

Dissertation Awards

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**Essays on the Changing Labor Market: Computerization,  
Inequality, and the Development of the Contingent Work Force:  
Dissertation Summary**

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# Essays on the Changing Labor Market: Computerization, Inequality, and the Development of the Contingent Work Force

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The essays in this dissertation explore the causes and consequences of three prominent U.S. labor market developments of the 1980s and 1990s: the rapid advent of workplace computerization, the historic rise in earnings inequality, and the unprecedented growth of temporary help supply employment (THS).

## 1. COMPUTING INEQUALITY: HAVE COMPUTERS CHANGED THE LABOR MARKET?

The first dissertation chapter, joint with Lawrence F. Katz and Alan B. Krueger, examines the effect of skill-biased technological change, as measured by computerization, on the recent widening of U.S. educational wage differentials. The first section of the essay presents evidence on trends in the relative quantities, wages, and wage bill shares of workers by education in the aggregate U.S. labor market from 1940 to 1996. A simple relative supply-and-demand framework is used to interpret these data. Substantial secular relative demand growth favoring college workers over the past five decades is necessary to reconcile an increase of 0.25 in the log college/high school wage differential from 1950 to 1996 (approximately 0.55 percent annually) with a more than threefold increase in the employment share of college graduates. The data are less clear on whether the trend rate of demand growth for more-educated workers has increased since the 1970s. Relative demand growth appears to have been more rapid than usual in the 1980s, but its pace appears to have slowed considerably in the 1990s. Nevertheless, as is shown in section two of the essay, a substantial increase in the growth rate of the within-industry component of the relative demand for college workers is apparent from the 1960s to the 1970s, and this higher within-industry growth rate is maintained into the 1980s and 1990s.

The diffusion of computers and related technologies and changes in the organization of work associated with effectively utilizing these technologies may be sufficiently widespread to have contributed to this pattern of more rapid within-industry skill upgrading in

recent years. In section three of the essay, we use data from the October 1984, 1989, and 1993 Current Population Survey (CPS) supplements to document the growing utilization of computers in the workplace. We discuss the mechanisms through which changes in the costs of information technology may affect relative skill demands and find that educational upgrading occurred more rapidly in industries with greater computer utilization in the 1980s and early 1990s.

Finally, we explore the role of skill-biased technological change in the growth of the relative demand for more-skilled workers from 1960 to 1990 by linking data from multiple sources on industry work-force composition, physical capital intensity, research and development expenditures, computer investments, and (for manufacturing industries) trade penetration and foreign outsourcing variables. We consistently find for both the manufacturing and nonmanufacturing sectors that increases in the utilization of more-skilled workers are greater in the most computer-intensive industries. Indicators of employee computer usage, computer capital per worker, and the rate of computer investment are higher in industries with more rapid rates of skill upgrading in each of the last several decades, and in industries with larger accelerations in skill upgrading in the 1970s and 1980s versus the 1960s. Using these measures of computerization in a regression framework, we are able to "account" for approximately 40 percent of the overall increase in U.S. within-industry skill upgrading from the 1960s to the 1970s and 35 percent of the increase in upgrading in manufacturing from the 1970s to the 1980s, although it is not clear that a causal interpretation is appropriate. Changes in import penetration and outsourcing in the manufacturing sector are not strong predictors of skill upgrading conditional on the computer investment ratio, but industries with expanding export shares appear to have faster growth in nonproduction worker payroll share.

We conclude that skill-biased technological and organizational changes that accompanied the computer

revolution appear to have contributed to faster growth in relative skill demand within detailed industries starting in the 1970s. While the strong observed conditional correlations of our computer measures and the growth in the relative utilization of highly educated workers may not just reflect causal relationships, it seems clear that whatever is driving the rapid rate of within-industry skill upgrading over the past few decades, it is concentrated in the most computer-intensive sectors of the U.S. economy. At the same time, these patterns leave much room for fluctuations in the rate of growth of the supply of college equivalents, globalization forces, and changes in labor market institutions to have contributed to recent movements in U.S. educational wage differentials.

## **2. WHY DO TEMPORARY-HELP FIRMS PROVIDE FREE GENERAL SKILLS TRAINING?**

The second dissertation chapter explores a previously unstudied facet of recent computerization: the nominally free computer skills training provided by the majority of U.S. temporary help supply (THS) establishments. According to the Bureau of Labor Statistics (BLS), training in general, portable skills—particularly computer skills—was available without charge or contractual requirement at approximately 75 percent of THS establishments as of 1994, seemingly in defiance of the logic of the competitive model of training. The second essay investigates this puzzle to gain insight into the labor market role served by temporary-help firms and to explore employers' motivations for offering skills training more generally. The principal conclusion is that in addition to skills formation, skills training plays an informational function at THS firms by helping to elicit private knowledge that workers possess about ability.

