
	(0.416)	(0.416)	(0.416)	(0.436)
$(Age)^2$	–0.05•••	–0.05•••	–0.05•••	–0.051•••
	(0.004)	(0.004)	(0.004)	(0.005)
Tenure	–0.009•	–0.009•	–0.009•	–0.018••
	(0.004)	(0.004)	(0.004)	(0.005)
Specialization	0.929•••	1.085•••	1.086•••	0.495
	(0.267)	(0.273)	(0.273)	(0.382)
Female	0.101	0.174	0.174	0.267
	(0.203)	(0.203)	(0.203)	(0.232)
Hindi	0.364•	0.494••	0.493••	0.5••
	(0.154)	(0.159)	(0.159)	(0.175)
Bengali	0.439	0.524	0.524	0.484
	(0.266)	(0.275)	(0.275)	(0.305)
Telugu	–0.57	–0.487	–0.488	–0.439
	(0.345)	(0.349)	(0.349)	(0.361)
Marathi	0.51	0.513	0.513	0.622
	(0.546)	(0.552)	(0.551)	(0.555)
Tamil	–0.193	0.0341	0.0334	–0.0517
	(0.254)	(0.259)	(0.259)	(0.287)
First division	0.714•••	0.806•••	0.806•••	0.777•••
	(0.140)	(0.142)	(0.142)	(0.152)
Engineering	0.098	0.117	0.118	0.135
	(0.233)	(0.240)	(0.240)	(0.247)
Humanities	–0.081	–0.135	–0.135	–0.18
	(0.217)	(0.218)	(0.218)	(0.231)
Medicine	–0.205	–0.265	–0.265	0.123
	(0.533)	(0.526)	(0.526)	(0.529)
Professional	–0.015	0.00239	0.00262	0.143
	(0.200)	(0.202)	(0.202)	(0.206)
Science	–0.117	–0.163	–0.163	–0.13
	(0.173)	(0.174)	(0.174)	(0.180)
Business	–0.211	–0.221	–0.221	–0.206
	(0.188)	(0.189)	(0.189)	(0.203)
Law	0.159	0.0535	0.0532	0.165
	(0.245)	(0.244)	(0.244)	(0.263)
No. of subjects	0.045	0.103	0.103	0.0406
	(0.145)	(0.146)	(0.146)	(0.153)
Two degrees	0.371	0.402	0.403	0.412
	(0.253)	(0.260)	(0.260)	(0.264)
Three degrees	0.646•	0.708•	0.708•	0.79••
	(0.275)	(0.282)	(0.282)	(0.299)
Four degrees	0.688•	0.769•	0.77•	0.852•
	(0.327)	(0.333)	(0.333)	(0.355)
P(promotion to Centre)		–20.16•••	–20.17•••	–20.45•••
		(5.873)	(5.874)	(6.112)
New chief minister			0.096	0.108
			(0.202)	(0.203)
Depth of experience	N	N	N	Y
Cadre F.E.s	Y	Y	Y	Y

(continued)

Table 6. (continued)

Variable	(1)	(2)	(3)	(4)
Cohort F.E.s	Y	Y	Y	Y
Year F.E.s	Y	Y	Y	Y
Observations	139075	139075	139075	138058
Log-likelihood	–2426.2	–2416.8	–2416.7	–2361.5

• $p < .05$; •• $p < .01$; ••• $p < .001$.

* Standard errors are in parentheses. Column 1 introduces all controls from columns 1 through 4 of table 3.

negatively and significantly correlated with empanelment, but including it does not significantly alter specialization's effect.

Because the state governments in India do have sway with the central government, it is reasonable to suspect that government changes in states can affect appointments of administrative officers in the capital. In column 3, we therefore include our control for whether the chief minister of the state in which the IAS officer has worked has changed. Its effect is small and not significant.

In column 4, we show the first test of our prediction that specialization will be rewarded later in careers because workers have differentiated themselves in terms of their accumulated specific skills. As in column 6 of table 4, we include a vector of months spent working in each type of IAS posting. In table 4, specialization remained significant after adding these controls. Here, though, their inclusion reduces the estimated effect of specialization by more than half, and it is no longer significant. For joint secretaries, then, we can explain most of the preference for specialists in terms of the specific jobs they have done in the past.

Table 7 elaborates on this point. As with table 5, here we estimate a multinomial logistic regression showing, among those who were empaneled, the relationship between their accumulated experience and the job they subsequently received. Our theory predicts that there will be a systematic match between amassed experience and the next job at this late-career stage. Here we show the top four fields, which together account for about 40 percent of all empanelments (results with more fields are similar). In this model, the relevant coefficients, in bold, are significant and positive. Taken together, the results from tables 6 and 7 support our proposition that, late in a career, more specialization is rewarded because it reflects specific skills.

