DOCUMENT RESUME

ED 392 856 UD 030 817

AUTHOR Holzer, Henry J.
TITLE Employer Skill Needs and Labor Market Outcomes across Groups.
SPONS AGENCY Rockefeller Foundation, New York, N.Y.; Russell Sage Foundation, New York, N.Y.
PUB DATE Nov 95
NOTE 44p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Blacks; Educational Attainment; *Employees; *Employers; Employment Patterns; *Employment Qualifications; Job Applicants; *Job Skills; *Labor Market; *Racial Differences; Racial Discrimination; Salary Wage Differentials; Sex Differences; Surveys; Whites

ABSTRACT

Data from a survey of 800 employers were used to investigate the effects of employer skill needs on the wage levels and employment of newly hired workers, and especially on how these outcomes differ by race, gender, and educational group. Results showed that very few new jobs were available to workers who lacked credentials such as diplomas or experience, or the job skills needed for daily task performance. This was true even of jobs that did not require college degrees. The hiring and task performance requirements of new jobs were associated with lower employment of blacks relative to whites within each gender. They also had significant effects on starting hourly wages, even after controlling for educational attainment of the worker. The effects of employer skill needs on employment patterns help to account for some of the observed differences in hourly wages across racial and educational groups, especially among men. Recent trends over time seem consistent with these findings, along with evidence that skill needs have been rising among employers. Results also indicate that discriminatory employer preferences across racial groups play some role in determining employment outcomes for these groups, even after controlling for skill needs. (Contains 6 tables and 44 references.) (Author/SLD)

EMPLOYER SKILL NEEDS AND LABOR MARKET OUTCOMES ACROSS GROUPS

Harry J. Holzer
Russell Sage Foundation
Michigan State Univ.
November 1995

I thank Jess Reaser for computational assistance and the Russell Sage and Rockefeller Foundations for financial support. I also thank seminar participants at the Russell Sage Foundation, Columbia and the Graduate Center of the City University of New York for helpful comments.

ABSTRACT

In this paper I use data from a new survey of employers to investigate the effects of employer skill needs on the wage levels and employment of newly hired workers, and especially on how these outcomes differ by race, gender and educational group. The skill needs are measured by a variety of credentials (or screens) required of applicants at the hiring stage, such as high school diplomas, specific experience, references and prior training; and by daily task performance needs from those who are newly hired, such as reading/writing, arithmetic and use of computers.

The results show that very few new jobs are available to those workers who lack most of these credentials or who cannot perform most of these tasks. This is true even of jobs that do not require applicants to have college degrees.

The hiring and task performance requirements on new jobs are associated with lower employment of blacks relative to whites within each gender. They also have significant effects on starting hourly wages, even after controlling for the educational attainment of the worker hired.

The effects of employer skill needs on employment patterns and wages help to account for some of the observed differences in hourly wages across racial and educational groups, especially among men. Recent trends over time in relative wages and employment across these groups also seem to be quite consistent with these findings, along with evidence that these skill needs have been rising among employers.

In addition, we find that a variety of other characteristics of employers, such as their size, location, and the racial composition of their clientele, also have signicant effects on their tendencies to hire blacks. These findings suggest that discriminatory employer preferences across racial groups play some role in determining employment outcomes of these groups, even after controlling for skill needs.

I. INTRODUCTION

In recent years, inequality in labor market outcomes across various demographic groups has grown quite substantially (e.g., Katz and Murphy, 1992; Levy and Murnane, 1992).[1] In particular, differences in earnings and employment rates across both racial and educational groups have risen, while those across genders have declined somewhat (Bound and Freeman, 1992; Blau and Kahn, 1994).

The growing labor market differences across education and racial groups have often been interpreted as reflecting rising returns to particular skills, associated with shifts in relative labor demand between more and less-skilled groups of labor.[2] Recent work by Murnane et. al. (1995) suggests rising market returns to basic cognitive skills, as measured by math test scores, during the 1980's. Indeed, they find that the entire increase in the rate of return to education among females can be attributed to the increasing market value of these cognitive skills during that time.[3]

---

[1]Inequality *within* each of these groups has grown as well.

[2]See, for example, Juhn et. al. (1993). On the other hand, Card and Lemieux (1994) question whether the recent deterioration in relative returns for blacks can be fully accounted for by shifting demand for skills. Katz and Murphy (op. cit.), among others, also find that shifts in relative supplies of labor across skill categories have also contributed to recent changes in relative wages.

[3]They use test scores available for individuals in the National Longitudinal Survey of the High School Class of 1972 and in the High School and Beyond Survey (for the Class of 1980). Blackburn and Neumark (1993), using Armed Forces Qualifying Test

Other researchers (e.g., O'Neill, 1990; Ferguson, 1993; Neal and Johnson, 1994) have recently found that, in cross-sectional work, differences in measured test scores can account for major portions of the black-white wage differential that remains after controlling for education.[4] Effects of test scores on racial differences in employment rates, though smaller, have been found as well (e.g., Rivera-Batiz, 1992; Neal and Johnson, op. cit.).

But these results raise a number of important questions. Why do these measured test scores help to account for observed levels or increases in inequality? Are there important and growing returns to cognitive skills *per se*, or are these just correlated with other job-related skills that are more directly valued by employers? If the latter is true, what exactly are these skills that employers now seek? What personal credentials do employers require as predictors of these skills (and other job-related attributes of applicants,) and how do these affect the labor

---

(AFQT) scores in data on the NLS Youth Cohort, find little evidence that rising returns to education can be attributed to biases caused by omitted ability measures, though they use just one cohort of individuals and a one-time measure of test scores in their analysis.

[4]These studies all use the AFQT scores in the NLSY, as do Herrnstein and Murray (1994) in their provocative work. These scores were measured in 1980, for a panel of individuals who were aged 15 through 23 at that time. These data therefore do not capture the relative improvement in test scores of blacks that have been observed elsewhere during the 1980's (e.g., Grissmer et. al., 1994), and any relative deterioration in labor market performance that has been observed for subsequent cohorts of younger blacks.

market options available to minorities and/or less-educated workers?[5]

From the viewpoint of public policy, it is clearly important to identify the specific skills that employers perceive to be lacking among various disadvantaged groups, so that education and training policies can be appropriately focused on these skills. Unfortunately, there has been little direct evidence to date on these issues, at least partly because of the paucity of available data that deals directly with the *demand* side of the labor market.[6]

In this paper, we provide new evidence on employer skill needs, and how they affect the labor market outcomes of blacks, females, and/or less-educated workers. The data are drawn from a

---

[5]For instance, Bishop (1989) argues that math scores are correlated with a variety of occupation-specific skills. See Hunt (1995) for a review of the psychometric literature on test scores, their effects on measured task performance, and racial differences in both of these. In a different vein, Moss and Tilly (1995) find that employers express a great deal of concern over the "soft skills" of job applicants, such as their attitudes and ability to interact well with customers and coworkers, that may well be correlated with measured cognitive skills (and are certainly correlated with race in the employer's eyes).

