

WHO CONTRACTS? DETERMINANTS OF THE DECISION TO WORK AS AN INDEPENDENT CONTRACTOR AMONG INFORMATION TECHNOLOGY WORKERS

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We examined which IT workers take jobs as independent contractors. Contracting offers less job security and less employer-provided training than regular employment. We base our predictions of which workers contract on how their preferences and resources match such jobs. Using career history data, we found that the likelihood of contracting increases with skill levels and presence of negative cues, and falls (for men) with family responsibilities. Contracting is more likely among workers whose careers are either just beginning or well advanced; the latter group also remains in contracting longer. These findings have implications for benefits, skills development, and income security policies.

At 7.4 percent of the workforce, independent contractors constitute an important and growing segment of the U.S. population (Bureau of Labor Statistics, 2005; Kunda, Barley, & Evans, 2002) and are increasingly prevalent throughout the developed world (Houseman & Ozawa, 2003). Although independent contractors often perform work similar to that of regular employees, they are not legally employed by the firms for which they do that work. Nor do independent contractors have close relationships with any employer beyond the workplace; unlike the employees of outsourcing firms, contractors do not expect to build careers within a single firm, or even remain in the same organization for an extended period.

To have such a large and growing population of workers fall outside traditional notions of the employment relationship raises important policy concerns. Their status as legal outsiders at the firm where they work leaves contractors without access to the job security and employer-provided training that most employees take for granted. Contractors

also lie outside the scope of many government programs that aim to support workers, such as unemployment insurance, tax-advantaged medical insurance, access to collective bargaining, and enforcement of minimum labor standards. There is therefore a growing need for new institutions and policies to bridge these differences between the legal protections afforded to regular employees and contractors and to ensure that contractors have access to the security, benefits, and skills development that they cannot get from employers (e.g., Hiatt, 1995; Stone, 2006).

Yet before policy makers can formulate new policies, they must first understand which workers contract, and what role contracting plays in those workers' careers. The needs of contractors vary depending on factors such as their skill, financial responsibilities, and career stage. Understanding who contracts can also inform broader debates as to whether contracting benefits workers or instead reflects a repudiation by employers of their responsibilities to their workforces (Barker & Christensen, 1998).

In this article, we develop and test a theoretical framework for predicting who enters highly skilled contracting. Drawing on internal labor market theory, we identify two important dimensions along which contracting and regular employment differ: job security and access to employer-provided training. We propose that these differences between contracting and regular employment determine which workers find contracting more attractive. Workers with less need for employment security

We wish to thank Roxana Barbulescu, Alex Colvin, Isabel Fernandez-Mateo, Henrich Greve, Katherine Klein, John Paul MacDuffie, Janet Marler, Paul Osterman, Linda Treviño, Chip Hunter, and our three anonymous reviewers for their advice and suggestions. We also benefited from the comments of the slump_management research group and seminar participants at Cornell, Wharton, and Nanyang Business School. We are particularly grateful to Steve Sawyer and Mark Wardell for providing us with access to data they collected under NSF Grant 0204253.

and training are more likely to choose contracting jobs. We further argue that these same differences in security and training constrain workers' ability to find contracting jobs versus regular employment. Offering a worker regular employment constitutes a greater commitment by an employer than offering a contracting job; some workers may end up contracting because they lack the resources needed to persuade employers to make that commitment.

We use this framework to explain how contracting fits within workers' careers. We draw on the dual effects of choice and constraint to predict a nonlinear relationship between contracting and experience, whereby workers contract both at the very beginnings of their careers and also much later, when they have accrued significant experience. We also propose that different factors are likely to lead workers into short-term versus long-term contracting. These effects combine to create a contracting workforce that is notably heterogeneous, even within a single occupation. We develop this point in discussing the implications of our findings for the public policies and institutions that will best serve the needs of contractors.

Our focus on explaining which workers enter contracting extends existing work. Recent ethnographic studies have examined the motivations of individual contractors (Kunda et al., 2002; Meiksins & Whalley, 2002; Rogers, 2000; Smith, 2001), though these studies largely lack comparisons to workers in regular employment. Other studies offer simple demographic portraits of the contracting population (e.g., Cohany, 1998; DiNatale, 2001; Hipple, 1998; Segal, 1996). We provide a theoretical framework to explain why some workers end up in contracting and use multivariate analyses to untangle the influences of various demographic and skills differences on who contracts.

We tested our hypotheses using unique data on the careers of graduates from information technology (IT) programs at five universities in the United States. IT is a valuable setting in which to study contracting, as it contains a large, highly skilled, and rapidly growing workforce. IT contractors have also become synonymous with a "free agent" view of contracting as liberation from the constraints of bureaucratic employment (Pink, 1998). If these are the workers who are expected to benefit from contracting, it is important to understand which of them end up in contracting, and how they get there.

THEORY DEVELOPMENT

We define contractors as workers who provide services directly to a client firm on an explicitly short-term basis and without entering into a formal

employment relationship with that firm. This definition excludes the "contract workers" who work directly for outsourcing firms, such as the employees of an on-site vendor providing reprographic or catering services. Those contract workers tend to have close, long-lasting employment relationships with the outsourcing firm itself (Cohany, 1996). In contrast, our definition of contractors does encompass temporary agency workers who are formally employed by a third-party staffing agency. Like independent contractors, temporary agency workers are engaged on an explicitly short-term basis and usually lack strong relationships with the staffing agencies. Often, decisions about whether to engage a highly skilled external worker as an independent contractor or a temporary agency worker reflect the legal policy of the hiring firm, rather than substantive differences in the nature of the relationship (e.g., Barley & Kunda, 2004).

Internal labor market theories provide a useful lens for understanding the practical differences between contracting jobs and regular employment. Contracting jobs resemble the archetype of an arms-length, "spot market" relationship (Davis-Blake & Uzzi, 1993). Internal labor market theories describe the differences between such spot markets and regular employment. There is of course wide variation both in the kinds of employment practices that firms adopt and in the way they apply those practices to different workers (Rousseau, Ho, & Greenberg, 2006). Yet internal labor market theories identify two features that distinguish regular employment from spot market relationships: provision of enhanced job security, and the use of internal training and development systems (Doeringer & Piore, 1971).

Historically, internal labor markets gave workers substantial job security through seniority rules for layoffs, formal or informal job guarantees, and entitlements to severance pay, which raise termination costs (Osterman, 1987). Although recent years have seen an erosion of perceived job security, regular employees retain important protections. One U.S. survey showed that 86 percent of regular employees were eligible for severance pay if they were laid off (Kodrzycki, 1998). Some states also impose legal limitations on firms' ability to terminate employees (Autor, 2003), and firms face substantial legal uncertainties when they terminate employees (Colvin, 2006). Contractors are excluded from these security provisions and employer guarantees. Instead, they are hired with the explicit understanding that their relationship with a firm will be short and can be terminated at any time.

Regular employment also affects workers' access to employer-provided training. In internal labor

markets, workers and firms gain a joint understanding of the career ladders along which workers should progress, helping workers and firms to anticipate the formal and informal training that will be needed (Doeringer & Piore, 1971). In addition, the relatively long tenure of regular employees means that firms expect to benefit from investing in the development of both firm-specific and general skills (Acemoglu & Pischke, 1998). As a consequence, firms often provide extensive training to regular employees and assign jobs with an eye to future development. Even in fields characterized by high turnover—such as IT—employer training is common. Surveys have shown that IT firms provide employees with an average of 64 hours of training a year (National Research Council [NRC], 2001: 262). A large majority of firms offer formal training in technologies, methodologies, and industry knowledge to new hires in IT (Zwieg, Kaiser, Beath, Bullen et al., 2006), and almost all high-tech firms offer tuition reimbursement (Zemsky & Eisenstein, 2000).

Firms do not offer the same skills development to independent contractors. Because contractors are likely to leave at any time, firms do not expect to be able to recoup training investments. Furthermore, training contractors can jeopardize a firm's legal status as the client of the contractors rather than their employer (Barley & Kunda, 2004: 15). Contractors often cite this inability to rely on employers for skills development as an important problem (Barley & Kunda, 2004: 246; O'Mahony & Bechky, 2006). One response for contractors is to spend a great deal of their own time developing new skills (Batt, Christopherson, Righthor, & Van Jaarsveld, 2001: 16).

Matching Frameworks

We drew on theories of labor market matching to predict how these differences in job security and skills development affect which workers enter contracting. In matching models, the allocation of workers to jobs is a result of constrained decision making (Logan, 1996; Rosen, 1986). Workers choose which jobs they want to take, but their choice is limited to the jobs that employers are prepared to offer them. Fully estimating these simultaneous decisions of both workers and employers is conceptually and empirically complex. The matching theories argument, however, is that these two sets of decisions are conceptually separable: given equal constraints on getting different kinds of jobs, workers end up in the jobs they prefer; given equal preferences for different kinds of jobs, workers end up in the jobs that employers are more

likely to offer them. We could therefore derive hypotheses about who contracts by separately considering the effects of workers' preferences and the constraints they face in finding jobs.

Matching frameworks allowed us to understand how differences in the characteristics of jobs affect which individuals end up doing these jobs. We focused on two types of matches: First, to the extent that jobs differ in the *rewards* that they offer, such as pay or opportunities for skill development, workers who have stronger *preferences* for those rewards are more likely to take those jobs. Those workers who value a particular reward more highly will be more likely to accept jobs offering more of that reward; jobs that lack a particular reward are more likely to be taken by workers who place little value on that reward.

Second, to the extent that jobs differ in their *demands*, such as their requirements for different kinds of intellectual, physical, and behavioral attributes, workers find it easier to be offered jobs for which their *resources* are a better fit. Those resources include both direct determinants of productivity, such as skill levels, and characteristics that help workers solicit job offers, such as reputation and social networks (Eliason, 1995). Workers are less likely to end up in jobs that are poorly matched to their resources, either because they are not offered such jobs at all, or because firms will only hire them for poorly matched jobs if they are prepared to accept low levels of pay and other rewards.

