Working Paper 8708

THE STRUCTURE OF THE FEMALE/MALE WAGE DIFFERENTIAL: IS IT WHO YOU ARE, WHAT YOU DO, OR WHERE YOU WORK?

by Erica L. Groshen

Erica L. Groshen is an economist at the Federal Reserve Bank of Cleveland. The author thanks professors Richard B. Freeman and John T. Dunlop for help in obtaining these data, and the Bureau of Labor Statistics for providing access to them. Paula Loboda provided invaluable research assistance. Comments from Paul Bauer, Patty Beeson, Francine Blau, John Bound, Charles Brown, Shirley Cassing, Mary Deily, Randall Eberts, and Joe Stone are gratefully acknowledged.

September 1987

ABSTRACT

This paper decomposes the observed wage difference between male and female workers into the portions associated with three types of segregation and with the individual's sex. The contribution of each type of segregation is the product of two factors: the extent of segregation and the wage penalty (estimated coefficient) associated with working in a female-dominated constituent.

In five Bureau of Labor Statistics Industry Wage Surveys, the earnings of men and women in the same occupation at the same establishment differ by only 1%. Much of the difference in pay between men and women is associated with segregation by occupation (this reduces women's wages by 11% to 28%). But segregation by establishment and work group also lowers the wages of women by a total of 12%.

Comparisons are also made between the union and nonunion sectors of two industries. Union establishments are characterized by less variation based on occupational and individual wage penalties, but more variation based on establishment segregation.

THE STRUCTURE OF THE FEMALE/MALE WAGE DIFFERENTIAL: IS IT WHO YOU ARE, WHAT YOU DO, OR WHERE YOU WORK?

I. Introduction

A variety of policies have been enacted and proposed to reduce wage differences between men and women. Each addresses certain components of the total differential. For example, equal pay provisions focus on individual differences within work group;[1] comparable worth targets inequality based on proportion female in occupation or work group; equal opportunity legislation attempts to reduce interemployer and work group segregation. The potential efficacy of each policy depends on the relative magnitude of the component(s) addressed. For example, equal pay legislation may be fully effective, but it will not reduce the female/male wage differential significantly if very little inequality is due to wage differences between the sexes within work group.

Thus, one step toward comparing the policies is to consider which are aimed at the largest source(s). This paper addresses the question by estimating the contribution of each of the following to the wage disparity between men and women: differences between individuals in the same occupation and establishment, or sex segregation by occupation, by establishment, or by work group.

The role of the workplace (i.e., establishment and work group) has been relatively neglected in previous studies of the effect of segregation on wages. The composition of the female/male wage differential is studied in five industries, using Bureau of Labor Statistics (BLS) Industry Wage Surveys.

Although most studies ascribe observed wage differentials to differences in human capital, many observed differentials (especially those linked to demographic characteristics such as sex and race) defy attempts to attribute them solely to human capital. The size of estimated industry, employer, and work group wage differentials suggests that they could be a large part of the wage differences observed among races or between men and women.[1] Thus, investigation of the workplace as a source of wage differentials seems particularly relevant.

Models of the female/male wage differential fall into three basic groups: human capital, compensating differentials, and discrimination. The first type explains differences in earnings by deficiencies in acquired human capital (education, on-the-job-training, etc.). In the strict version, women invest in less human capital because they expect to work outside the home for less of their adult lives (Polachek [1981]). Alternatively, differential returns or costs to investment caused by discrimination could also link proportion female with low wages among occupations. In either case, the role of the workplace in this model is not obvious. Most wage differences should be associated with occupation and with the individual within the work group, unless establishments or work groups are sorted by quality.

The second explanation assumes that women have a greater taste for nonwage compensation (perhaps because of uneven allocation of homemaking responsibilities) and that employers generally offer the same benefit package to groups of employees. Or, working conditions are associated primarily with occupation or industry, and women have stronger preferences for clean, quiet, flexible, or attractive environments (Filer [1983]). In either version, women are sorted into the high-benefit/low-wage jobs.

Compensating differentials should generate an association between segregation and wages in establishments and occupations. Work group effects should be minimal, and limited to cases where work conditions vary by establishment within occupation or where benefit packages change significantly among different occupations in an establishment (e.g., between exempt and nonexempt positions). Also, individual effects should be positive, to compensate women for the inferior package of benefits offered.

Finally, the theoretical literature offers various models of discrimination in the workplace.[3] The problem with the simplest models is. that employer discrimination should lower profits (unless it is due to tastes of coworkers or customers). Thus, owners of capital will prefer to invest in firms that do not discriminate, thereby reducing the prevalence of discrimination.