[6]More *qualitative* evidence on employer skill needs can be found in Bailey (1990) or Packer and Wirt (1992). Moss and Tilly op. cit. also provide evidence from open-ended employer interviews on their skill needs and how they affect the hiring of black males. Summary quantitative evidence on specific skills sought by employers has appeared in several recent reports, such as those issued by the U.S. Department of Labor's SCANS Commission (1991), the National Center on the Educational Quality of the Workforce (1995), and the New York City Department of Employment (1995). But little analysis is provided in these reports on the relationships between skill needs and observed employment outcomes among various groups of workers.

survey of over 3000 employers that I recently administered in four large metropolitan areas of the U.S.

The analysis here focuses on the effects of two types of employer skill needs: 1) Requirements or credentials that employers demand of applicants before the hiring decision is made, such as high school diplomas, specific experience, prior training and references; and 2) Tasks that employers require new employees to perform on the job once they are hired, such as daily reading/writing, arithmetic, use of computers, and dealing with customers. This list of tasks, though clearly not exhaustive, seems to capture the types of cognitive and social/interactive skills that have been emphasized in many recent discussions of changes in employer skill needs (see Footnote 6); while the credentials listed are likely to be viewed by employers as "signals" of applicants' abilities on these (and other) dimensions of work performance.[7]

After tabulating these employer skill needs in various educational and occupational categories, we will consider estimates of their effects on two types of labor market outcomes: the probabilities that employers hire blacks and females into starting positions; and the hourly wages paid to these new

---

[7]A wider range of employer screening devices (such as tests and interviews) were covered in the survey, as were a range of employer attitudes towards a variety of personal characteristics of applicants (e.g., criminal records, unstable employment histories, lengthy unemployment, etc.). Data on these other factors appears in Holzer (1996a). Of all employment screens and attitudes, the ones analyzed here generally had the most explanatory power with regards to wage and employment outcomes.

employees. We will then calculate the extent to which these estimates can account for differences in wage and employment outcomes between various demographic groups, and in recent trends over time in these differences.

Before proceeding with the analysis, we first provide some background information on the employer survey that generated these data and on some sampling issues associated with it.

II. The Employer Survey

The survey from which the data in this paper are drawn was administered to 800 employers in each of four metropolitan areas: Atlanta, Boston, Detroit and Los Angeles.[8] The survey was administered between June of 1992 and May of 1994, as the national economy was recovering from the recession of the early 1990's.[9]

The survey was administered over the phone, and averaged roughly 35 minutes in length. Questions focused on overall

---

[8]The survey is part of a broader project known as the Multi-City Study of Urban Inequality, that consists of household surveys and an in-depth, qualitative study of a smaller sample of employers in each of these four metro areas. The project has been financed by the Ford and Russell Sage Foundations.

[9]The survey was administered to firms in Detroit between June 1992 and February 1993; it was administered in the other areas between March 1993 and May 1994. The timing was deliberately chosen in order to coordinate with the surveying of households in each area, as part of the Multi-City study described above. Monthly unemployment rates averaged under 6% in Atlanta and Boston during the survey period; in Detroit and Los Angeles they averaged roughly 8% and under 10% respectively during the relevant periods. Dummy variables for metro area and year of survey are included in all multivariate analyses below to control for these differences in local labor market conditions.

employer and employee characteristics (e.g., establishment size, presence of collective bargaining, recent hiring and turnover behavior, composition of current employees by race and gender, etc.); the numbers and characteristics of all currently vacant jobs; and the characteristics of the most recently filled job in the establishment and of the worker hired into that job.

The sample of firms was drawn from two sources: 1) a listing of firms and their phone numbers provided by Survey Sampling Inc. (SSI); and 2) the employers of respondents in the household surveys that were also administered in each of these four metro areas.[10] The latter were drawn in order to generate a sample of "matched pairs" of individuals and employers. The numbers of firms drawn from each of these sources vary quite substantially across the metro areas, because of differences in the timing of household surveys and other factors.[11] But sample weights were then generated to account for any differences in firm characteristics that might be attributable to these different

---

[10]The SSI listings are drawn primarily from local phone directories that are supplemented by other sources. For another example of employer data drawn from SSI listings see Barron et. al. (1994).

[11]A total of 1006 firms (or approximately 31% of the total) were drawn from the household surveys, with 425 in Detroit, 296 in Atlanta, 160 in Boston and 125 in Los Angeles. The large number of firms generated by households in Detroit is partly due to the use of an additional survey of youths living in these households that was discontinued in the other areas. The smaller numbers in Boston and Los Angeles reflect the relatively late dates at which the household surveys were administered there, thus causing a relatively greater reliance on firms generated by SSI.

sampling strategies, so that we can pool data from these two sources.[12] [13]

Despite the differences between these two sources, both were designed to generate *employee-weighted* samples of firms. For the SSI sample, this was accomplished by ex-ante stratification of the sample based on establishment size, with the distribution of firms chosen to approximate the distribution of employees across size categories in the workforce.[14] For the household-generated sample, the distribution of firms should approximate the distribution of employment in the population by definition (at least when sample-weighted).

Thus, no additional size-weighting of firms is necessary with this sample. When focusing on the characteristics of each firm's most recently filled job, the sample will provide extra weight to firms that do alot of hiring because of their size (but

---

[12]Sample weights are applied to the household-generated firms that adjust for: 1) the underrepresentation of jobs requiring college, since the SSI sample focused on non-college jobs; 2) the oversampling of low-income and minority residents in the household surveys; and 3) the incompleteness of the Boston and Los Angeles samples of households from which employers were drawn. More information on the construction of these weights is available from the author.

[13]Most characteristics of workers and jobs that have been analyzed do not differ significantly across firms generated by the two data sources, as long as we are focusing on the non-college part of the household-generated sample.

[14]The stratification scheme was: 25% in establishments with fewer than 20 employees; 50% in establishments with 20-99 employees; and 25% in those with 100 or more employees. These distributions were drawn from a weighted sample of firms in the Employment Opportunity Pilot Project (EOPP) of 1980 and 1982.

not because of high turnover).[15] The sample of new jobs should thus reasonably approximate the stock of jobs available to employees searching for work over a limited time period.

The overall response rate for the survey was roughly 67% for firms that were successfully screened.[16] This response rate compares quite favorably with other surveys of employers administered over the phone.[17] In addition, because we have some measured characteristics of firms in the SSI sample that did not respond to the survey (i.e., establishment size, industry and location), we could check for differences in response rates across these *observable* categories that might generate sample selection bias. Few significant differences were found in response rates across the categories measured by these variables.[18]

---

[15]The lack of extra weighting for high-turnover firms seems appropriate, since a single job that turns over frequently is only available to a single worker at any time. Unfortunately, there was no easy way to put extra weight on firms whose rate of hiring is temporarily high due to their net employment growth.

[16]Successfully screened firms were those where we contacted the correct firm and the person responsible for new hiring into the relevant types of positions, and where we determined that the firm had hired someone in the past 3 years into one of those positions.

[17]See Kling (1995).

[18]For more details see the Appendix to Chapter 1 in Holzer (1996a). Only response rates among firms in construction and in the smallest size category were significantly lower than others, while those in the public sector and the largest establishments were significantly higher. But response rates were within .10 of the mean (.67) in all of these categories.