The conceptual model proposed in the essay is premised on the idea that training is more productive—and hence valuable—to high-ability workers, where ability is defined as an individual's facility and/or motivation at learning job skills. Workers are assumed to have (imperfect) prior knowledge of their ability, while employers cannot initially perceive ability but observe it through training. Because of the learning advantage possessed by high-ability workers, firms are able to offer a package of training and initially lower wages that induces self-selection. Workers of high perceived ability choose to apply to firms offering training in expectation of wage gains in permanent employment, while low-ability workers are deterred by lower wages and limited expected gains. Firms profit from their training investment *ex post* via their short-

run informational advantage about ability and thereby limited monopsony power.

Since the economic theory of training implicitly concerns how market forces impact training provision and payment, the model further explores how firms may adjust wages and training to accommodate competitive pressure as proxied by a "markup" parameter. Perhaps counter to the intuition of the standard framework, the model indicates that THS firms will choose to provide additional training to attract skilled workers as competitive conditions tighten. The explanation for this result is straightforward: due to their limited monopsony power, firms maximize profits by providing a level of training that is socially sub-optimal—equating marginal firm benefits with costs while ignoring gains accruing to workers. When heightened market competition requires firms to raise wages, they therefore find it optimal to provide additional efficient training that increases both wages and output. Since trainees earn less on average than non-trainees, the implication is that competition squeezes employer rents, narrowing the wedge between training and non-training wages.

Tests of the model using a confidential BLS survey of wages and training in the THS industry find consistent support: wages are lower at establishments offering training by a modest but statistically significant magnitude; heightened market competition, as measured by a Herfindahl index, substantially increases firms' propensity to offer free training; and, although training grows with market competition, the wage gap between training and non-training firms contracts significantly. These findings are supplemented by an analysis of a national survey on hiring, training and placement at THS establishments conducted by the author. The survey results indicates that, consistent with the model, THS establishments offering free skills training are significantly more selective in their hiring criteria than non-training establishments, place a greater fraction of their workers in permanent positions, and primarily view training's role as one of attracting and screening motivated and capable workers.

Based on these findings, the essay draws three conclusions. First, the research suggests that in addition to its conventional human capital role, training may usefully be viewed as a mechanism for eliciting private information about worker ability. In particular, in an environment in which ability and training are complementary and where workers hold initially superior information about their own ability, the analysis indicates that firms may employ training

strategically to differentially attract and retain more capable and motivated workers.

Second, understanding the informational role played by training at THS firms may inform a question raised by many labor market analysts: what function do THS firms serve in the labor market and why are they growing so rapidly? A potential answer supplied by the present research is that in addition to providing labor services, THS firms gather and supply information about worker quality to the market. If the benefits to employers of making informed hiring decisions have increased recently, perhaps due to a changing legal environment surrounding worker dismissal (as discussed in the third dissertation chapter) or due to technological and organizational changes which more closely tie productivity to worker ability (as discussed in the first chapter), the growth of the THS industry as an information broker may be a partial result.

A final noteworthy implication of the essay is that the growth of a "contingent" workforce may not imply a monotonic contraction of employer sponsored skills training. While an increase in THS employment (and other forms of arms-length contracting) may reduce employer's conventional incentives for human capital investment, the present model also suggests that high rates of worker turnover require employers to efficiently attract and screen employees, and that training may serve as the employment screen of choice in some contexts. Augmenting this trend, rapid technological change has likely increased the rate of skill obsolescence, thereby generating an incentive for workers to continually replenish skills to maintain marketability. Hence, paradoxically, training may become an increasingly effective screening tool even as its "shelf life" diminishes.

These observations are not to suggest, however, that the growth of the "contingent" workforce augurs an overall intensification of skill training efforts. As the THS example shows, training may be simultaneously prevalent and of limited depth. The principal argument is rather that, because training may serve an informational as well as human capital function, firms' motivation and propensity for offering skills training may differ substantially from the conventional understanding. While training's primary function may always be to augment worker productivity, its hypothesized role in selectively attracting and screening applicants may become increasingly significant.

### 3. OUTSOURCING AT WILL: UNJUST DISMISSAL DOCTRINE AND THE GROWTH OF TEMPORARY-HELP EMPLOYMENT

Building on the view that temporary-help firms may serve a screening function for permanent employment, this chapter explores a potential cause of the apparent increase in employer demand for screening and arms-length contracting: the erosion of the common-law doctrine of employment at will. Until the late 1960s, U.S. common-law employment doctrine held, with few exceptions, that unless explicitly contracted otherwise, employers and employees possessed unlimited discretion to terminate their employment relationships at any time and for any reason without legal consequence. Between 1973 and 1995, however, courts in 46 states adopted exceptions to the employment at will doctrine, thereby limiting employers' discretion to terminate workers and opening them to potentially costly litigation. During the same period, temporary-help employment grew at the unprecedented rate of approximately 11 percent annually. The goal of this chapter is to assess whether the contemporaneous growth of temporary-help supply and the rapid decline of employment at will are causally related.