We tried several different specifications of the empanelment models. A common reservation about the use of Herfindahl indices in dynamic models is that any such time-varying index can be correlated with time, which can bias estimates of time-varying effects (Allison and Christakis, 2006). One way to break this correlation is to dispense with the event-history framework and instead use a simpler specification of time. Dispensing with the framework means being unable to estimate the effects of individual variables that vary over time, such as tenure and number of promotions. It is worth checking, however, that doing so does not come at the cost of the above-mentioned bias. We therefore estimated simple logit models of whether an officer who

Table 7. Multinomial Logistic Regression Predicting Experience Match upon Empanelment (N = 486)*

Variable	Finance	Industries	Home	Personnel
Age	–0.021	–0.053	0.088	–0.072
	(0.040)	(0.059)	(0.054)	(0.068)
Postings	–0.097•	–0.049	–0.09	–0.002
	(0.047)	(0.060)	(0.063)	(0.086)
Female	–0.515	–0.402	0.138	–0.661
	(0.518)	(0.526)	(0.646)	(0.715)
First division	0.0679	0.052	0.037	0.204
	(0.311)	(0.341)	(0.448)	(0.339)
Specialization	–0.8	–0.054	0.144	–0.62
	(0.733)	(0.848)	(0.765)	(1.005)
Finance	**3.284**•••	0.729	0.466	0.903
	(0.472)	(0.566)	(0.784)	(0.621)
Industries	0.741	**2.515**•••	0.411	–13.57•••
	(0.682)	**(0.413)**	(0.822)	(0.416)
Home	–23.26•••	0.519	**3.502**•••	–23.73•••
	(0.490)	(1.043)	**(0.595)**	(0.556)
Personnel	1.25•	0.878•	0.807•	**2.002**••
	(0.490)	(0.447)	(0.371)	**(0.660)**
P(empanelment)	–50.39	–20.2	10.31	–3.34
	(27.93)	(19.88)	(13.08)	(45.80)
Constant	–1.669	0.517	–5.842	–0.555
	(1.831)	(3.485)	(2.986)	(3.762)

• $p < .05$; •• $p < .01$; ••• $p < .001$.

* Standard errors, in parentheses, are clustered at the cadre level. Statistics in bold show the likelihood of a match between skills and next job.

was posted to New Delhi was ever empaneled in the ten-year period following his or her promotion. In these models, we included a snapshot of officers' post-Centre specialization, operationalized as their specialization score five years after their posting. No officers were empaneled in fewer than five years after their first Centre posting, so this seemed a reasonable window to use. These models yielded substantively similar results to our main models, as do event-history ones that use slightly different time windows for the snapshot of specialization and empanelment. Models that use a snapshot of early-career specialization after four years (when officers are first eligible for posting to New Delhi) and that ask whether an officer was ever posted to New Delhi in his or her first ten years in the service also yield results that are comparable to our first-stage analysis. We are confident therefore that the event-history models are appropriate for analyzing these data.

Robustness Checks

We also conducted several robustness checks to examine other factors that may potentially bias our results. First, we examined whether different types of work have different statuses and whether job status affects an officer's level of specialization. Our analysis suggested that while different types of work had different levels of status, there was little evidence that status correlated with

the level of specialization. Similarly, we did not find evidence that there were distinct ''tracks'' in IAS careers. Finally, we examined whether specializing in ''rare'' types of work, whether of high or low status, affected our results. We find that gaining rarer types of experience increases an officer's chance of promotion ($\beta = 1.184$, $\sigma = .074$) but does not significantly alter the effect of specialization in our key models ($\beta = 1.569$, $\sigma = .116$), which remains both positive and statistically significant. A fuller account of these robustness checks is presented in the Online Appendix (http://asq.sagepub.com/supplemental), where we also discuss tests for the possible effects of favoritism and corruption on IAS officers' career advancement.

DISCUSSION

Our results support the contention that both skill- and signaling-based mechanisms are at play in relating specialization to career advancement. We argued that signaling matters, especially early in an IAS officer's career, but signaling also produces a self-fulfilling prophecy, wherein people who specialize acquire skills and thus have incentives to continue specializing. These effects are strong and persist even when we control for other characteristics of individuals and their careers, such as their education, favoritism, the status and type of work they have performed, and their ascriptive qualities, as well as individual fixed effects. Furthermore, the nature of IAS job mobility rules out self-selection as a mechanism that would produce differences in specialization. These results are all the more striking given that the IAS's internal labor market is explicitly committed to producing general managers. This suggests that we would find even stronger effects in other labor markets, and accordingly even stronger incentives toward and rewards for specializing.