Agency costs, however, introduce slack into the system, which loosens the discipline imposed by the marketplace. Suppose that, in each establishment, managers exercise their taste for discrimination in only a few of the occupations they oversee, or that only a subset of each establishment's supervisors discriminate. Then, a firm's expected gains from eliminating discrimination may be small or negative, when coupled with the cost of internal monitoring. Furthermore, if all firms have a random amount of discriminatory activity among their supervisors or managers, most variation in discrimination occurs within firms, rather than between them.

This version suggests that segregation by establishment will have a smaller impact than segregation by work group. But establishment, work group, and individual sex will all contribute to the female/male wage differential.

Little empirical work has been offered on the workplace effects on wage differentials, in part because of data limitations. In a major exception, Blau (1977) proposes and tests a model in which employers set wages according to external wage contours and internal labor markets, rather than solely according to local labor-market conditions. Thus, firms with high wages choose from a queue of applicants, introducing latitude for discrimination in hiring. In BLS Area Wage Surveys, Blau finds that wages and the percentage of females in one's work group were negatively correlated within occupation, controlling for sex of the individual.

Another exception is Bielby and Baron (1984), who find that firms are highly and permanently segregated by work group: individuals are employed in work groups composed almost entirely of members of their own sex.

This study expands Blau's work by comparing the size of four components of the female/male wage differential within industry--the individual, occupation, establishment, and work group--to estimate how much each contributes to the total observed differential.[4] The observed female/male wage differential is divided into several components that each reflect the extent to which sex segregation associated with a labor-market structure contributes to the total differential in a working population. It will be shown that the size of a component depends on two factors: the extent of segregation by sex among constituents of the component, and the magnitude of the penalty associated with working in a female-dominated constituent.

The method uses ordinary least squares regression to decompose an observed wage differential, without assuming any particular theory of wage determination or discrimination. It provides a way to examine the extent to which segregation-based models have an empirical foundation. The method of decomposition is a variant of that introduced in Oaxaca (1973) and Blinder (1973).

II. Method

For ease of exposition, the method is presented in terms of only two components (individual and occupation), although two more (establishment and work group) are considered in the actual estimation. Consider the case of individual i in occupation j, with log wage w_{ij}.

Let f_{ij} = female dummy variable for individual i in occupation j,
n = number of individuals in the working population,
n_j = number of individuals in occupation j,
$r = \sum_j \sum_i f_{ij}/n$, the proportion of the work force that is female, and
$r_j = \sum_i f_{ij}/n_j$, the proportion of occupation j that is female.

The following wage equation is estimated:

$$w_{ij} = A + G \cdot f_{ij} + B \cdot r_j + e_{ij}, \tag{1}$$

where A is the work-force mean wage and G is the estimated wage effect of being female, controlling for the proportion female of one's occupation. B is the estimated wage effect of working in a female-dominated occupation, controlling for the sex of the individual. A person who switched from an all-male occupation to an all-female occupation would suffer an average wage loss of B. Last, e_{ij} is the estimated error term.

Following Oaxaca (1973) and Blinder (1973), the observed femalelmale wage differential in a working population is simply the difference between the average wage of women and the average wage of men:

$$D = \bar{w}^{female} - \bar{w}^{male} = G + B\,(\bar{r}_j^f - \bar{r}_j^m), \tag{2}$$

where

$\bar{r}_j^f = \sum_j \sum_i f_{ij} r_j / rn$, the mean proportion female in occupation among females, and
$\bar{r}_j^m = \sum_j \sum_i (1-f_{ij}) r_j / (1-r)n$, the mean proportion female in occupation among males.

As D becomes more negative, the wage difference between men and women increases. The observed difference between the wages of men and women in the work force is the sum of G (the estimated within-occupation wage differential between men and women) and a term for the estimated impact of segregation among occupations. The impact of segregation is the product of two terms: B (the wage change associated with an increasing concentration of women in an occupation) and the extent of segregation among occupations (the difference in the average proportion of women in the occupations held by women compared to that of the average occupation held by men).

Accordingly, define S as the extent of segregation:

$$(3) \qquad S = (\bar{r}_j^f - \bar{r}_j^m).$$

S measures the extent of segregation on a scale from 0 to 1 (increasing as occupations become more segregated) and can be associated with a commonly used measure of segregation. Another algebraic representation for S is as follows:

$$(4) \qquad S = \frac{1}{r(1-r)} s_{r_j}^2,$$

where $p_j = n_j/n$, the proportion of the work force in occupation j, and

$s_{r_j}^2 = \sum_j [p_j r_j^2] - r^2$, the sample variance of r_j.