In this study, we focused on how the two characteristics of contracting jobs identified above—reduced job security and reduced employer-provided skills development—affect the relative rewards and demands of those contracting jobs. Many other rewards are relevant to job matching but may not vary systematically between contracting and regular employment. For example, there is contradictory evidence on whether contractors earn more than comparable employees (Barley & Kunda, 2004: 62; Marler, Barringer, & Milkovich, 2004). Preferences for still other rewards may be difficult to measure; though some writers have argued that the rewards of contracting include liberation from the constraints of office politics and greater control over assignments (Kunda et al., 2002), it is difficult to know which workers most value such liberation.

Figure 1 summarizes how we use differences in job security and employer-provided skills development to explain which workers contract. The figure demonstrates how differences in job security and employer-provided skills development shape the relative demands and rewards of contracting jobs,

FIGURE 1
Overview of the Matching Framework

Nature of Contracting Jobs	Effects on Rewards and Demands of Contracting Jobs	Worker Characteristics with Best Fit for Contracting Jobs	Projected Duration of Contracting Spell
Lower job security	Rewards: Less job security	• Less family responsibility (H1)	No prediction ^a
	Demands: Less need to demonstrate favorable attitudes and behaviors	• More negative cues about attitudes and behaviors (H2) • Less experience (H4)	Declining effects of inexperience and negative cues during contracting → Shorter duration (H5a, H5c)
Reduced employer-provided training	Rewards: Less employer-provided skills development	• Higher level of existing skills (H3)	Continued skills acquisition during contracting → Longer duration (H5b, H5c)
	Demands: Higher need for skills	• More experience (H4)	

^a Family responsibilities do not change in smooth, predictable ways in the medium term. We therefore make no prediction about how they will affect contracting.

and how those rewards and demands can then predict which workers' preferences and resources match contracting jobs. The figure also outlines how the match between workers and contracting may change over time. Many of the determinants of workers' preferences and resources evolve with experience. As a consequence, different determinants may lead a worker to become a better or worse fit with contracting over time. We further exploit this variation to make predictions about which workers are more likely to end up in short-term versus long-term contracting.

Job Security and Matching to Contracting Jobs

Job security affects both the rewards and demands of contracting jobs. Perhaps most obviously, job security represents an important reward that firms offer regular employees, affecting which workers most prefer contracting jobs. One important factor that likely shapes workers' tolerance for insecurity is the presence of dependents. In particular, workers with a need to provide for dependents are more concerned than those without dependents about their ability to moderate their expenditures in response to income fluctuations. Such workers find the greater job security provided by regular employment highly attractive. We therefore propose:

Hypothesis 1. Workers with greater family responsibilities are less likely to contract than are other workers.

The increased provision of job security also shapes the job demands of regular employment. Job

security raises the costs to firms of hiring mistakes, so that regular employment requires more evidence of a worker's likely performance than does contracting. These demands then affect which workers have the resources to be offered regular employment rather than contracting.

A particularly important resource for gaining regular employment is the ability to signal possession of favorable work attitudes and behaviors, such as motivation, interpersonal skills, and problem-solving ability. Research on hiring indicates that employers are more concerned about these kinds of work attitudes than they are about more technical skills (e.g., Cappelli, 1995; Zwiag et al., 2006). Such concerns make sense: it is possible for employers to provide training for technical skills; basic work attitudes and behaviors are harder to change.

Because workers cannot directly demonstrate these work attitudes and behaviors to potential employers, they must instead draw on their work histories to signal these characteristics. Of particular importance is the absence of "negative cues"—information that casts doubt on whether a worker will make a good long-term employee (Bills, 1990). Such information might include involuntary separations from previous jobs or long periods of time that are unaccounted for (Bills, 1990; Gibbons & Katz, 1991). The presence of such a negative cue creates enough uncertainty about a worker's attitudes and behaviors that the worker can find it more difficult to persuade firms to hire him or her as a regular employee. Such a worker should find contracting jobs easier to obtain; employer termination costs are far lower for these positions, enabling employers to take greater risks in hiring contrac-

tors. Research on low-skill occupations shows that some of the hardest-to-place workers find it easier to be hired into temporary jobs than into permanent ones (Autor & Houseman, 2006). Workers in highly skilled occupations whose work histories contain negative cues may also find it easier to obtain jobs in contracting than in regular employment. We therefore propose:

Hypothesis 2. Workers whose work histories provide negative cues about their attitudes and behaviors are more likely to contract than are other workers.

Skills Development and Matching to Contracting Jobs

The skills development that firms offer to regular employees affects both the rewards and demands of contracting jobs, as highlighted in Figure 1. First, the increased training available in regular employment is a reward that affects worker preferences for contracting. In particular, workers with high levels of skills are likely to place a lower value on further training. Even among professional and technical workers who must keep up with new technology and knowledge, evidence of diminishing returns to skills accumulation exists. In the field of IT, for example, cutting-edge technical knowledge is only a small part of the skills that workers need. Employers find project management, process management, and business-related skills to be more important than technical knowledge, particularly for midlevel workers (Zwieg et al., 2006). Knowledge in those areas changes more slowly than technical knowledge; once workers have acquired management and business skills, they have less need for further training. Studies therefore find diminishing returns to education and experience, even in IT (Mithas & Krishnan, 2008). We therefore expected workers who already have high skill levels to value employer-provided development less than workers without high skill levels, leading the former to be more likely to prefer contracting jobs than less skilled workers.

The reduced skills development provided in contracting jobs also has consequences for the demands of those jobs, and hence the resources that workers need to be offered jobs in contracting. Although core-periphery theories suggest that external workers are generally used for simple, low-skill tasks (Atkinson, 1987), the evidence does not generally support these predictions (e.g., Barley & Kunda, 2004: 195-198; Bidwell, 2009). Instead, the logic of internal labor markets suggests the opposite prediction: that contracting jobs should demand

higher skills than regular employment. Firms may be willing to hire unskilled workers as employees and train them for particular jobs. To the extent that firms are unwilling to train contractors, though, they require them to already possess the necessary skills when hired. Indeed, ethnographies of contractors emphasize that firms expect them to “hit the ground running” (Barley & Kunda, 2004:178; Osnowitz, 2008). On the basis of these consistent predictions about workers’ preferences and their ability to be offered contracting jobs, we propose:

Hypothesis 3. Workers with the strongest skills are more likely to contract than are other workers.

Contracting and Careers

To this point, we have hypothesized about the influences affecting when workers are more likely to contract at a given point in time. We can draw on the same arguments to examine how contracting fits within workers’ careers. On the one hand, workers accrue skills through on-the-job learning (e.g., Mincer, 1962; NRC, 2001: 111). In keeping with Hypothesis 3, we would therefore expect workers to become more likely to contract as they accrue experience.

On the other hand, the most inexperienced workers may also be more likely to contract, because they find it more difficult to obtain regular employment than contracting jobs. Much like workers with negative cues, inexperienced workers have difficulty persuading employers to hire them (Rosenbaum, Kariya, Setterstein, & Maier, 1990). Inexperienced workers lack prior work histories that they can use to signal their behavior and attitudes (Bills, 1990); they also lack networks of former employers and coworkers who can provide potential employers with credible information about their skills and behavior (Crain, 1984; Holzer, 1987: 266). Because employers find it more difficult to establish the attitudes and behaviors of inexperienced workers, they can be reluctant to risk offering such workers regular employment. Given the lower costs that employers face in dismissing contractors, workers may therefore find it easier to get contracting jobs early in their careers (see also Houseman, Kalleberg, & Ericcek, 2003: 122).

The combination of these two dynamics suggests a nonlinear pattern to contracting. During the first few years of work experience, workers can establish track records and build relationships with coworkers and managers who can vouch for their behavior in the workplace. The problems associated with inexperience should then wear off rela-

tively rapidly. By contrast, acquisition of work-related skills is likely to be a slow process in many fields. We might therefore expect that the odds of contracting would initially fall as workers gain track records early in their careers. At some point, however, further experience adds little to workers' ability to signal favorable attitudes and behaviors to potential employers. After that point, the odds of contracting should instead rise with experience, as workers gain sufficient skills to be able to forego employer-provided training. We therefore propose:

Hypothesis 4. The relationship between the probability of contracting and workers' experience is U-shaped.

Workers' probabilities of contracting evolve with experience because characteristics such as skills and track record change over time. This evolution of worker characteristics may also affect how long workers remain in contracting. If the factors that led a worker to enter contracting then diminish over time, the worker's fit with a contracting job declines as he or she accumulates experience. We would expect such workers to revert to regular employment more quickly. When the factors that led a worker into contracting are stable or strengthen with time, that worker remains a good fit with contracting. Such workers are more likely than others to engage in longer-term contracting. Studying these changes in the worker-job match therefore extends our framework to explain how long workers spend in contracting, as Figure 1 demonstrates.

In particular, we have argued that individuals whose work histories contain negative cues enter contracting because their access to regular employment is restricted. It is likely, though, that these negative cues will diminish in importance over time. As workers accumulate work experience, they are likely to find new ways to signal their possession of favorable work attitudes and behaviors, reducing employers' doubts about them. Similarly, the time that inexperienced workers spend in contracting allows them to build track records, making it easier for them to find regular employment. To the extent that these workers are contracting because of a lack of regular employment opportunities, we would expect them to move into regular employment once they have established their abilities through contracting. For such workers, contracting would be used as a short-term stepping stone into regular employment (Jovanovic & Nyarko, 1997).