This study has shown that a diverse work history hurts one's chances of promotion; prior work has also shown that such work histories imply lower wages (Acemoglu and Pischke, 1999b), greater risks of termination (Osterman and Burton, 2004), and less professional recognition (Leahey, 2007). Finding differential returns from specialization in this environment, in which self-selection is not a serious issue, should make us hesitate before attributing such effects to self-selection elsewhere. Scholars of stratification and inequality in organizations should be alert to structures beyond individual workers' control that can increase their movement between different types of work. Such structures might include the vagaries of project-based jobs and temporary work, but also larger social structures like racial and sexual discrimination, which historically have restricted blacks and women to more casual jobs within various industries and made it hard for them to construct careers within a single industry (Piore, 1973; Milkman, 1987). Such structures could indirectly increase inequality through the mechanism of specialization.

This study has two limitations, both of which suggest directions for future research. First, while we have been able to rule out specific skills as the mechanism linking specialization to promotion early in IAS officers' careers, it is harder for us to judge between several other mechanisms that could produce the effect. Here we emphasize the signaling and typecasting role that career histories play. But it is also possible that specializing in one type of work lets officers develop better relations with their superiors and supervisors, and thus at any level of actual performance, more specialized officers will receive higher

evaluations of their performance (Castilla, 2008). We stress, though, that this study focuses on specialization in a type of work, not in a specific job. More specialized IAS officers do not necessarily have longer relationships with a single supervisor than less specialized officers.

Second, and related to this point, while we have multiple controls for differences in ability, we do not have information on individuals' performance in specific jobs. These would seem to be the ideal data to test whether specialization in a single type of work actually improves performance. Even if we had performance evaluations, though, we could not evaluate the between-individual, within-job effects of specialization, precisely because we do not directly observe the strength of personal relationships. This individual-relations mechanism, it should be noted, does not invalidate signaling as a possible mechanism. It implies that the signal inheres in the performance evaluations rather than the career history in and of itself. Second, we do not observe the bidding pool for each vacancy. We can partially control for whether officers put themselves up for posting to the Centre at different rates, via the individual fixed-effects models, but we cannot know whether, for example, different ministries value specialization differently without seeing all the candidates they considered for each opening. We can say, though, that this is unlikely to apply at the empanelment stage, in which all officers in a cohort are simultaneously evaluated, and we have no theoretical reason for expecting self-selection on this dimension into the bidding pool at the earlier stage. Ideally, future research into such effects of specialization on career paths can leverage empirical settings in which data on supply-side sorting are available, as, for example, has been done in the work on networks and hiring (Fernandez and Mors, 2008; Fernandez and Friedrich, 2011).

The IAS has some atypical features, such as its guarantee of lifetime employment, which might limit the generalizability of findings from this setting. It might seem premature, for example, for organization theorists to give career advice based solely on this setting. The strength of this setting for future work on specialization and careers, though, is that its idiosyncrasies encourage us to think about the conditions under which we would expect to see different degrees of specialization and diversification rewarded. For example, in his comparison of internal promotion and external hiring in a financial services firm, Bidwell (2011) found that external hires had more education and experience than internal promotes and that external hires were paid more even though their initial post-hire performance was worse than the internally promoted. Both Bidwell's argument and our own presume an asymmetry of information about the job that makes a more experienced candidate preferred, but we find that specialization in a type of work rather than total experience is the deciding factor. It is possible that firms are willing to hire externally, despite the initial performance lag while acquiring firm-specific skills, because external candidates bring more depth of experience in a specific job than internal candidates could accrue in a single firm. Certainly this mechanism has been proposed to explain high compensation for externally hired CEOs and other top executives (Groysberg, Lee, and Nanda, 2008). Our findings suggest that it would be useful for future work on external recruitment to gather data on potential recruits' types of previous jobs as well as their tenure in the labor market.

More generally, the IAS's large internal labor market, with its detailed information on officers' careers, makes it an excellent strategic site for researching

questions that require detailed information on workers' previous jobs. Many contemporary careers, though, are built from movements between organizations (Barley and Kunda, 2001), as, for example, when software programmers complete discrete projects for a succession of firms (Barley and Kunda, 2004). In such careers, job-specific skills and signaling are probably even more important than here, but detailed data on such workers' moves through the labor market have been lacking. With the rise of career and employment network services like LinkedIn, however, it is at last becoming possible that researchers might be able to build comparable career histories for large numbers of employees in external labor markets as well. Thus the most exciting extension of this research will probably lie not in another large, regimented internal labor market but in the networked hiring and ephemeral contract work of the digital economy.

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