Comparisons of the industries and sizes of firms in our sample were also made with firms in the most recently available published data from the County Business Patterns of these metro areas, and the two samples appeared to be quite comparable.[19] Finally, we compared the distributions of occupations among our most recently filled jobs with those in the 1990 Census of Population for these areas, and with the distributions of occupations and worker characteristics among all employees in our firms, to see whether or not the sample of "marginal" employees (i.e., new hires) here differs greatly from the "average". Once again, we found little evidence that this was the case.[20]

III. EMPIRICAL RESULTS

A. Summary Data

We begin by considering some summary data on the skill needs of employers in our sample. As noted above, skill needs are measured through two sets of variables: 1) Credentials that individuals generally need to have before they are hired; and 2)

[19]The published data show that jobs in retail trade, the services, and manufacturing account for .17-.21, .31-.40. and .13-.24 of total employment in these areas. The distribution of employment across industries in our survey are very comparable to these.

[20]For instance, the new hires contain fewer white males (.26 v. .32), more blacks (.20 v. .17), and more blue-collar workers (.35 v. .26) than do all current employees.

Tasks that individuals are expected to perform once they are hired on a daily basis.[21]

In part A of Table 1 we present frequencies for each of these two sets of requirements in newly filled jobs. These data are presented for all jobs and for subsamples based on whether college degrees were required or on occupational groupings. All frequencies are sample-weighted.

The results show that most credential requirements and task performance needs are widespread on newly filled jobs. High school diplomas and references are each required of applicants in over three-fourths of new jobs; specific experience is required in almost two-thirds, while previous training is required in over 40%. Among the tasks listed, each is required in over two-thirds of all jobs except for computer use, which is required in well over half.[22]

---

[21]For each of the hiring requirements, firms were asked whether it was "absolutely necessary","strongly preferred", "mildly preferred", or "doesn't matter." We count each factor as a requirement here if the respondent gave either of the first two responses. For each of the tasks, respondents could list required performance as "daily", "weekly", "monthly", or "not at all." Since the vast majority of respondents listed either the first or the last of these categories, we transform these into dichotomous variables for daily use. Dealing with customers in person and over the phone were listed separately in the survey, as were reading and writing paragraphs; these two sets of factors are each combined here, with each task counted as a daily requirement if either underlying task is performed daily. The category of "vocational training" under hiring requirements is based on a single survey question dealing with vocational education in school/military or "other previous job training or skill certification."

[22]Krueger (1993) reported that 39% of CPS respondents reported using computers at their jobs in 1989. The higher fraction of computer users here might represent the later date of

As expected, hiring and task performance requirements are higher in jobs that require college; but even in those that do not, skill requirements are still substantial and do not differ greatly from those described above[23].

A similar story can be told across occupations, where we find that requirements are higher in the white-collar jobs and lower in the blue-collar ones (i.e., craft, operative and laborer occupations), though still substantial among the latter. Requirements are generally highest for professional/managerial jobs, though customer contact and computer use are highest for clerical/sales jobs. Service jobs are generally more likely than blue-collar ones to require high school diplomas and references of applicants, and are more likely to involve customer contact and reading/writing; but the craft/operatives jobs require more specific experience (62%), vocational training (43%), and arithmetic (62%) than do the service jobs.

In part B of Table 1, we present distributions on the *number* of these hiring credentials and daily tasks that are required in each job category. The results show that *very few new jobs are available that require none of these hiring credentials (about 5%) or none of these tasks (about 6%);* and less than 20% of new jobs require no more than one credential or task. In fact, the median number of these required credentials per new job is 3, as

---

the survey or the focus on newly filled jobs.

[23]Roughly three-fourths of the jobs in the sample do not require college degrees.

is the median number of these tasks performed on a daily basis. Once again, we find that hiring and task performance requirements are quite high even among jobs that do not require college degrees or in blue-collar occupations.

Of course, the extent to which these skill needs on the *demand* side of the labor market result in low employment rates for various groups of workers (as some of the recent literature on "skills mismatch" suggests) depends on the availability of these skills among jobseekers (actual or potential) on the *supply* side of the market.[24] Based on a variety of summary data, it seems quite likely that certain groups of less-skilled individuals (such as long-term AFDC recipients), whose residences and work/job search activities are heavily concentrated in central-city areas, will have difficulty gaining employment into these new jobs, at least in the short-run and at current wage levels.[25]

---

[24]Skills mismatch has been emphasized as a barrier to employment among less-educated, inner-city minorities by Kasarda (1995) and Wilson (1987), among others. In the absence of nominal wage rigidities, imbalances between the supply of and demand for skills should generate low equilibrium wages and employment rates but not *un*employment. In the presence of such rigidities all of these outcomes are possible.

[25]To take one example, longer-term welfare recipients alone constitute 10-15% of the household heads in the central-cities of these four metropolitan areas (Wacquant and Wilson, 1989), and may soon be required to enter the labor force in substantial numbers. Roughly half of these are high school dropouts (Bane and Ellwood, 1994), few can officially report any recent work experience, and most score in the bottom quartile on written tests such as the AFQT (Burtless, 1994). When they work or search for work, they are most likely to do so in areas close to home (Holzer, 1995); and yet skill requirements among central-city employers are generally higher than among suburban employers,

Another question that can be raised about these results is the extent to which even the least-educated workers in the labor force would have difficulty performing the tasks listed here. For example, the use of computers might range from extremely simple tasks (such as running products over a scanner in a supermarket) to those requiring complicated programming skills, and our survey provides no additional information on task complexity. The extent to which these tasks, on average, measure meaningful workplace skills that might be in relatively short supply must therefore be inferred from their estimated effects on labor market outcomes, such as who gets hired into various jobs and what these employees are paid.

Table 2 presents summary evidence on the race and gender of newly hired workers, in all jobs and in subsets based on educational and skill requirements. To simplify the analysis, we focus only on white and black males and females here.[26]

The results of Table 2 show a strong correlation between numbers of hiring requirements or tasks and the gender of the last worker hired. As the number of tasks required rises, the fraction of white females employed rises dramatically, while the fraction of white males generally declines. Among blacks, the

---

while the ratios of available vacant jobs to unemployed workers are substantially lower in the former than the latter. For more evidence and discussion on these issues, see Holzer (1996a).

[26]For similar evidence on a sample that also includes Hispanics and Asians, see Holzer (1996).

hiring of females *relative to males* also rises with the numbers of tasks performed and credentials required.

This gender effect of task and hiring requirements arises at least partly because of the relatively greater concentration of females than males in clerical and sales jobs; and some of this no doubt occurs because of occupational choices of employees by gender as well as employer preferences.[27] Even the component of the gender effect attributable to employer preferences may not be directly causal - e.g., employers may prefer females in certain types of clerical jobs for reasons other than the fact that these tasks are performed more frequently there.