By contrast, we have argued that more skilled workers enter contracting because they have little need for the employer-provided skills development

found in regular employment. These workers are likely to continue to acquire skills once they are in contracting, albeit more slowly than they would have done in regular employment. Hence, the factors that make these workers a good fit with contracting continue to strengthen over time. We therefore expect that the most skilled workers, including those with high levels of experience, will remain in contracting longer.

As a consequence, the factors that lead workers to contract will also determine how long they spend in contracting. Specifically:

Hypothesis 5a. Workers whose work histories contain negative cues about their attitudes and behaviors are more likely to contract for short periods of time than for long periods.

Hypothesis 5b. Those workers with the most skills are more likely to contract for long periods of time than for short periods.

Hypothesis 5c. Workers with higher levels of experience than other workers are more likely to contract for long periods of time than for short periods.

METHODS

We tested our predictions using a career-history survey of IT graduates from five major U.S. universities. Two of the universities were private and three public; they were located in the mid-Atlantic and western regions of the United States. We chose IT workers because contracting is commonly associated with IT and appears to be well suited to that sector (Barley & Kunda, 2004). IT is also regarded as a bellwether sector whose employment practices spread to other areas of the knowledge economy (Kanter, 1995). We believe that results for IT should generalize to other highly skilled technical and professional occupations in which general skills are important.

The sampling frame comprised all graduates from the years 1988 to 2001 who had earned at least a B.A. or B.S. in an IT-relevant major (some had earned master's degrees or Ph.D.s). Sampling alumni of IT programs provided us with a large group of similar technical workers with similar educational backgrounds. We were then able to hold occupation constant and focus on factors that shaped the career decisions of similar individuals doing comparable work. Using a sampling frame based on education allowed us to identify workers who were similar before they made any contracting decisions and then explore how they decided to take regular employment and contracting jobs over time.

Data and Sample

The data were collected using computer-assisted telephone interviewing (CATI). The interview schedule was developed through several pretests and a lengthy pilot test. Trained staff administered interviews between September 2003 and April 2004. A total of 2,823 interviews were completed, for an effective response rate of 46 percent.

Respondents were asked whether they had ever held a job in the IT field. They were allowed to decide themselves if their work activity qualified as an IT job, a method used by the U.S. Bureau of Labor Statistics when conducting workforce inventories. Of the 2,823 people interviewed, 2,369 (or 83.9%) had held at least one IT job after graduation. Each of these 2,369 respondents with IT experience was asked, "How many jobs have you had in the IT field?" A battery of questions about the first job followed. The battery was then repeated for the next job, and so on, until the respondent had described all of her or his IT jobs. These different job spells were our central unit of analysis. The number of job spells reported by individual workers ranged from 1 to 9, with a median of 2 per worker. The number of contracting spells ranged from 0 to 9, with the great majority of respondents having no contracting experience.

We made several further exclusions from the data to ensure an appropriate sample for our present purposes. We excluded job spells that were (1) indicated as internships by the job title, (2) reported as self-employment but not contracting, (3) reported as regular employment in which the job title was clearly unrelated to IT (for example, chief financial officer), (4) reported as regular employment with a job title of CEO or president in a workplace of 50 or more (we assumed those were leadership roles with little technical content), or (5) missing data. We also dropped the first job spell, to allow us to include characteristics of a respondent's previous job in our analyses. Contracting spells made up 4.9 percent of these first job spells and 4.8 percent of subsequent spells; this difference is not significant. Our final data set comprised 1,847 job spells for 1,068 respondents.

Defining Contracting

Establishing in detail whether a job involves contracting is surprisingly difficult. Indeed, the federal government uses up to 20 different questions to determine whether a given job should be classified as contracting (Barley & Kunda, 2004: 15). We also used multiple questions to establish contracting status, looking for these features: temporary nature

of the work; work being conducted through temporary agencies; and the absence of a formal employment relationship with the place of work. First, respondents were asked "Was/is this job: part-time; full-time; or on a temporary contractual basis?" A spell was defined as contracting when the job was on a temporary contractual basis;¹ 79 job spells met this definition. Second, respondents were asked "Was/is this: self-employment; or was/is this job through the government; a non-profit organization; a temporary agency; or was/is it through some other type of private organization?" We defined all jobs reported as acquired through a temporary agency as contracting. This added another 7 job spells. We also assigned spells to contracting status when a job was described as self-employment taking place at a site with more than two other individuals where the respondent did not have anybody reporting to them. In such cases, a worker is not formally employed by a firm but is clearly providing services to one. We defined a further 4 job spells as contracting using this definition.

We assigned job spells to contracting when they met one or more of the above tests. We did not attempt to differentiate among workers classified as contractors under the various tests: in each case, workers have little job security and are treated by the client firm as external workers. All other job spells were assigned regular employment status.

Short-term versus long-term contracting. To examine whether contract spells constituted long-term or short-term contracting, we combined all contiguous contracting job spells (reducing the total number of spells). We then defined a spell as long-term if it was equal to or over one year in duration. The U.S. Census Bureau defines a temporary "contingent" job as one that is expected to last for less than a year. Similarly, a spell in contracting of less than a year should be treated as an interim measure rather than a longer-term job choice. This definition produced 25 spells of short-term contracting and 24 spells of long-term contracting.

¹ This question yields ambiguous answers about part-time contractual jobs, because respondents might describe such jobs as part-time rather than as contracting. We conducted a partial check for this problem by exploring what proportion of workers worked less than 35 hours a week on contracting and regular jobs. We found that 23 percent of the reported contracting jobs were less than 35 hours per week, compared to only 6 percent of the regular jobs. We concluded that most workers with part-time contractual jobs described these as temporary and contractual rather than as part-time. It is, however, possible that a few job spells were misclassified in this way.

Characteristics of contracting spells. In our theory section, we highlighted two differences between contracting spells and regular employment: job security and employer-provided skills development. Our data allowed us to confirm that the contracting and regular employment spells in our sample differed along these dimensions. We briefly describe these differences here.

We assessed differences in job security by comparing the job duration of contracting and regular employment spells. Although this measure does not provide a true gauge of protection against dismissal, it does indicate whether contracting spells are less stable than regular employment in practice. As proposed, we found that contracting jobs had much shorter mean duration than regular employment (440 days versus 915 days; $t = 4.98$).

Two questions in our survey related to workers' ability to learn skills in their jobs. For each job spell, respondents were asked "Did/does this job require that you keep learning new things?" Workers were much less likely to answer yes to this question for job spells in contracting versus regular employment (73% vs. 92%; $t = 10.4$). Similarly, workers were much less likely to answer yes to "Did/does this job offer opportunities to learn skills that interest you?" for contracting job spells versus regular employment spells (74% vs. 88%; $t = 6.4$). We found similar differences in regression analyses controlling for a variety of demographic and educational variables, as well as for the extent of learning in the workers' previous jobs.

More specific data on employer-provided training came from questions about employer-sponsored degree programs. For 15 percent of the workers in our sample, employers fully or partially paid tuition incurred in study for a formal degree. Not surprisingly, such sponsorship was more common in regular employment. Workers were awarded employer-sponsored degrees from four-year colleges during 156 regular employment spells (3.4%). Only one worker reported receiving an employer-sponsored degree in a contracting spell (0.4%; $t = 2.5$ versus regular employment)—and the individual may have received that sponsorship before entering contracting.

Independent Variables

Workers' skills. We measured skills using proxy variables commonly found in related research. First, we used workers' formal education as a measure of skills, as has much existing research on "human capital" (e.g., Ang, Slaughter, & Ng, 2002). The universities included in the sampling frame provided data on degrees awarded to respondents.

Respondents were also asked about any degrees subsequently awarded to them. From these data, we created dummy variables at the individual level for whether the respondents had bachelor's degrees (we found that a few respondents had only graduated with associate's degrees, providing some variation in this variable), master's, and Ph.D.s. Because we lacked data on degrees awarded prior to enrollment at these universities, we assumed that workers with master's degrees also had bachelor's and that those with Ph.D.s also had master's. These educational categories are not, therefore, mutually exclusive.

Second, we used working in the high-technology industry as an indicator of skills. Previous research has demonstrated that IT workers in high tech tend to have higher skills than those elsewhere. IT workers are more critical to the performance of information-intensive firms, leading those firms to attend more closely to the quality of their IT workers (Ang et al., 2002). Better promotion and learning opportunities in IT firms also help them to hire more skilled workers and mean that their workforces receive better training (Levina, Xin, & Yang, 2003). Supporting these arguments, studies have shown that IT workers in information-intensive and high-technology industries earn more and are better educated than their counterparts elsewhere (Ang et al., 2002; Mithas & Krishnan, 2008; Levina et al., 2003). We created a dummy variable for a previous job in high technology via open-ended questions that asked which industry the company housing the previous job was in. We used 13 word forms related to technology, such as "computing," "dot-com," and "web," to assign job spells to high technology. Unfortunately, industry data were missing for around half of the job spells; these were coded as not in the technology industry. These missing data should bias our estimates downward but not create spurious results.

Third, we used data about job titles as a measure of workers' skills. Job titles constitute highly concise descriptions of workers' jobs. To the extent that jobs with similar titles have similar content, those titles can be used to assess the nature of the work individuals are doing. Hence, much research has used job titles to measure jobs' skill demands, often using the *Dictionary of Occupational Titles* (now O*Net) as a source (e.g., Oldham, Kulik, & Stepina, 1991; Shalley, Gilson, & Blum, 2000: 217-218). Research on promotions also suggests that job titles act as a labor market signal of workers' skills. For example, Trevor, Gerhart, and Boudreau (1997) found that being promoted increased the probability of voluntarily quitting a job ("voluntary turnover"). We followed these traditions by using our

respondents' self-reported job titles to create a measure of skills. This approach does have some limitations. The mapping of titles to jobs may vary across organizations, and factors other than skill level may influence job titles. For example, some employers try to make up for low pay in a job by giving it a more attractive title. We sought to minimize such biases by coding the title of a respondent's previous job rather than his or her current one, in case contracting jobs received systematically different titles than regular employment. We also controlled for features of the previous job that might influence how titles mapped to skills, including the size of the previous workplace and whether the previous job spell was in contracting.