Section 1 of this essay provides a legal history of the adoption and erosion of the at-will doctrine, discusses the three categories of exception to the doctrine recognized by the courts, and considers their implications for temporary-help supply. Because THS firms are bound by the same legal restrictions as other employers, it is not obvious *a priori* that the erosion of employment at will should advantage THS. In particular, the essay argues that two of the doctrinal exceptions, the public policy and implied covenant exceptions, are unlikely to have had significant impacts on THS. A third exception, however, the implied contractual right to continued employment ("implied contract" exception) appears highly relevant to THS. Unlike the public policy and implied covenant doctrines, which primarily limit terminations that violate ethical or public policy norms, the implied contract doctrine bars terminations where employers may have by action, policy, or industry practice implied that they would only terminate employees for valid cause, i.e., poor performance or economic necessity. By providing numerous employees with a legal right to ongoing employment (frequently in cases where the contract was neither originally intended by the

employer nor expected by the worker), the implied contract exception creates significant costs and legal uncertainty for many employers—but notably not for THS employers. Because THS employment is by nature temporary, courts are quite unlikely to recognize an implied contract action by a THS worker. Hence, the analysis suggests that the widespread adoption of the implied contract doctrine might plausibly have contributed to the rapid growth of THS.

To formalize these ideas, section 2 develops an illustrative model of the impact of firing costs on firms' hiring, screening, and outsourcing decisions. The model is predicated on three ideas. First, although the legal environment may make it costly for employers to terminate workers who are hired directly, employers may contract for workers terminable at will through a THS supplier that charges a "markup" for its services. Second, firms face *ex ante* uncertainty about worker productivity or "fit" that may be partly resolved through a period of trial employment. Third, workers have an option to make productive up-front investments in firm-specific capital, but the value of this capital is destroyed when workers are terminated.

The model suggests that there exists a trade-off between reducing termination costs via THS contracting (outsourcing) and motivating workers to make productive specific capital investments, i.e., "taking a personal stake in the company." How firms resolve this trade-off for a given job depends not only on the extent of firing costs but also on the value of specific capital investment foregone by outsourcing. Greater firing costs lead to increased temporary-help employment, both on the extensive margin (greater occupational scope) and on the intensive margin (greater "depth" within an occupation). Occupations that were previously hired directly shift towards THS contracting, while those already contracted through THS experience fewer temporary-to-permanent conversions. The relative size of THS grows. Moreover, because firing costs are likely highest in occupations where specific capital is most important to productivity, it is plausible that workers with relatively lower firing costs will be predominantly employed through THS. This implication consistent with the

observation that the bulk of occupations contracted through THS entail relatively low expected firing costs but also demand predominantly general skills (e.g., clerical, assembly, and laborer positions).

To explore these relationships empirically, the analysis exploits variation in the timing of state court decisions recognizing the three employment at-will exceptions to ascertain whether THS employment grew disproportionately in states and times after these exceptions were adopted. Consistent with the legal analysis, the data reveal a sizable and robust relationship between adoption of the implied contract exception and growth of THS employment. I estimate that in the one- to five-year period after a state's adoption of the implied contract exception, THS employment grew on average by 20 percent relative to trend with no evidence of mean reversion in subsequent years. By contrast, the public policy and implied covenant exceptions are not found to have an impact on THS employment. The findings are robust to numerous specification checks and the inclusion of a broad set of covariates. In total, the estimates indicate that due to court restrictions limiting unjust dismissal, approximately 291,000 to 399,000 additional workers were employed in THS on an average daily basis as of 1998. The essay further considers factors that may cause the empirical analysis to underestimate the total impact of the changing legal doctrine on THS growth.

Yet, while changes to the at-will doctrine appear to have significantly impacted the THS industry, the conclusion emphasizes that the present research does not constitute a welfare evaluation of the changing legal doctrine. Because THS is only one margin of labor market response, it remains plausible that the compensatory benefits to workers of amending the doctrine—increased employment security and greater freedom from retaliatory discharge—outweigh this potential source of harm. Bearing these qualifications in mind, the essay provides insight into an institutional force contributing to the rapidly evolving U.S. employment relationship and offers the first empirical evidence supporting an explanation for the growth of THS employment: the erosion of employment at will.