Within each gender group, we also find that *fewer blacks than whites are hired into jobs that require college or higher numbers of credentials and tasks*. Indeed, blacks are more than twice as likely to be hired into jobs that do not require college as into those that do; and the hiring of blacks falls monotically with rising hiring requirements and tasks.[28] In fact, black males are more than four times as likely to be hired into jobs requiring no tasks as into those requiring all; and they are almost four times as likely to be hired into jobs requiring no credentials as into those requiring all. The negative association

---

[27]In regressions in which the number of tasks is the dependent variable, a set of 1-digit occupation dummies reduces the magnitude of the coefficient on a female dummy variable by more than half.

[28]The one exception to this general observation can be found for black females, who are more likely to be hired into jobs requiring one tasks than those requiring none. But for blacks overall, the monotonicity of this relationship still holds.

between numbers of tasks or credentials and the hiring of black females also becomes much clearer when compared with the hiring of white females across the various skill frequencies.

B. Employment Equations

The summary data of Table 2 suggest that employer skill needs affect the race and gender of workers whom they hire. But these results do not control for a variety of other employer, job, and worker characteristics.

In Table 3 we therefore present coefficients from estimated multinomial logit equations in which the dependent variable measures the race and gender of the newly hired worker (white males are the omitted group). In addition to the variables measuring tasks and credentials, the independent variables include dummies for location of the establishment (i.e., both by metro area and within these areas), establishment size, industry, and the year in which the individual was hired.[29] To control for other factors affecting the relative demand for black or female labor, we include a dummy for whether the firm reports the use of Affirmative Action in recruiting or hiring; and the reported

[29]Within-metro area location is measured by two dummies: one for whether the establishment is located in the "primary" central-city - i.e., the city of Atlanta, Boston, etc.; and another for whether it is located in another central-city or a municipality whose population is at least 30% black. Establishment size dummies are for the following categories: 1-20, 21-50, 51-100, and 101-500 (omitted category is >500).

fraction of the establishment's customers who are black.[30] The percent of workers at the establishment covered by collective bargaining is also included, as are 1-digit occupation dummies in some cases. Finally, we include among the regressors the age and education level of the last worker hired, to control for some observable human capital differences in the applicants.[31]

Three specifications of these equations are presented: one in which hiring requirements are measured by the number of credentials and tasks that are required; one in which dummies for individual requirements and tasks are included but without occupation dummies; and one in which individual requirement and occupational dummies are both included.[32]

The results of Table 3 show that hiring requirements and task performance needs have significant effects on the race and gender of workers who are hired. Numbers of requirements and

---

[30]Missing value dummies are also included on some variables, such as percentage of customers who are black, and missing values are replaced with zeroes in these cases.

[31]Both variables are measured through dummies: for age, categories are 16-24 and 25-34; for education, they are high school dropout, high school graduate, some college, or college graduate (omitted category is graduate degree). In addition to the control variables for actual level of educational attainment by the new hire, we include the variable for whether a high school diploma is required on the job but not for whether a college diploma is required, since the latter variable is much more highly correlated with actual attainment of the employee than is the former.

[32]Likelihood ratio tests consistently rejected the use of numbers of tasks/credentials in place of the individual measures (as did F-tests for the wage equations presented below). But we present one such specification nonetheless to provide a summary measure of their effects in each case.

tasks both significantly reduce the hiring of black males relative to white males. The number of required tasks has significant positive effects on the hiring of both white and black females relative to white males, though the number of credentials have negative effects for each; and both measures are more positive for white than for black females.[33]

When the skill requirements are measured as separate variables, we find the task and hiring requirement variables are jointly significant.[34] Regarding the individual effects, we find that *virtually each required credential or task has a negative coefficient for black males,* with those for reading/writing, arithmetic, specific experience and vocational training being at least marginally significant (i.e., at the .10 level in a one-tailed test). For females, dealing with customers or computers on a daily basis each raises the probability of being hired, though requirements of vocational experience or reading/writing have negative effects (with the latter being more significant for black females).[35] Controlling for occupation at the 1-digit level reduces but does not eliminate these effects in most cases.

---

[33]Only the difference between coefficients for white and black females on tasks is significant.

[34]Likelihood ratio tests for the two groups of measures (i.e., for tasks and for credentials) consistently show that both are significant, except that the credentials drop below conventional significance levels once occupation dummies are included.

[35]The negative effects of reading/writing for females are not significant unless computer use is also controlled.

When we transform the multinomial logit coefficients into partial derivatives (calculated at the samples means of the dependent variables for each group), we find that each task reduces the hiring of black males by 1-8 percentage points, and each required credential does so by 1-3 points.[36] Customer contact and computer use each raises the probability of hiring white females by 9-20 percentage points, while both effects for black females are much smaller (i.e., 3-5 points).

It is important to note here that the relatively negative effects of tasks and requirements on the hiring of blacks imply that employers *perceive* skill deficiencies on their part, *whether or not these deficiencies are real*. The hiring behavior associated with these perceptions might therefore reflect discrimination, in either a pure or a statistical sense. The racial gap in test scores noted above suggests that, at least to some extent, the perceived gap in skills is real; but questions remain about the extent to which these test scores really predict

[36]Without occupational dummies, each partial effect of tasks for black males is -.07 except for reading/writing (which is -.02). Partial derivatives occasionally show results quite different than those implied by the multinomial logit coefficients, since effects are measured relative to coefficients for other groups. The formula for converting coefficients into partial derivatives is $P_j(B_j - P_k * B_k)$ where j denotes a particular group, k denotes the other groups, B denotes the coefficients and P denotes the relevant probabilities of the dependent variable.

actual job performance, and whether or not employers accurately perceive the magnitudes of any such gaps.[37]

To the extent that discrimination may affect some of these results, some of the other variables included in these equations are intended to control for the racial preferences of employers, and a number of them have significant effects on hiring outcomes. Thus, the hiring of blacks is relatively greater at establishments located in central-cities, at larger establishments, at those with many black customers, and (at least marginally for black males) where firms report the use of Affirmative Action in recruiting or hiring.[38] Furthermore, the magnitudes of these effects are sometimes quite substantial.[39]

---

[37]The statistical discrimination model in its simplest form implies that employers accurately perceive racial gaps in skills between the means of each group, but that discrimination occurs when the means are thought to apply to all members of each group. If employers exaggerate the magnitude of the racial skill gaps at the means, we are likely to have some combination of pure and statistical discrimination (Cain, 1986). The negative effects of the credential requirements, which are observable *ex-ante*, on the hiring of blacks more strongly suggest actual deficiencies in their credentials; but, like test scores, the extent to which these measures predict skill or actual job performance remains an open question (see Footnote 5). For more discussion of all of these issues see Holzer (1996).

[38]The Affirmative Action effect can also be seen for white females. For more evidence on this question see Holzer op. cit.

[39]For instance, a .10 rise in black customers increases the probability of hiring black males by .03 and black females by .04-.05. Location in the primary central-city (relative to suburbs) or being in the largest category of establishments (relative to the smallest) each raises employment probabilities by roughly .10 for black males and also for black females. Affirmative Action raises black male employment by about .02 and white female employment by .03-.05.