For each job spell, we created a job-level variable based on the previous job title. Jobs were classified into three skill levels, low, middle, and high (coded -1, 0, and 1). The terms used to classify jobs were based on a scheme developed in conjunction with three senior subject matter experts. The full list of terms received complete agreement among the subject matter experts and was validated using the O*Net online dictionary of occupations. We entered each word form as a search keyword, combined with the common term "computer." Hourly wages for the jobs that best matched the high-skill keywords averaged \$40.41, and for low-skill keywords they averaged \$25.45.²

Negative cues about favorable behaviors and attitudes. We used involuntary separation from the most recent job as a measure of negative cues about worker behaviors and attitudes. Research on hiring indicates that reasons for past job separations are an important signal of workers' behaviors and attitudes (Bills, 1990). Although involuntary separations may simply reflect economic troubles at a previous employer or a poor fit for the worker, they can also signal undesirable work habits or attitudes. Previous research on wages also supports the role of involuntary separations in shaping employer inferences (Gibbons & Katz, 1991).

Experience. Our measure of experience was the difference between the date that a worker's focal job began and the date that his or her first job began, minus any time that the worker spent out of the labor market. We report experience in years. We tested for nonlinearity in the effects of experience

using a two-part spline, split at the median value of experience (3.89 years). The spline creates two different variables for experience (Smith, 1979). The first variable (experience less than median) takes the value of experience for all observations falling below the median; for all observations above the median it takes the value 3.89. The second variable (experience greater than median) takes the value of 0 for all observations of experience below the median; for all observations above the median it takes the value of experience minus 3.89. The sum of the two spline variables always equals experience. However, separating them out allowed us to distinguish the effects of increasing experience at low and at high levels of experience. The spline therefore allowed us to conduct a more precise test for nonmonotonicity than a squared experience term would have permitted (Smith, 1979). The knot at the median gave us reasonable statistical power at both high and low levels of experience. We also felt that this dividing point represented sufficient time for workers to have established clear track records.

Family responsibilities. The survey asked respondents whether they had a spouse living with them at home, whether they had children, and how old these children were. We used the children's ages to estimate their birth years. For each job spell, we then calculated the number of children that had been born during or before the year that the job started. Unfortunately, the data did not allow us to create the same time-varying measure for marriage. We therefore coded individuals' marital status on the basis of their responses at the time of the survey.

Previous research has indicated that men and women can have very different labor market responses to family responsibilities (e.g., Briscoe 2006; Hundley, 2000; Marler & Moen, 2005). We therefore separately estimated the effects of family commitments for men and women, creating different dummies for each of the eight possible combinations of gender, marital status, and having children. Job spells for single men and women with children were dropped from the logit analyses as none of these 21 job spells involved contracting. The dummy for single men without children was our omitted category.

Control Variables

We controlled for respondent age at the start of a job spell. We also controlled for respondent ethnicity using a dummy that took the value 1 for a self-report of "white" and 0 otherwise. We also controlled for whether workers were "in education" during a job spell. We did not know how long

² We found a similar relationship between pay and job title in our data. In wage regressions that controlled for education, experience, job title, and previous industry, we found that moving up one point on our three-point job title scale was associated with a 17 percent increase in pay ($t = 5.75$).

degrees took to complete, so we made conservative assumptions about duration. Our dummy took the value 1 when a job spell began or ended within the three years prior to a bachelor's degree being awarded, within 6 months prior to a master's degree being awarded, or within 18 months prior to a Ph.D. being awarded. We also coded a job spell as being "in education" if the job spell began before a degree was awarded and ended after it was awarded. We made the conservative assumption that degrees were awarded at the beginning of a given year. We did not know the dates on which the initial degrees that entered the respondents into our sample frame were awarded. We were therefore only able to construct the "in education" variable for subsequent degrees. This control therefore indicates whether studying for a degree affects contracting but does not fully control for this effect.

We also controlled for whether a worker's spouse was employed. Spousal employment may mitigate some of the effects of increased family demands. Because we only knew whether the spouse was employed at the time of the survey, we had to assume that the spouse had either always been employed or never been employed.

We were also concerned that a history of short jobs might correlate with both a preference for contracting and various aspects of workers' past career histories. We therefore included the total number of jobs that a respondent had held (including the focal job) as a control. We also included a linear trend for the date that a job spell began to control for any trend toward more or less use of contracting by firms. Including a squared term for start date had no effect on our results.

We controlled for four characteristics of a respondent's previous job that might influence contracting choices. First, we controlled for the log of previous workplace size. Kunda, Barley, and Evans (2002) argued that a reaction to the bureaucratic politics of large organizations often drives decisions to contract. Second, we controlled for the type of work an individual was doing in her/his last job, because of concerns that certain kinds of work might lend themselves more to contracting. We distinguished between IT work involving the creation and development of software or hardware and IT work involving the application of existing software and devices to solve particular needs (NRC, 2001). Using a simple automated text categorization scheme (Giorgetti & Sebastiani, 2003), we created a dummy for the previous job being application work. Third, we controlled for whether the individual was a contractor in the last job, as this might be correlated with characteristics of the previous job and with a decision to become a contractor. Fourth,

we controlled for whether the current job spell was in the high-technology industry, because of concerns that this might be correlated both with whether the previous job was in high tech and with demand for contractors. Controls for the five institutions that workers graduated from did not affect our results and were not included in the models reported here.

Analytic Strategy

Our main analysis estimated the probability that a job spell was in contracting versus regular employment. We included varying numbers of job spells per respondent and clustered errors by respondent to account for nonindependence of errors across observations (Froot, 1989).³ Although contracting was a relatively rare event in our data, our sample was within the range in which logit estimates are consistent (King & Zeng, 2001:153, 157). Our results were also robust to the Bayesian corrections for rare events recommended by King and Zeng (2001).

We tested for different determinants of long-term and short-term contracting using multinomial logit analyses in which the dependent variable was either short-term contracting or long-term contracting (Greene, 1997: 917). For these analyses, we dropped all spells that began less than a year before the survey date, to avoid erroneously assigning spells to short-term contracting because of right censoring. As we increased the number of categories that we examined, the small cell sizes prevented estimation of consistent results. This led us to drop variables for which there was little variation, such as the bachelor's and Ph.D. dummies, from our analyses. We also estimated the effects of experience and previous job characteristics separately in some analyses because of concerns that the job characteristics might mediate the effects of experience: as workers build more experience, they can move into more skilled jobs.

An assumption underlying the multinomial logit analysis was that workers knew *ex ante* whether they planned to contract for a long or short period of time. Concerns about this assumption led us to conduct event history analyses for exiting contracting. We again combined contiguous spells in con-

³ We also explored whether a sample selection bias might be affecting our results by rerunning the analyses applying a Heckman selection correction to account for the fact that decisions to find a new job are endogenous (Greene, 1997: 974–981). Our main results were robust to this check. Full details are available from the authors.

tracting and then estimated the hazard rate for returning to regular employment. The small number of events led us to estimate these models with only the most important controls, although including the controls used in our other analyses did not affect our substantive results.

RESULTS

Table 1 provides descriptive statistics for all job spells used in our analysis. Just under 5 percent of the job spells—90 events—were in contracting; this finding is consistent with the 6 percent of IT workers who are reported as in contracting or temporary agency employment in Current Population Survey (CPS) data. Altogether, 8.5 percent of the workers in our sample had been contractors at some time during their careers.

Table 2 provides further descriptive statistics for job spells, divided into contracting and noncontracting spells. We found that contracting spells occurred at significantly higher levels of experience than regular employment spells. The variance in experience is also higher for contracting spells, suggesting that contracting may indeed occur at both the highest and lowest levels of experience. We also found that contracting spells were more likely to occur immediately following involuntary separations, and following a job in the high-technology industry. Workers with master's degrees were less likely to contract, though. Contracting job spells were also less likely than were regular employment spells to involve married men with children.

Determinants of Contracting

Model 1 of Table 3 presents our main regression results. The results support Hypothesis 1, stating that family commitments reduce contracting, although the results vary by gender. We found that married men were significantly less likely to contract than single men. Married men with children were even less likely to contract—indeed, the incremental reduction in propensity to contract when married men had children was marginally significant ($p < 0.06$). By contrast, we found no significant effects of being married or having children on women's propensity to contract (the lack of findings does not solely reflect reduced statistical power for women; having children had a significantly stronger effect on men's propensity to contract than on women's; $p < 0.04$).

We also found support for Hypothesis 2, stating that workers are more likely to contract if their work history provides negative cues about their

attitudes and behavior. Individuals who experienced involuntary separations from their last job were more likely to contract.

We found reasonable evidence that high levels of skills increase the probability of contracting, supporting Hypothesis 3. Workers who were previously in high-end jobs were significantly more likely to contract. We also found that workers whose last job was in the high-technology industry were more likely to take contracting jobs, even though a current job in the high-technology industry did not predict contracting. We did not find that higher levels of education led to contracting, though. Indeed, possession of a master's degree actually reduced the probability of contracting.

We also found that experience had a U-shaped effect on the probability of contracting, supporting Hypothesis 4. Contracting was associated with the lowest levels of experience: the negative coefficient on the early experience spline (below median) indicated that the probability of contracting initially falls as workers gain experience. The probability of contracting increases again as workers gain high levels of experience, as the positive coefficient on the later experience spline (above median) indicates. This pattern of coefficients confirms the nonlinear effects of experience on contracting; it also provides further evidence of the effects of both skills and constraints on finding regular employment in workers' decisions to contract.

Of our controls, only contracting in the previous job was statistically significant. This finding may indicate a "path dependence" in decisions to contract, but it is also consistent with some individuals being more prone to contracting than others. Perhaps surprisingly, we did not find an effect of start date on contracting probabilities once we controlled for experience. Within the period captured by our data, it did not appear that IT contracting had become much more (or less) prevalent.

The McFadden's pseudo- R^2 indicates that our model is highly significant. We further explored the model's fit by examining the predicted probabilities of contracting for different job spells. For job spells that actually involved contracting, our model gave a mean predicted probability of contracting of 0.16. The mean predicted probability of contracting for all other job spells was 0.04 ($t = 15.3$ for the difference in means). Hence, the model does a good job of differentiating contracting spells from noncontracting but generally underestimates the probability of contracting. Underestimation is not surprising, given the generally low probability of contracting. It also reflects the importance of many unmeasured variables in determining contracting, including other facets of skills and person-

TABLE 1
Summary Statistics and Correlations^a

Variables	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1. Contractor	0.05	0.22																									
2. Long-term contractor	0.02	0.14	.63*																								
3. Short-term contractor	0.03	0.17	.75*	-.02																							
4. Bachelor's degree	0.99	0.09	-.04	-.03	-.02																						
5. Master's degree	0.33	0.47	-.06	-.04	.06*																						
6. Ph.D.	0.01	0.11	.00	-.02	.01	.01	.05*																				
7. Start date	14.017	1.494	.08*	.00	.10*	-.05*	-.17*	-.03																			
8. Experience spline < median	2.83	1.26	-.02	.02	-.04	.00	.04	-.05*	.16*																		
9. Experience spline > median	1.65	2.88	.10*	.12*	.03	.01	.08*	-.02	.15*	.48*																	
10. Job number	2.81	1.10	.10*	.08*	.06*	.01	.08*	-.01	.20*	.42*	.43*																
11. Age	28.75	6.21	.08*	.09*	.02	.03	.13*	.01	.14*	.39*	.58*	.32*															
12. In education	0.04	0.19	-.02	.01	-.03	.02	.27*	.00	-.09*	-.04	-.05*	-.02	-.04														
13. White	0.84	0.37	-.02	.04	-.06*	.01	-.10*	.00	-.05*	.09*	.11*	-.01	.06*	.02													
14. Single female, no child	0.05	0.21	.02	.04	-.01	.02	.01	-.03	.00	-.03	.03	.02	.01	.00	.03												
15. Married male, child	0.16	0.37	-.06*	-.05*	-.03	.01	.09*	-.01	.13*	.23*	.29*	.14*	.28*	-.02	.07*	-.10*											
16. Married male, no child	0.44	0.50	-.07*	-.02	-.07*	-.01	.07*	.06*	-.17*	.01	.11*	.08*	.10*	.05*	-.03	-.20*	-.39										
17. Married female, no child	0.10	0.30	.02	.03	.00	.03	.02	-.04	-.15*	.00	-.02	-.03	.00	.01	.00	-.07*	-.15*	-.29*									
18. Married female, child	0.02	0.14	.04	.07*	.00	-.03	.01	-.02	.05*	.08*	.10*	.03	.12*	-.03	-.01	-.03	-.06*	-.12*	-.05								
19. High tech	0.12	0.33	.05	.09*	-.02	.03	.06*	.02	.01	.01	.07*	.03	.03	.00	.00	.12*	.01	.00	-.02	-.01	.00	.36*					
20. Last job, high tech	0.12	0.32	.10*	.12*	.03	.01	.02	-.01	.04	.03	.08*	.02	.02	-.03	.02	.09*	.01	.00	-.02	.00	.02	.00	.05*				
21. Last job, involuntary separation	0.18	0.38	.05*	.02	.05*	-.01	.00	-.02	.19*	.15*	.11*	.16*	.14*	-.03	-.01	-.04	.03	-.05*	.00	.02	.00						
22. Last job, contractor	0.06	0.23	.22*	.15*	.16*	-.03	-.04	.03	.03	-.18*	-.01	.05	-.04	.00	-.05*	.03	-.08*	-.08*	-.03	.02	.02	.01	-.08*				
23. Last job, workplace size (ln)	4.88	2.20	.01	.04	-.02	.01	.07*	.01	-.01	.09*	.06*	-.14*	.03	.01	-.01	.05*	.03	.02	.02	.05*	.02	-.02	-.08*	-.06*			
24. Last job, application work	0.33	0.47	.02	.02	.01	.03	-.02	-.01	.01	-.07*	-.03	-.03	-.02	.00	-.01	.09*	.00	-.05	.01	-.04	.04	-.01	-.06*	.05*	.02		
25. Last job, level	-.037	0.76	.04	.03	.03	-.03	.08*	.06*	.16*	.06*	.05*	.12*	.04	-.02	-.03	-.02	.06*	.00	-.05*	.00	.02	.03	.07*	-.04	-.04	-.22*	
26. Spouse employed	0.52	0.50	.01	.05*	-.04	.01	.08*	.01	-.08*	.09*	.04	.02	.07*	-.01	.06*	-.08*	-.01	.22*	.26*	.11*	.05*	.04	.00	-.05*	.05*	-.07*	-.03

^a $n = 1,826$.

* $p < .05$

TABLE 2
Comparison of Job Spells in Regular Employment
versus Contracting^a

Variable	Regular Employment		Contracting Spells	
	Mean	s.d.	Mean	s.d.
Age	28.64	5.84	30.8 ⁺	11.00 ^{**}
White	0.84	0.37	0.81	0.39
In education	0.04	0.19	0.02	0.15
Spouse employed	0.52	0.01	0.53	0.05
Job number	2.78	1.06	3.27 ^{**}	1.53 ^{**}
Last job, workplace size (ln)	4.88	2.20	4.96	2.19
High tech	0.12	0.33	0.19	0.39
Last job, application work	0.33	0.47	0.38	0.49
Last job, contractor	0.05	0.21	0.28 ^{**}	0.45
Ph.D.	0.01	0.11	0.01	0.11
Master's degree	0.34	0.47	0.21 [*]	0.41
Bachelor's degree	0.99	0.09	0.98	0.15
Last job, high tech	0.11	0.31	0.26 ^{**}	0.44
Last job, level	-0.37	0.76	-0.23	0.78
Current job, level	-0.26	0.78	-0.33	0.74
Last job, involuntary separation	0.17	0.38	0.27 [*]	0.44
Experience	4.42	3.56	5.59 [*]	5.15 ^{**}
Married male, child	0.17	0.38	0.07 ^{**}	0.25
Married male, no child	0.44	0.50	0.29	0.46
Married female, child	0.10	0.29	0.12	0.33
Married female, no child	0.02	0.13	0.04	0.21
Single female, no child	0.05	0.21	0.07	0.25
<i>n</i>	1,736		90	

^a Significance levels for means refer to difference with regular employees, using tests with unequal variance; significance levels for variance refer to Levene's statistic, using median threshold. Significance tests for variance of dummy variables are omitted.

⁺ $p < .10$

^{*} $p < .05$

^{**} $p < .01$

ality not measured here, as well as the presence of frictions in the labor market matching process (Petronglo & Pissarides, 2001).

Long-Term versus Short-Term Contracting

Models 2 to 4 in Table 3 examine the determinants of long-term versus short-term contracting. We find some support for Hypothesis 5a, that workers are more likely to enter short-term contracting when their work histories contain negative cues about their attitudes and behaviors. Being laid off significantly predicts short-term contracting but not long-term contracting. We found limited support for Hypothesis 5b, stating that workers with higher skills are more likely to enter long-term contracting. When we separated out the effects of ex-

perience and the previous job, we found that having been in a high-end job and having been in the high-technology industry significantly predicted long-term but not short-term contracting. We also found that higher levels of experience significantly increased the probability of long-term but not short-term contracting. In none of these cases, however, are the differences in coefficients for long-term versus short-term contracting significant.

We conducted a more robust test of our hypotheses by using hazard rate models to test whether skills, negative cues, and experience predicted time to exiting contracting. Figure 2 shows the Kaplan-Meier survival function for contiguous spells in contracting, with adjacent spells combined and truncation at 2,000 days. The figure demonstrates the short periods of time that most workers spend in contracting: around 70 percent of workers returned to regular employment within 400 days. A few workers, however, contracted for much longer periods of time.

Table 4 presents the results of the hazard rate analyses. In keeping with our hypotheses, the rate of exit from contracting declines with labor market experience, although increases in standard errors reduce the significance of this effect in the presence of multiple covariates. This finding demonstrates that individuals who enter contracting at different stages of their careers use it in different ways: early in a career, contracting is likely to be a transitional arrangement; later in the career, contracting becomes a longer-term form of work. We do not, however, find effects of our measures of skills or negative cues about workers' employability. This lack of findings may in part reflect an absence of statistical power. Perhaps more importantly, very few individuals in our sample appeared to be engaging in truly long term contracting; only seven of our respondents had spent more than five years in contracting. This suggests that genuinely long term contracting is a rare event, at least in our data.