The exact interpretation of these findings is not clear. For instance, do they reflect choices made on the demand or supply sides of the labor market? Firms located in the central-cities, those at larger establishments, etc. draw relatively more black applicants than do others, though controlling for the racial composition of the applicants to each firm (based on an additional question in the survey) does not eliminate the effects of these variables.[40]

On the demand side, Becker (1971) first suggested that the racial preferences of customers could affect employer hiring; the use of Affirmative Action likely reflects employer behavior, driven by constraints imposed by government (in the case of federal contractors) or their own choices; and employer size and location are likely to affect their hiring decisions as well out of any given pool of applicants.[41]

---

[40]See Holzer (1996a). But these equations do not deal with the self-selection of applicants into firms, perhaps on the basis of perceived employer racial preferences or skill needs.

[41]Nardinelli and Simon (1990) and Ihlanfeldt and Young (1994) have provided some evidence in favor of customer-based discrimination, though their samples are each somewhat unique (the former looks at the market for baseball cards, the latter at fast-food restaurants in Atlanta). Leonard (1990) has documented the effects of Affirmative Action on hiring in a large body of work; he focuses exclusively on whether or not firms are contractors with the federal government, though the self-reported measure used here is not based strictly on contractor status. It seems likely that large firms and those in the central-city might hire more blacks because they face relatively greater legal pressure (since size determines the need to file EEO-1 forms with the federal government, and distance to minority populations often is used in legal cases to measure the racial composition of potential applicants). Large firms also are much more likely to use the kinds of formal recruiting and screening procedures that are beneficial to the hiring of blacks (Brown et. al., 1990;

Thus, it seems likely that employer preferences and behavior have important effects on who gets hired into which jobs, even after controlling for the skill needs on those jobs.

C. Wage Equations

If employer skill needs (and other factors) affect the extent to which they hire blacks or females, this will no doubt affect the wages received by those who are hired. What are the magnitudes of these effects?

Table 4 presents coefficients from log wage equations in which the independent variables are the same as those from Table 3, except that dummies have been added for race/gender. The dependent variable is based on the starting hourly wages of new employees, and therefore no effects of tenure are measured here.[42] The samples have been pooled across race/gender groups, but the Appendix presents estimates separately for each group.[43]

The results show that tasks and hiring requirements both have significant effects on starting wages, even after controlling for the age and educational attainment of the worker. Among the hiring requirements, jobs requiring specific experience

---

Holzer, 1987).

[42]*Anticipated* tenure could still affect starting wages, especially for females relative to males. See, for instance, Gronau (1988).

[43]An F-test for the first of the three specifications presented rejects pooling at the .10 level but not the .05 level. For the other two specifications, pooling is not rejected at either level.

pay 9-10 percent more than those which do not, as do jobs requiring previous vocational training. [44] Among the daily tasks, reading/writing and computer use have the largest positive effects on wages. The effect of computer use is somewhat smaller than that estimated by Krueger (op. cit.), partly because of our controls for other skills and requirements.[45]

The results in the Appendix also show some interesting variation in these returns across race/gender groups. For instance, returns to computer use are consistently positive and significant only for white females; while white males earn the highest returns to specific experience, vocational training and reading/writing.[46]

D. Accounting for Group Differences and Trends in Outcomes

How do these estimated returns affect observed differences in earnings across race, gender and educational groups? In Table 5 we present estimates of between-group differences in wages that control for employer skill needs and compare them to estimates without these controls. We compare wage differences across a

---

[44]Each set of requirements is jointly significant at the 1% level in the pooled equations.

[45]When we estimate these equations without the other skill need variables, the return to computer use rises to .11 in Column 2. Other possible causes of the lower return here include the focus on starting wages, so that the possible effects of these skills on wage growth of workers over time are not captured here.

[46]Standard errors on these differences across groups can be obtained by calculating the square root of the sum of squared standard errors for any two groups.

variety of educational and race/gender groups for all new hires, and also across race/gender for jobs not requiring college.

We present estimates of the differences in sample means of wages across these groups, and compare these to estimated differences based on a variety of specifications similar to those presented in Table 4. Column 1 estimates are from equations that include controls only for personal and firm characteristics; in the Column 2 equations we have added the numbers of hiring requirements and tasks for the newly filled job; and in Column 3 we replace the numbers of requirements and tasks with separate measures of each. Results are presented both from equations that omit occupation dummies and those that include them. The differences across groups are measured by sample-weighted means of residuals for the relevant groups from pooled equations that omitted dummies for these groups.[47]

The results of Table 5 show that differences in tasks and hiring requirements can account for fairly major portions of starting wage differences in certain cases. Comparing estimates from columns 2 or 3 with those from column 1 (for those equations that omit occupational dummies), we find that tasks and

---

[47]Sample-weighting raises the returns to education and some of the race/gender differences quite substantially, though it has little effect on the percentages of these differences that are explained by tasks and hiring requirements. Similarly, some of the firm characteristics (e.g., industry dummies) reduce the magnitude of differences across educational groups (especially between high-school graduates and dropouts) but not the percentages of these differences explained in these equations. The differences in mean residuals across education groups are based on equations that do include race/gender dummies and vice versa.

requirements on jobs can account for 4-7 percentage points of the wage differences between pairs of educational groups, and 4-5 points between white and black males.

The wage effects of tasks and hiring requirements account for roughly a fifth of the wage differences between college and high school graduates, and substantially more (i.e., over half) of the differences between those with some college and those with only high school. They also account for the vast majority of differences high school graduates and dropouts that still remain after controlling for age and other firm characteristics (but just under a fifth of the overall differences in means).

Across racial groups, the wage effects of tasks and requirements constitute almost 30% of the wage differences between white and black males that remains after controlling for personal and firm characteristics, and roughly a fifth of the overall differences in means. Doing these calculations after controlling for occupation reduces the magnitudes of explained differences by only small amounts in most cases.

These findings are at least partially consistent with those of O'Neill, Neal and Johnson, and others who find large effects of racial differences in cognitive skills (as measured by AFQT scores) on wages. On the other hand, the job skills and hiring requirements that we measure here do not fully account for racial differences in wages, as do the AFQT scores in those papers. Perhaps there are other relevant skills needed to perform these jobs that the test scores measure; or perhaps the AFQT scores are

spuriously correlated with other wage-determining factors and with race.

We also note that very little or none of the wage differences between males and females or between white and black females can be accounted for by these tasks and requirements.[48] Indeed, the addition of tasks and requirements actually raises the estimated diffentials in some cases, which is not surprising given the relatively high concentration of females in jobs that require many of these tasks (such as clerical positions).

It should be stressed once again that the calculations in Table 5 are based on a sample of *starting* wages among new hires, rather than estimates for current wages of the overall labor force. The frequency of task use is likely higher among new hires than among all workers, perhaps leading us to overstate their contributions to changes observed among the latter. On the other hand, the effect of tasks and requirements on starting wages might well *understate* their effects on wages over time (Murnane et. al., 1995).

An alternative question that can be asked is the extent to which increases in employer skill needs have contributed to observed changes in relative outcomes between these groups over time. In Table 6 we present some estimates of relative shifts in labor demand that are simulated under a variety of assumptions,

---

[48]On the other hand, much of the white-black difference among females as well as that among males is accounted for by other firm and personal characteristics.

and compare these to changes in annual earnings that actually occurred over the decade of the 1980's.