Alternative Mechanisms

We have focused on the role of job security and training in shaping contracting decisions, using the lens of internal labor market theory. As we noted above, these are not the only rewards that individuals look for in jobs. Preferences for pay and benefits could also drive contracting decisions. For example, Abraham and Taylor (1996) and Houseman (2001) argued that contracting may be used to bypass administrative pay scales, allowing firms to pay more to the most skilled workers and less to the least skilled workers. As a consequence, it is possible that firms employ inexperienced or laid-off

TABLE 3
Results of Logit and Multinomial Logit Analyses for Determinants of Contracting^a

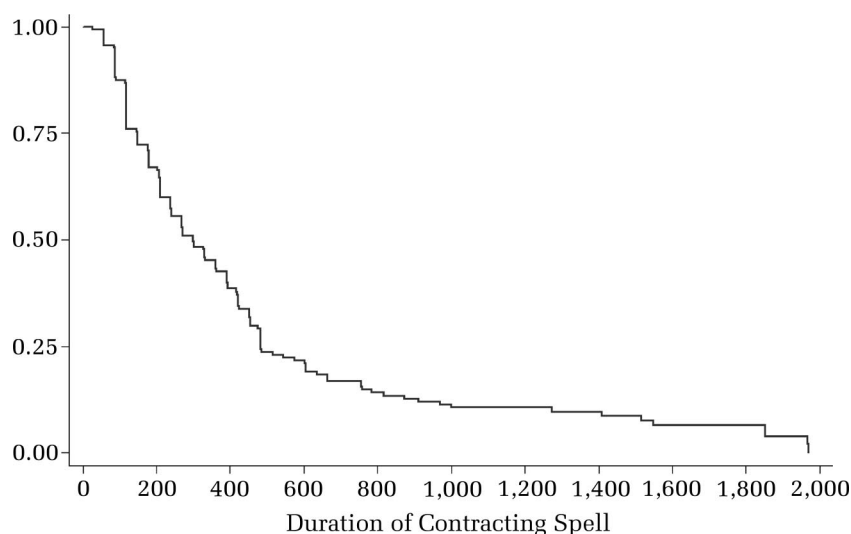
Variables	Model 1		Model 2		Model 3		Model 4	
	<i>b</i>	Odds Ratio	Short	Long	Short	Long	Short	Long
Age	0.02 (0.02)	1.02	0.03 (0.03)	0.04 (0.03)	0.04 (0.02)	0.05* (0.02)	0.04* (0.02)	0.03 (0.03)
White	-0.22 (0.29)	0.80	-0.01 (0.65)	0.62 (0.76)	0.08 (0.64)	0.70 (0.77)	-0.38 (0.42)	0.40 (0.62)
In education	0.45 (0.86)	1.56						
Spouse employed	0.45 (0.32)	1.57	0.44 (0.49)	0.48 (0.62)	0.32 (0.46)	0.46 (0.61)	0.21 (0.42)	0.30 (0.49)
Job number	0.18 (0.11)	1.20	0.11 (0.25)	0.04 (0.26)	0.02 (0.21)	0.06 (0.22)	0.05 (0.23)	0.03 (0.18)
Start date	0.00 (0.00)	1.00	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00* (0.00)	-0.00 (0.00)
Last job, workplace size (ln)	0.09 (0.05)	1.09	0.01 (0.07)	0.14 (0.10)	0.01 (0.07)	0.15 (0.10)		
High tech	0.07 (0.34)	1.07	-0.95 (0.77)	0.97* (0.48)	-0.92 (0.77)	1.04* (0.49)		
Last job, application work	0.39 (0.25)	1.47	0.73 (0.40)	0.56 (0.45)	0.83* (0.39)	0.53 (0.46)		
Last job, contractor	1.76** (0.34)	5.82						
<i>Skills</i>								
Ph.D.	0.18 (0.95)	1.19						
Master's degree	-0.78* (0.33)	0.46	-1.29* (0.63)	-0.89 (0.55)	-1.24* (0.60)	-0.79 (0.51)	-1.11* (0.56)	-0.50 (0.46)
Bachelor's degree	-1.08 (0.60)	0.34						
Last job, high tech	1.07** (0.28)	2.91	0.99* (0.48)	1.21* (0.51)	0.96 (0.50)	1.26* (0.51)		
Last job, level	0.34* (0.16)	1.41	0.06 (0.32)	0.57* (0.27)	0.02 (0.31)	0.56* (0.27)		
<i>Negative cues</i>								
Last involuntary separation	0.60* (0.26)	1.81	0.87* (0.42)	0.73 (0.45)	0.82* (0.41)	0.73 (0.46)		
<i>Career stage</i>								
Experience spline < median	-0.24* (0.11)	0.79	-0.22 (0.17)	-0.08 (0.19)			-0.22 (0.14)	-0.11 (0.18)
Experience spline > median	0.11* (.046)	1.12	0.06 (0.09)	0.06 (0.07)			0.05 (0.08)	0.11* (0.06)
<i>Family responsibilities</i>								
Married male, child	-1.67** (0.51)	0.19	-1.43* (0.72)	-1.90 (1.09)	-1.63* (0.76)	2.01 (1.10)	-1.50** (0.70)	-1.24 (0.82)
Married male, no child	-0.84* (0.38)	0.43	-1.08* (0.49)	-0.33 (0.62)	-1.19* (0.48)	-0.37 (0.61)	-1.15** (0.43)	-0.16 (0.54)
Married female, child	-0.16 (0.73)	0.85						
Married female, no child	-0.16 (0.51)	0.85	0.07 (0.72)	0.64 (0.76)	0.00 (0.70)	0.62 (0.77)	-0.03 (0.62)	0.19 (0.68)
Single female, no child	-0.73 (0.54)	0.48						
Constant	-5.48** (1.82)		-9.75** (3.36)	-5.83** (2.14)	-10.14** (3.24)	-6.60** (2.11)	-10.69** (3.16)	-4.90* (2.08)
Observations	1,826	1,589	1,694				1,902	
Pseudo- <i>R</i> ²	0.18	0.14	0.14				0.08	

^a Standard errors are in parentheses. Models 2, 3, and 4 are multinomial logit analyses for short- and long-term contracting; Ph.D., bachelor's, in education, married female with child, and single female variables dropped because of small cell sizes. Contiguous contracting spells are combined.

* $p < .05$

** $p < .01$

FIGURE 2
Kaplan-Meier Survival Plot for Time in Contracting^a



^a Spells < 2,000 days only.

workers as contractors in order to pay them lower wages. Similarly, highly skilled workers may contract because they can earn more as contractors than as regular employees. Contractors also lack access to employer-provided benefits, as noted above. Here, we briefly assess the role of these rewards in shaping decisions to contract.

First, we used data on the wages that workers earned in their final jobs to assess whether pay dif-

fered for contracting and regular employment (analysis available from authors). Our wage analyses showed no significant differences between the wages of contractors and regular employees. We also found no difference between the pay of regular employees and specific groups of contractors, such as experienced, inexperienced, long-term, and short-term contractors. It appears that organizations' attempts to bypass pay scales are not driving decisions to contract.

TABLE 4
Results of Cox Proportional Hazard Models for Exit from Contracting^a

Variables	Model 1	Model 2	Model 3
Age	0.01 (0.02)	0.01 (0.02)	-0.01 (0.02)
White	-0.68 [†] (0.38)	-0.53 (0.45)	-0.51 (0.44)
Spouse employed	-0.02 (0.35)	-0.30 (0.42)	-0.43 (0.39)
Start date	0.00** (0.00)	0.00* (0.00)	0.00* (0.00)
High tech		-0.68 (0.54)	-0.78 (0.53)
Last job, application work		0.34 (0.38)	0.23 (0.35)
Master's degree	-0.48 (0.40)	-0.44 (0.53)	-0.27 (0.48)
Last job, high tech		-0.02 (0.40)	0.02 (0.39)
Last job, level		-0.22 (0.27)	-0.29 (0.26)
Last job, involuntary separation		-0.22 (0.37)	-0.23 (0.36)
Experience	-0.10* (0.05)	-0.10 [†] (0.05)	
Married male, child	0.38 (0.68)	0.39 (0.71)	-0.01 (0.67)
Married male, no child	-0.45 (0.37)	-0.23 (0.43)	-0.14 (0.42)
Married female, no child	0.25 (0.49)	0.17 (0.69)	0.27 (0.59)
<i>n</i>	73	65	69
Failure events	60	53	55
Probability likelihood ratio > χ^2	0.00	0.02	0.04

^a Standard errors are in parentheses.

[†] $p < .10$

* $p < .05$

** $p < .01$

Second, we note that our analyses fail to offer strong support for access to benefits as an influence on contracting decisions. Although the effects of family responsibilities on contracting could partly be shaped by access to benefits, other variables that determine how workers value benefits do not have an effect. We would expect that workers would value benefits more as they become older, and if they do not receive benefits through a spouse. Yet we did not find contracting declining with age (in a few of the multinomial logit specifications, workers appeared more likely to contract when they got older). Nor did we find that workers with employed spouses were significantly more likely to contract. This lack of effects may reflect a reduced importance of insurance and pensions among the young workers found in our sample.

DISCUSSION

Contributions

This is the first study to develop and test a model of which individuals work as highly skilled contractors. We use a matching framework to identify the factors that increase the odds of contracting and explore how those factors change over the course of a career. We focus on two established differences between regular employment and contracting: job security and employer provision of training. We use these differences to predict which workers will contract, by examining who best fits the rewards and demands of contracting jobs. In keeping with our predictions, we find evidence that workers are more likely to contract when they have higher levels of skills. We do not, though, find that educational qualifications increase the propensity to contract; possession of a masters' degree actually reduces contracting. These findings may reflect important differences between skills acquired in the workplace and those acquired through formal education (see also NRC, 2001: 293); it is those skills acquired in the workplace that have the greatest effect on contracting, as our theory would predict. We also find that workers are more likely to contract when their work histories provide negative cues about their attitudes and behaviors. Partly as a consequence of these dynamics, contracting has a nonlinear relationship with experience, being most likely when workers have very low levels of experience, then increasing again when workers acquire high levels of experience. We also find that men are less likely to contract when they have greater family responsibilities. Finally, we find that more experienced workers remain in contracting for longer periods.

Our study has a number of limitations that reflect the difficulties of studying matching processes in the labor market. We use a sample that allows us to hold constant national context, occupation, and educational background. Yet that homogeneity also limits our ability to generalize from our sample. Some of our measures are imprecise, reflecting the difficulties of getting accurate measures for such constructs as skills. We are also unable to directly measure the worker preferences and job demands that mediate our theory. Rather, we are able to show that the predictions of our theory hold in this sample.