To simulate these demand shifts we multiply partial derivatives of relative employment with respect to skill needs (based on coefficients from Table 3) by various estimates of increases in these skill needs over time.[49] Since we do not have very precise estimates of the increases in employer skill needs over time, we make the following four sets of assumptions regarding percentage-point increases in computer use, other tasks, and hiring requirements respectively: 1) .15, .10, and .00; 2) .15, .10, .10; 3) .25, .20, .00; and 4) .25, .20 and .20. The various upper and lower bounds for these changes are derived from some additional questions in my employer survey as well as

[49]The coefficients from relative employment equations can be used to predict relative demand shifts across groups since they measure *relative* changes in employment (across firms and employee groups) that can affect both overall wage and employment levels of each group. For instance, a 10% decrease in employment for black males at firms with growing task needs can affect their overall wages or employment, with the exact outcomes depending on their relative labor supply and demand elasticities. The partials for white males are those implied by estimates for the other 3 groups, since partials across all four groups should sum to zero.

other sources.[50] Predicted changes appear in both absolute (i.e., percentage-point) and percent terms.[51]

The results show that increases in employer skill needs predict relative shifts in labor demand that are qualitatively similar to outcomes actually observed for all groups. In these calculations, white females face sizable positive labor demand shifts while black females face much smaller ones; white males face some negative demand shifts and black males face shifts that are comparable in absolute magnitude to those of white males but much larger in percent terms.

Actual changes in employment and earnings for these four groups show very similar patterns in relative terms and, for most

---

[50]Krueger (op. cit.) found that computer use increased by .13 just from 1985 through 1989; a lower bound of .15 for the decade thus seems reasonable. In my survey, I asked whether or not overall skill needs on the recently filled job had risen in the past 5-10 years; and, if they had, whether the increases were in reading/writing/numeric or social/verbal skills, and whether they were linked to greater use of computers. Cross-tabulating these responses with those for daily task needs generated increases of .23-.25 for those reporting daily task use in each category. Since the increases in reading, writing and numeric skill are listed separately as daily tasks but jointly when referring to increases, we use .10 and .20 as lower and upper bounds respectively for increases in each of these tasks and .25 as the upper bound for computers. With no direct information on changes in the hiring requirements, we use .00 as the lower bound and changes comparable to the non-computer daily tasks as the upper bound.

[51]Percent changes for each group can be approximated by dividing each absolute change by the share of total employment that is currently accounted for by that group (from top row in Table 2).

groups, even in magnitudes.[52] Thus, rising employer skill needs might well account for substantial parts of observed changes in relative employment outcomes across these groups in the 1980's.

It is, of course, quite possible that a different and more complete set of tasks or required skills, including those for physical strength or managerial responsibilities on the job, would have generated a different set of results by race and gender. As noted above, we chose to focus on a set of skills that appear to be of growing importance and are frequently stressed in descriptive or popular discussions of these problems.

Finally, we note again that the direct causal interpretation of the relationship between skill needs and outcomes by both race and gender here are subject to question. The greater observed tendency for females than males to be hired into jobs requiring these skills may simply reflect their own preferences for these jobs, as well as those of employers; and estimated race differences might well reflect discriminatory employer perceptions and preferences as well as real skill deficiencies on the part of blacks. With these data, it is not possible to conclusively distinguish between these interpretations.

---

[52]Changes in log(annual earnings) over the period 1979-89 were -.090, .184, -.169 and .033 respectively for white males, white females, black males and black females (Bound and Holzer, 1995). Only for black males is the percent shift in labor demand implied by Table 6 inconsistent with the magnitude of the actual changes observed, which in this case were much smaller than the implied changes.

IV. CONCLUSION

In this paper I use data from a new survey of employers to investigate the effects of employer skill needs on the wage and employment outcomes of newly hired workers, and especially on how these outcomes vary by race, gender and educational group. The skill needs are measured by a variety of credentials required of applicants at the hiring stage, such as high school diplomas, specific experience, and prior training; and also by task performance that is required on a daily basis of those who are hired, such as reading/writing of paragraph-length material, arithmetic, computer use, and customer contact.

The results show that most new jobs require these credentials before hiring and these tasks after hiring. Indeed, very few new jobs are available to workers who lack these credentials and the ability to perform at least some of these tasks. This is true even for jobs that do not require applicants to have college degrees.

The hiring and task performance requirements are associated with lower employment of blacks relative to whites within each gender group. They also have significant effects on hourly wages, even after controlling for the educational attainment of the worker hired; and they help to account for observed differences in hourly wages across racial and educational groups, especially among men.

The estimated effects of employer skill needs on relative wages and employment among men and across educational groups are

at least broadly consistent with other recent studies that find that differences in cognitive ability (as measured by test scores) account for major parts of the black-white wage differences at a point in time, though the magnitudes of our measured effects are smaller. On the other hand, the magnitudes of implied shifts in labor demand that might be attributable to increases in employer skill needs look substantial, and quite comparable to changes in relative earnings across race/gender groups in recent years.

We also continue to find that employer hiring across racial groups is strongly related to factors such as their location, establishment size, use of Affirmative Action and the racial composition of their customers, even after controlling for education and skill needs. These findings at least suggest that discriminatory employer preferences continue to play important roles in determining whether and where blacks become employed.

REFERENCES

Bailey, Thomas. "Changes in the Nature and Structure of Work: Implications for Skill Requirements and Skill Formation." National Center for Research on Vocational Education, University of California at Berkeley, 1990.

Bane, Mary Jo and David Ellwood. Welfare Realities. Harvard University Press, 1994.

Barron, John; Mark Berger and Dan Black. "Employer Search, Training, and Vacancy Duration." Mimeograph, University of Kentucky, 1994.

Becker, Gary. The Economics of Discrimination. University of Chicago Press, 1971.

Berman, Eli; John Bound and Zvi Griliches. "Changes in the Demand for Skilled Labor Within U.S. Manufacturing: Evidence from the Annual Survey of Manufacturers." Quarterly Journal of Economics, May 1994.

Bishop, John. Paper in Investing in People: Background Papers, Volume 1. Secretary's Commission on Workforce Quality and Labor Market Efficiency, U.S. Department of Labor, 1989.

Blackburn, McKinley and David Neumark. "Omitted Ability Bias and the Increase in Returns to Schooling." Journal of Labor Economics, July 1993.

Blau, Francine and Lawrence Kahn. "Rising Wage Inequality and the U.S. Gender Gap." American Economic Review, May 1994.

Bound, John and Richard Freeman. "What Went Wrong? The Erosion of Relative Earnings and Employment for Blacks." Quarterly Journal of Economics, February 1992.

_____ and Harry Holzer. "Structural Changes, Employment Outcomes and Population Adjustments for Whites and Blacks, 1980-90." Institute for Research on Poverty Discussion Paper, 1995.

Brown, Charles; James Hamilton and James Medoff. Employers Large and Small. Harvard University Press, 1990.

Burtless, Gary. "The Employment Prospects of Welfare Recipients." In Nightingale and Haveman eds. The Work Alternative, Urban Institute Press, 1994.

Cain, Glen. "The Economic Analysis of Labor Market Discrimination: A Survey." In O. Ashenfelter and R. Layard eds. Handbook of Labor Economics, North-Holland, 1986.

Card, David and Thomas Lemieux. "Changing Wage Structure and Black-White Wage Differentials." American Economic Review, May 1994.

Ferguson, Ronald. "New Evidence on the Growing Value of Skill and Consequences for Racial Disparity and Returns to Schooling." Manuscript, Harvard University, 1993.

Grissmer, David; Sheila Kirby, Mark Berends and Stephanie Williamson. "Student Achievement and the Changing American Family." Rand Corporation, 1994.

Gronau, Reuben. "Sex-Related Wage Differences and Women's Interrupted Labor Careers - The Chicken or the Egg." Journal of Labor Economics, 1988.

Hamermesh, Daniel and Albert Rees. The Economics of Work and Pay. Harper Collins, 1993.

Herrnstein, Richard and Charles Murray. The Bell Curve. Basic Books, 1994.

Holzer, Harry J. "Employer Hiring Decisions and Antidiscrimination Policy." In R. Freeman and P. Gottschalk eds. Demand-Side Strategies for Low-Wage Labor Markets. Russell Sage Foundation, forthcoming in 1996.

_____. "The Detroit Labor Market: A View from the Household Side." Mimeo, Michigan State University, 1995.

_____. "Informal Job Search and Black Youth Unemployment." American Economic Review, June 1987.

_____. What Employers Want: Job Prospects for Less-Educated Workers. Russell Sage Foundation, forthcoming in 1996a.

Hunt, Earl. Will We Be Smart Enough? A Cognitive Analysis of the Coming Workforce. Russell Sage Foundation, 1995.

Ihlanfeldt, Keith and Madelyn Young. "The Spatial Distribution of Black Employment between the Central-City and the Suburbs." Economic Inquiry, 1994.

Juhn, Chinhui; Kevin Murphy and Brook Pierce. "Wage Inequality and the Rise in the Returns to Skill." Journal of Political Economy, June 1993.

Kasarda, John. "Industrial Restructuring and the Changing Location of Jobs." In R. Farley ed. State of the Union, Volume 1. Russell Sage Foundation, 1995.

Katz, Lawrence and Kevin Murphy. "Changes in Relative Wages, 1963-87: The Role of Supply and Demand Factors." Quarterly Journal of Economics, February 1992.

Kling, Jeffrey. "High Performance Work Systems and Firm Performance." Monthly Labor Review, May 1995.

Krueger, Alan. "How Computers Have Changed the Wage Structure: Evidence from Microdata, 1984-89." Quarterly Journal of Economics, February 1993.

Leonard, Jonathan. "The Impact of Affirmative Action Regulation and Equal Opportunity Law on Black Employment." Journal of Economic Perspectives, Fall 1990.

Levy, Frank and Richard Murnane. "U.S. Earnings Levels and Earnings Inequality: A Review of Recent Trends and Proposed Explanations." Journal of Economic Literature, December 1992.

Moss, Philip and Chris Tilly. "Soft Skills and Race." Russell Sage Foundation Working Paper, 1995.

Murnane, Richard; John Willett and Frank Levy. "The Growing Importance of Cognitive Skills in Wage Determination." National Bureau of Economic Research Working Paper, March 1995.

Nardinelli, Clark and Curtis Simon. "Customer Racial Discrimination in the Market for Memorabilia: The Case of Baseball." Quarterly Journal of Economics, 1990.

National Center on the Educational Quality of the Workforce. "First Findings from the EQW National Employer Survey." University of Pennsylvania, 1995.

Neal, Derek and William Johnson. "The Role of Pre-Market Factors in Black-White Wage Differences." Mimeo, University of Chicago, 1994.

New York City Department of Employment. "What Employers Require for Employment." June 1995.

O'Neill, June. "The Role of Human Capital in Earnings Differences Between White and Black Men." Journal of Economic Perspectives, Fall 1990.

Packer, Arnold and John Wirt. "Changing Skills of the U.S. Workforce: Trends in Supply and Demand." In G. Peterson and W. Vroman eds. Urban Labor Markets and Job Opportunities. Urban Institute Press, 1992.

Rivera-Batiz, Francisco. "Quantitative Literacy and the Likelihood of Employment Among Young Adults in the U.S." Journal of Human Resources, Spring 1992.

U.S. Department of Labor, Secretary's Commission on Achieving Necessary Skills. What Work Requires of Schools. 1991.

Wacquant, Loic and William J. Wilson. "Poverty, Joblessness and the Social Transformation of the Inner City." In P. Cottingham and D. Ellwood eds. Welfare Policy for the 1990's. Harvard University Press, 1989.

Wilson, William J. The Truly Disadvantaged. University of Chicago Press, 1987.

Table 1

Skill Requirements of New Jobs

A. Requirement Frequencies	All Jobs	College Required: Yes	College Required: No	Occupation: Prof./Mg.	Cl./Sale	Service	Cr./Op.	Lab.
Hiring Requirements:								
High School Diploma	.783	1.000	.712	.946	.840	.617	.548	.512
Specific Experience	.642	.741	.610	.739	.637	.556	.619	.348
Vocational Training	.425	.556	.383	.576	.367	.347	.431	.257
References	.759	.865	.724	.879	.735	.754	.659	.647
Daily Task Performance:								
Deal With Customers	.729	.819	.700	.800	.837	.775	.408	.307
Read/Write Paragraphs	.683	.906	.610	.878	.670	.577	.543	.339
Arithmetic	.677	.769	.647	.761	.702	.517	.620	.529
Computers	.564	.740	.507	.663	.753	.225	.231	.165
B. Number of Above Requirements Per Job								
Hiring Requirements:								
0	.053	.000	069	.008	.037	.090	.108	.171
1	.140	.041	.169	.040	.144	.221	.188	.288
2	.244	165	268	.184	.273	265-	.262	.243
3	.284	.372	257	.335	.303	.195	.232	.180
4	.280	422	237	.433	.244	.230	.209	.117
Daily Tasks:								
0	.063	000	083	.009	.022	.108	.167	.295
1	.121	023	.151	.046	.082	.175	.268	.268
2	.201	106	229	.154	.168	.339	.250	.277
3	.343	474	304	416	.367	.287	.257	.107
4	.272	347	234	.375	.360	.091	.058	.054

Table 2

Race/Gender of New Hires By Skill Requirements

	White Males	Black Males	White Females	Black Females
All Jobs	.353	.102	.447	.097
College Required:				
Yes	.419	.055	.481	.044
No	.333	.117	.437	.114
No. of Requirements:				
0	.311	.264	.283	.142
1	.332	.174	.373	.120
2	.326	.105	.468	.100
3	.357	.076	.479	.089
4	.375	.071	.465	.088
No. of Tasks:				
0	.492	.237	.178	.093
1	.440	.173	.259	.128
2	.375	.130	.394	.102
3	.334	.085	.486	.096
4	.302	.055	.560	.083