Future research could further validate and extend the model presented here. For example, prospective studies could include data on the job rewards workers seek prior to decisions to enter contracting, including increased control over assignments and freedom from organizational politics. It would also be valuable to collect more personal data in future studies, including data on the workers' households, which could help explain gender differences in responses to family responsibilities, and on personality factors such as risk aversion. Future research should also incorporate transitions between contracting and employment that occur both within the same workplace and across different workplaces. To extend our model beyond a single, highly skilled occupation, further research is needed on less skilled occupations, particularly those where contracting is mediated by temporary help agencies. We believe that the same factors of lack of job security and reduced employer-provided training will also affect contracting in less skilled occupations, although the importance of these factors may vary: skills development may be less important, and constraints on finding work more important (Autor & Houseman, 2006; Marler et al., 2002).

Implications for Public Policy

As we noted above, the growth of contracting presents challenges for a variety of existing public policies that tie benefits, training, and security to regular employment relationships. Our findings help to clarify which strategies are more likely to succeed in addressing these challenges. We also highlight some of the most important problems that contractors face.

Coordinating institutions. Our framework and findings demonstrate that policies aimed at contractors must be flexible enough to accommodate a wide range of circumstances. As we have argued, workers' preferences and resources—key drivers of matching to contracting jobs—evolve over their ca-

reers. As a consequence, we found that workers enter contracting at different career stages: both early on, when they lack an ability to signal that they have favorable behaviors and attitudes; and later, when they possess higher skills. We also found that workers move out of contracting as their preferences change and resources develop. This heterogeneity must be kept in mind when developing policies that affect contractors.

Consider, for example, current debates about how best to provide workers with benefits such as health insurance, pensions, and collective voice. Given the difficulties of changing the way that benefits are provided on a national level, many commentators have suggested that the best way to extend such benefits to contractors is through the use of specialist labor market intermediaries such as workers' associations and unions. The hope is that by aggregating large numbers of contractors, such groups would be able to provide insurance at much lower cost than contractors are able to find on their own. Indeed, groups such as Working Today/The Freelancers Union have already begun to provide contractors with a range of such services.

Our findings, however, suggest that such nongovernmental solutions to the problems posed by contingent work may prove challenging. Much of the discussion about these intermediaries assumes a somewhat homogeneous population of long-term contractors (e.g., Barley & Kunda, 2004). Our analyses suggest that this population is highly heterogeneous in skill, life stage, and attachment to contracting. Of special concern is the ability of intermediaries to reach short-term contractors, who, our analysis indicates, constitute a large portion of all technical contractors. To the extent that these workers do not consider themselves to be long-term contractors, they will be less likely to seek out, identify with, or subscribe to services from intermediaries targeting contractors. Furthermore, the high turnover of such contractors could pose severe challenges for intermediaries.

The prevalence of short-term contracting in our data suggests that we should perhaps see the growth of contracting as one part of a more general trend toward higher workforce "churning" across employers. Against that background, it makes little sense for benefits to be linked to an increasingly tenuous employment relationship. When workers are moving from job to job and passing through periods of contracting, insurance needs to follow them with minimal hassle. Our findings thus support the need for affordable portable pensions (Bernhardt & Bailey, 1997; Osterman, Kochan, Locke, & Piore, 2001: 160-164) and other reforms aimed at addressing mobile workers' needs. Simi-

larly, health insurance should cover workers' moves across employment situations, including short stints in contracting. We suspect meeting this goal will ultimately require a system of coverage provided by entities other than just employers. One option is to use organizations based on sector or occupational identity, such as the Association for Computing Machinery (ACM) for computer programmers (van Jaarsveld, 2004). That approach would be more attractive if cross-firm organizations were given the same tax advantages for providing benefits that employers currently enjoy. "Single-payer" or "public option" plans administered by the government provide another potential solution.

Skills development. Our findings also emphasize some of the challenges that contractors face. The good news is that our findings suggest that the average contractor may not need as much training as other workers. Contractors are often already highly skilled. The bad news is that the same findings suggest that contractors really do get less training. The fact that contracting is disproportionately performed by the most skilled workers suggests that contractors' lack of employer-provided training is important enough to affect who contracts. Furthermore, not all workers entering contracting are already skilled. Some have very little experience. Our findings therefore underline concerns that the expansion in contracting is displacing traditional routes of skill acquisition through regular employment.

To the extent that employers are not providing contractors with skills development, there is a growing need for governments to coordinate and spur collective investment in training (Cappelli, Bassi, Katz, Knoke, Osterman, & Useem, 1997: 151-153). Regional public-private partnerships may be the best way to identify the most important skills while also overcoming the collective action problems inherent in employer-provided training. Such partnerships have proved effective in the transitional training of unemployed workers (Bernhardt & Bailey, 1997). The growth of contracting work suggests a need to expand such institutions to offer ongoing skills development to contractors as well. Such development is particularly important in the high-technology industry, where existing skills can rapidly become out of date, even for the most skilled workers (Barley & Kunda, 2004).

Economic security. Similarly, our findings underscore the importance of improving the security of contractors. We show that men with family responsibilities are less likely to contract, suggesting that insecurity still dissuades workers from entering contracting. It appears that not all workers share the belief that contractors' marketable skills

give them job security similar to that of regular employees (Barley & Kunda, 2004: 289). Yet current policy does little to manage the insecurity facing contractors. Contractors are usually unable to meet eligibility requirements for unemployment insurance, even if they are contracting full-time (Stone, 2006). When workers remain in contracting for several years—as a few of our respondents did—they should have access to unemployment insurance equal to that of regular employees. A number of reform proposals currently exist. One option is to expand insurance eligibility for contractors by extending the base period during which earlier spells of regular employment contribute to eligibility (e.g., Osterman et al., 2001). Alternatively, contractors who meet a threshold hours requirement in a given year could be made eligible for unemployment insurance in some form.

Contracting as coercion versus liberation. Our findings also speak to the ongoing debate about whether contracting should be characterized as coercive. Employers can use contracting to avoid labor and employment laws covering regular employees, potentially helping them to remove protections and benefits from the weakest workers. Some commentators have therefore interpreted the growth of contingent work as reflecting employers' attempts to renege on their obligations to their workforces (Barker & Christensen, 1998; Hiatt, 1995; Rogers 2000).

Such questions hinge on whether workers are entering contracting voluntarily. Data from both ethnographies (e.g., Kunda et al., 2002) and surveys (e.g., Marler & Moen, 2005) present reasons why individuals say they are contracting. Such studies suggest that a significant proportion of workers enter contracting voluntarily. Yet there is a risk that such responses reflect ex post rationalizations of constrained decision making rather than what workers really want. Because we focused on objective factors that precede job spells in contracting, our findings avoid such biases.

We proposed that contracting was more likely to be entered by those workers who least value the rewards provided by regular employment. Hence, workers with the most power in the market—those with high levels of skills—should be the most likely to contract. Our findings strongly supported this prediction. If contracting genuinely offered poorer rewards than regular employment, we would expect those unable to find better jobs to contract. Instead, we found that much contracting is performed by highly experienced and skilled workers who are likely to have other labor market options. This suggests that much highly skilled contracting is indeed voluntary.

The current findings suggest that a goal for policy makers should not be to restrict the use of contracting relationships per se, but rather to ensure that they are not used in ways that exploit vulnerable workers. Various options exist. One possibility would be to recognize an intermediate class of contracting workers that would be outside a firm's boundaries for some purposes but not for others. In this way, a contractor might be excluded from any implied contract of employment continuity or firm-provided benefits but still qualify for tax withholding and labor standards. Such a measure might allow firms and workers to continue reaping the benefits of contracting while reducing the temptation to misclassify workers. Alternatively, the law could explicitly take into account power differentials in regulating contracting. For example, employers could face tougher requirements for the treatment of more vulnerable contractors, such as those with low skills. Differentiation might be based on established distinctions between "exempt" and "nonexempt" employees, or on the degree of worker dependence on an employer (Dunlop Commission, 1994). Any of these approaches could help to facilitate contracting for those who benefit from it while limiting the scope for exploitation among more vulnerable workers.

REFERENCES

- Abraham, K. G., & Taylor, S. K. 1996. Firms' use of outside contractors: Theory and evidence. *Journal of Labor Economics*, 14: 394–424.
- Acemoglu, D., & Pischke, J. S. 1998. Why do firms train? Theory and evidence. *Quarterly Journal of Economics*, 113: 79–119.
- Ang, S., Slaughter, S., & Ng, K. Y. 2002. Human capital and institutional determinants of information technology compensation: Modeling multilevel and cross-level interactions. *Management Science*, 48: 1427–1445.
- Atkinson, J. S. 1987. Flexibility or fragmentation? The United Kingdom labor market in the eighties. *Labor and Society*, 12(1): 87–105.
- Autor, D. H. 2003. Outsourcing at will: The contribution of unjust dismissal doctrine to the growth of employment outsourcing. *Journal of Labor Economics*, 21: 1–42.
- Autor, D. H., & Houseman, S. N. 2006. Temporary agency employment as a way out of poverty? In R. Blank, S. Danziger, & R. Schoeni (Eds.), *Working but poor: How economic and policy changes are affecting low-wage workers*: 312–337. New York: Russell Sage.
- Barker, K., & Christensen, K. 1998. *Contingent work*:

- American employment relations in transition.** Ithaca, NY: ILR Press.
- Barley, S. R., & Kunda, G. 2004. **Gurus, hired guns and warm bodies: Itinerant experts in a knowledge economy.** Princeton, NJ: Princeton University Press.
- Batt, R., Christopherson, S., Rightor, N., & Van Jaarsveld, D. 2001. **Net working: Work patterns and workforce policies for the new media industry.** Washington, DC: Employment Policy Institute.
- Bernhardt, A., & Bailey, T. 1997. **Making careers out of jobs: Policies to address the new employment relationship.** IEE brief no. 17, December, Institute on Education and Economy, Columbia University, New York.
- Bidwell, M. J. 2009. Do peripheral workers do peripheral work? Comparing the use of high skill contractors and regular employees. **Industrial and Labor Relations Review**, 62: 200–225.
- Bills, D. B. 1990. Employers use of job history data for making hiring decisions—A fuller specification of job assignment and status attainment. **Sociological Quarterly**, 31: 23–35.
- Briscoe, F. 2006. Temporal flexibility and careers: The role of large-scale organizations in the practicing physician labor market. **Industrial and Labor Relations Review**, 60: 67–83.
- Bureau of Labor Statistics. 2005. **Contingent and alternative employment arrangements.** <http://www.bls.gov/news.release/pdf/conemp.pdf>, February.
- Cappelli, P. 1995. Is the skills gap really about attitudes. **California Management Review**, 37(4): 108–124.
- Cappelli, P. 1997. **Change at work.** New York: Oxford University Press.
- Cohany, S. R. 1996. Workers in alternative employment arrangements. **Monthly Labor Review**, 119(10): 31–45.
- Cohany, S. R. 1998. Workers in alternative employment arrangements: A second look. **Monthly Labor Review**, 121(11): 3–21.
- Colvin, A. J. S. 2006. Flexibility and fairness in liberal market economies: The comparative impact of the legal environment and high-performance work systems. **British Journal of Industrial Relations**, 44: 73–97.
- Commission on the Future of Worker-Management Relations. 1994. **The Dunlop Commission on the Future of Worker-Management Relations**, final report, U.S. government, Washington, DC.
- Crain, R. L. 1984. **The quality of American high school graduates: What personnel officers say and do about it.** Working paper/report, John Hopkins University, Center for Social Organization of Schools, Baltimore.
- Davis-Blake, A., & Uzzi, B. 1993. Determinants of employment externalization—A study of temporary workers and independent contractors. **Administrative Science Quarterly**, 38: 195–223.
- DiNatale, M. 2001. Characteristics of and preference for alternative work arrangements, 1999. **Monthly Labor Review**, 124(3): 28–49.
- Doeringer, P. B., & Piore, M. J. 1971. **Internal labor markets and manpower analysis.** Lexington, MA: Heath.
- Eliason, S. R. 1995. An extension of the Sorensen-Kalleberg theory of the labor-market matching and attainment processes. **American Sociological Review**, 60: 247–271.
- Froot, K. A. 1989. Consistent covariance-matrix estimation with cross-sectional dependence and heteroskedasticity in financial data. **Journal of Financial and Quantitative Analysis**, 24: 333–355.
- Gibbons, R., & Katz, L. F. 1991. Layoffs and lemons. **Journal of Labor Economics**, 9: 351–380.
- Giorgetti, D., & Sebastiani, F. 2003. Automating survey coding by multiclass text categorization techniques. **Journal of the American Society for Information Science and Technology**, 54: 1269–1277.
- Greene, W. H. 1997. **Econometric analysis** (3rd ed.). Upper Saddle River, NJ: Prentice Hall.
- Hiatt, J. P. 1995. Policy issues concerning the contingent work force. **Washington and Lee Law Review**, 52: 739–753.
- Hipple, S. 1998. Contingent work: Results from the second survey. **Monthly Labor Review**, 121(11): 22–34.
- Holzer, H. J. 1987. Hiring procedures in the firm: Their economic determinants and outcomes. In M. M. Kleiner, R. N. Block, M. Roomkin, & S. W. Salsburg (Eds.), **Human resources and the performance of the firm**: 243–274. Madison, WI: Industrial Relations Research Association.
- Houseman, S. N. 2001. Why employers use flexible staffing arrangements: Evidence from an establishment survey. **Industrial and Labor Relations Review**, 55: 149–170.
- Houseman, S. N., Kalleberg, A. L., & Ericcek, G. A. 2003. The role of temporary agency employment in tight labor markets. **Industrial and Labor Relations Review**, 57: 105–127.
- Houseman, S. N., & Osawa, M. 2003. **Nonstandard work in developed economies: Causes and consequences.** Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.
- Hundley, G. 2000. Male/female earnings differences in self-employment: The effects of marriage, children, and the household division of labor. **Industrial and Labor Relations Review**, 54: 95–114.
- Jovanovic, B., & Nyarko, Y. 1997. Stepping-stone mobility. **Carnegie-Rochester Conference Series on Public Policy**, 46: 289–325.
- Kanter, R. M. 1995. Nice work if you can get it: The

- software industry as a model for tomorrow's jobs. *American Prospect*, 6(23): 52–58.
- King, G., & Zeng, L. 2001. Logistic regression in rare events data. *Political Analysis*, 9(2): 137–163.
- Kodrzycki, Y. K. 1998. The effects of employer-provided severance benefits on reemployment outcomes. *New England Economic Review*, issue 6: 41–68.
- Kunda, G., Barley, S. R., & Evans, J. 2002. Why do contractors contract? The experience of highly skilled technical professionals in a contingent labor market. *Industrial and Labor Relations Review*, 55: 234–261.
- Levina, N., Xin, M., & Yang, S. 2003. *Information technology workforce structure and compensation in IT services versus other firms: Implications to IT outsourcing*. Paper presented at the 24th International Conference on Information Systems, Seattle.
- Logan, J. A. 1996. Opportunity and choice in socially structured labor markets. *American Journal of Sociology*, 102: 114–160.
- Marler, J. H., Barringer, M. W., & Milkovich, G. T. 2002. Boundaryless and traditional contingent employees: worlds apart. *Journal of Organizational Behavior*, 23: 425–453.
- Marler, J. H., & Moen, P. 2005. Alternative employment arrangements: A gender perspective. *Sex Roles*, 52: 337–349.
- Meiksins, P., & Whalley, P. 2002. *Putting work in its place: A quiet revolution*. Ithaca, NY: ILR Press.
- Mincer, J. 1962. On-the-job training—Costs, returns, and some implications. *Journal of Political Economy*, 70(5): 50–79.
- Mithas, S., & Krishnan, M. S. 2008. Human capital and institutional effects in the compensation of information technology professionals in the United States. *Management Science*, 54: 415–428.
- National Research Council (NRC). 2001. *Building a workforce for the information economy* (Report of the Committee on Workforce Needs in Information Technology). Washington, DC: National Academy Press.
- Oldham, G. R., Kulik, C. T., & Stepina, L. P. 1991. Physical environments and employee reactions: Effects of stimulus-screening skills and job complexity. *Academy of Management Journal*, 34: 929–938.
- O'Mahony, S., & Bechky, B. A. 2006. Stretchwork: Managing the career progression paradox in external labor markets. *Academy of Management Journal*, 49: 918–941.
- Osnowitz, D. 2008. *Assessing options, making choices*. Working paper, Clark University.
- Osterman, P. 1987. Choice of employment systems in internal labor-markets. *Industrial Relations*, 26: 46–67.
- Osterman, P., Kochan, T. A., Locke, R. M., & Piore M. J. 2001. *Working in America: A blueprint for the new labor market*. Cambridge, MA: MIT Press.
- Petrongolo, B., & Pissarides, C. A. 2001. Looking into the black box: A survey of the matching function. *Journal of Economic Literature*, 39: 390–431.
- Pink, D. 1998. Free agent nation. *Fast Company*, 12: 131–147.
- Rogers, J. K. 2000. *Temps: The many faces of the changing workplace*. Ithaca, NY: ILR Press.
- Rosen, S. 1986. The theory of equalizing differences. In O. Ashenfelter & R. Layard (Eds.), *Handbook of labor economics*, vol. 1: 641–692. Amsterdam: Elsevier Science.
- Rosenbaum, J. E., Kariya, T., Settersten, R., & Maier, T. 1990. Market and network theories of the transition from high-school to work—Their application to industrialized societies. In W. R. Scott & J. Blake (Eds.), *Annual review of sociology*, vol. 16: 263–299. Palo Alto, CA: Annual Reviews.
- Rousseau, D. M., Ho, V. T., & Greenberg, J. 2006. I-Deals: Idiosyncratic terms in employment relationships. *Academy of Management Review*, 31: 977–994.
- Segal, L. M. 1996. Flexible employment: Composition and trends. *Journal of Labor Research*, 17: 525–542.
- Shalley, C. E., Gilson, L. L., & Blum, T. C. 2000. Matching creativity requirements and the work environment: Effects on satisfaction and intentions to leave. *Academy of Management Journal*, 43: 215–223.
- Smith, P. L. 1979. Splines as a useful and convenient statistical tool. *American Statistician*, 33(2): 57–62.
- Smith, V. 2001. *Crossing the great divide: Worker risk and opportunity in the new economy*. Ithaca, NY: ILR Press.
- Stone, K. V. W. 2006. Legal protections for atypical employees: Employment law for workers without workplaces and employees without employers. *Berkeley Journal of Employment and Labor Law*, 27: 251–286.
- Trevor, C. O., Gerhart, B. and Boudreau, J. W. 1997. Voluntary turnover and job performance: Curvilinearity and the moderating influences of salary growth and promotions. *Journal of Applied Psychology*, 82: 44–61.
- van Jaarsveld, D. 2004. Collective representation among high-tech workers at Microsoft and beyond: Lessons from Washtech/CWA. *Industrial Relations*, 43: 364–385.
- Zwieg, P., Kaiser, K., Beath, C., Bullen, C. et al. 2006. *The information technology workforce: Trends and implications 2005–2008*. White paper, Society for Information Management, Chicago.
- Zemsky, R., & Eisenstein, R. G. 2000. You can't get there from here: Gauging the demand for education and training by high-tech employers. *Change*, 33(September/October): 51–54.



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