Table 3

Determinants of Race/Gender of Last Hire: Multinomial Logit Estimates

	White Females			Black Males			Black Females		
	1	2	3	1	2	3	1	2	3
No of Tasks	.437	-	-	-.270	-	-	.207	-	-
	(.053)			(.074)			(.076)		
No. of Requirements	-.078	-	-	-.212	-	-	-.143	-	-
	(.052)			(.073)			(.075)		
Tasks:									
Customers	-	.984	.774	-	-.009	-.046	-	.901	.711
		(.147)	(.161)		(.200)	(.215)		(.226)	(.234)
Reading/Writing	-	-.227	-.255	-	-.317	-.253	-	-.358	-.399
		(.130)	(.141)		(.179)	(.186)		(.183)	(.189)
Arithmetic	-	-.057	.023	-	-.714	-.750	-	-.473	-.394
		(.130)	(.139)		(.176)	(.182)		(.179)	(.186)
Computers	-	1.033	.534	-	.011	.085	-	.843	.523
		(.127)	(.142)		(.186)	(.203)		(.185)	(.201)
Requirements:									
HS Diploma	-	.321	.055	-	-.072	-.037	-	.139	.019
		(.156)	(.168)		(.203)	(.208)		(.217)	(.225)
Specific Experience	-	- 048	-.021	-	-.237	-.218	-	-.219	-.206
		(.134)	(.142)		(.188)	(.194)		(.189)	(.195)
Vocational Training	-	-.307	-.213	-	-.309	-.314	-	-.289	-.206
		(.127)	(.135)		(.189)	(.195)		(.187)	(.192)
References	-	-.083	-.094	-	-.190	-.205	-	-.080	-.080
		(.139)	(149)		(.190)	(195)		(.195)	(.201)
Central-City Location	117	069	- 030	1 244	1.207	1.142	1.084	1.061	.982
	(147)	(150)	(158)	(199)	(.200)	(.204)	(.198)	(.201)	(.205)
Percent of Customers Who Are Black	- 001	- 004	- 003	035	034	034	.042	040	.041
	(004)	(004)	(.004)	(005)	(.005)	(.005)	(.004)	(.004)	(.005)
Establishment Size:									
1-20	- 169	- 151	- 107	-1 196	-1.153	-1.247	-1.179	-1.132	-1.074
	(.228)	(.234)	(243)	(302)	(.306)	(.314)	(.298)	(.304)	(.311)
21-50	021	019	- 013	- 731	-.693	-.838	-.578	-.557	-.573
	(.237)	(.243)	(253)	(.309)	(.313)	(.322)	(.305)	(.311)	(.318)
51-100	.041	086	080	- 339	-.286	- 460	-.336	- 283	-.300
	(250)	(257)	(267)	(318)	(.322)	(.329)	(.321)	(.326)	(.335)
101-500	188	239	247	- 171	- 130	-.182	- 091	- 021	-.010
	(.225)	(230)	(246)	(276)	(.279)	(.284)	(.277)	(.281)	(.289)
Affirmative Action	.296	208	160	289	247	.223	.041	- 067	-.105
	(.119)	(123)	(130)	(176)	(.178)	(.182)	(.174)	(.178)	(.182)
Occ Dummies Included	no	no	yes	no	no	yes	no	no	yes
Log L	-2182 5	-2130 8	-1986 9	-2182.5	-2130.8	-1986.9	-2182.5	-2130.8	1986.9
N	2098	2098	2071	2098	2098	2071	2098	2098	2071

NOTE White males are used as the base group Other independent variables include dummies for year hired, age (16-24, 25-34) and education level (high school dropout or graduate, some college, or college grad without graduate degree) of last worker hired, for location in other central-cities in metro area (besides the primary one) or in heavily black residential areas; for metro area, for missing educational attainment or missing percent black among customers, industry dummies, and the percent of workers covered by collective bargaining. The omitted establishment size category is > 500

Table 4

Effects of Hiring Requirements and Tasks on Log (Starting Wage)

	1	2	3
No. of Tasks	.051	-	-
	(.007)		
No. of Requirements	.077	-	-
	(.007)		
Tasks:			
Customers	-	-.003	-.003
		(.019)	(.019)
Reading/Writing	-	.096	.080
		(.016)	(.016)
Arithmetic	-	.022	.017
		(.016)	(.016)
Computers	-	.075	.052
		(.017)	(.017)
Requirements:			
H.S. Diploma	-	.072	.056
		(.020)	(.020)
Specific Experience	-	.097	.085
		(.017)	(.017)
Vocational Training	-	.099	.091
		(.017)	(.016)
References	-	.013	.019
		(.018)	(.018)
Occupation Dummies	no	no	yes
R^2	476	.485	.516
N	1,914	1,914	1,889

NOTE: The specifications of these equations are comparable to those of Table 3, except that the samples are now pooled and race/gender dummies have been added as independent variables

Table 5

Effects of Skill Needs On Wage Differences By Group

	Differences in Sample Means	No Occupation Controls			With Occupation Controls		
		1	2	3	1	2	3
All New Hires							
By Education:							
H.S. Graduates v. Dropouts	.294	.063	.021	.009	.079	.044	.035
Some College v. H.S. Graduates	.125	.120	.054	.050	.067	.030	.028
College Graduates v. H.S. Graduates	.457	.341	.268	.262	.221	.192	.190
By Race/Gender:							
White Male v. Black Male	.277	.163	.115	.119	.136	.099	.102
White Male v. White Female	.107	.097	.101	.098	.117	.108	.106
White Male v. Black Female	.347	.197	.192	.191	.204	.193	.192
Black Male v. Black Female	.070	.034	.077	.072	.068	.094	.090
White Female v. Black Female	.240	.100	.091	.093	.087	.084	.086
Jobs With College Not Required							
By Race/Gender:							
White Male v. Black Male	178	132	.094	.095	.105	.076	.079
White Male v. White Female	070	067	.078	.072	.085	.080	.076
White Male v. Black Female	239	144	.140	.136	.155	.142	.141
Black Male v. Black Female	061	012	.045	.041	.050	.066	.062
White Female v. Black Female	170	076	.062	.065	.070	.062	.065

NOTE: These are differences across groups in weighted means of residuals from log (wage) equations that omit the particular group of dummies (either for education or race/gender). The first column above is based on equations that include no hiring requirements or tasks, the second includes number of tasks/requirements; while the third includes these variables separately.

Table 6
Implied Effects of Skill Need Increases on Labor Demand Across Groups

	WM		WF		BM		BF	
Assuming Percentage Point Increases in Computer Use, Other Tasks and Hiring of:	Abs.	%	Abs.	%	Abs.	%	Abs.	%
1) .15, .10, .00	-.030	-.085	.052	.116	-.026	-.255	.004	.041
2) .15, .10, .10	-.020	-.057	.055	.123	-.034	-.333	.001	.010
3) .25, .20, .00	-.051	-.144	.094	.210	-.049	-.480	.006	.062
4) .25, .20, .20	-.035	-.099	.100	.224	-.065	-.637	.000	.000

Note: The "absolute" changes are predicted percentage-point shifts in labor demand, based on partial derivatives calculated from coefficients of relative employment equations. "%" changes are calculated by dividing absolute changes by current employment shares of each group.