This form is intuitively appealing if one notes the range of the variance of r_j. At the lower extreme, if the work force were totally integrated, then $r_j = r$ for all j, so the variance of r_j would be zero. On the other hand, total segregation of the work force maximizes the variance of r_j:

$$(5) \qquad \max s_{r_j}^2 = r(1-r)^2 + (1-r)(0-r)^2 = r(1-r).$$

Thus, S, the ratio of the variance of r_j to $r(1-r)$, is the ratio of the actual variance to the maximum possible variance. Most other investigations of the impact of segregation (e.g., Beller [1984]) use another measure, the displacement index, to measure segregation. The properties of the displacement index (SD) are quite similar to those of S.[5] The most familiar version of the formula for SD is as follows:

$$(6) \qquad SD = 1/2 \sum_j |M_j - F_j|,$$

where M_j = proportion of male work force in occupation **j**, and
F_j = proportion of female work force in occupation **j**.

In the notation used in this paper, SD reduces to the following:

$$(7) \qquad SD = \frac{1/2}{r(1-r)} \cdot \sum_j [p_j \, |r_j - r|].$$

Comparing expression (7) to expression (4), it is clear that S and SD are both ratios of a measure of deviation to the maximum possible variance. S and SD share common bounds (0 = perfectly integrated, to 1 = completely segregated), and are composed of the same terms. The difference between them is that SD measures deviation by the mean absolute deviation of proportion female, while S takes the mean squared deviation. SD and S will be most similar close to the bounds or if r is close to 1/2. The advantages of the SD measure are insensitivity to outliers, and easy interpretation of the proportion of women who would have to be redistributed among occupations in order to achieve perfect integration.

The particular advantage of S is its use in the simple decomposition of the female/male wage differential shown in equation (2). This treatment may be easily generalized to include segregation among establishments and other labor market institutions, simply by adding terms that are the product of the penalty and the extent of segregation:

$$(8) \qquad D = \bar{W}^{female} - \bar{W}^{male} = G + \sum_k (B^k \cdot S^k)$$

where k = labor market structure k (occupation, establishment, or work group),

B^k = estimated coefficient on proportion female in institution k, and

$S^k = \bar{r}^f_k - \bar{r}^m_k$ = extent of segregation among constituents of k.

Expression (8) is a decomposition of the type introduced by Oaxaca (1973) and Blinder (1973), where the male and female coefficients are constrained to equality.[6] Table 1 summarizes the application of this technique. The components and their factors are listed with definitions and interpretations. The sum of the four components is the total observed wage differential.

III. Description of the Data

This study presents decompositions of the female/male wage differential in the miscellaneous plastics products, life insurance, nonelectrical machinery, banking, and computer and data processing industries. These industries were chosen as examples because they employ significant numbers of both men and women, represent both manufacturing and service industries, and have a low incidence of incentive-based compensation.

Analysis of industries separately allows occupations to be defined narrowly, while a large proportion of each employer's work force is covered. In cross-industry surveys, either occupations must be very broadly defined or the vast majority of the employees of each establishment must be excluded from analysis, because only support occupations are employed in common across employers. Since industries are themselves somewhat segregated by sex, but do not (in general) overlap much in occupations, analysis within industry tends to underestimate the contribution of establishment and work group segregation.

The analysis uses five Bureau of Labor Statistics Industry Occupational Wage Surveys (IWS). Table 2 presents means of the relevant characteristics. The data consist of the wages, sex, occupation, and establishment identifier of individual production and maintenance workers in the manufacturing industries, and of individual nonsupervisory workers in the service industries. The jobs covered are described in great detail, are particular to the industry in question, and generally cover approximately 60% of establishment employment. Wages reported are straight-time hourly earnings (no overtime or shift premiums included) for hourly workers, and average hourly earnings for incentive workers.

The surveys are extensive, covering 15,000 to 76,000 workers in 221 to 876 establishments. In general, establishments surveyed for an IWS are a random sample of those employing 25 or more workers in the industry, though the cutoff varies somewhat by industry. A unique establishment identifier is provided for each place of employment, but actual identity of employers is withheld.

An important feature of these data is the detail of the occupation definitions. The appendix consists of listings of the job classifications surveyed in the five samples. For example, in the plastics sample, codes distinguish among three occupations working on a blow-molding machine: "operate," "set up," and "set up and operate." This level of industry-specific detail controls more completely for differences in job content and worker training than do the broader occupational codes used in other surveys; for example, four-digit Dictionary of Occupation Titles or three-digit Census codes. Following BLS practice, for brevity in the discussion that follows (except where noted), the term "occupation" will be used as a synonym for IWS job classification, which is the more accurate term.

IV. Decomposition of the Female/Male Wage Differential in Five Industries

1. Decomposition of the Differential in Two Manufacturing Industries

Table 3 reports the decomposition of the female/male wage differential in the miscellaneous plastics products and nonelectrical machinery manufacturing industries. The total differential between the wages of men and women in the two samples (-.240 and -.298) is substantially lower than the differential observed in broader samples. For example, the Current Population Survey usually records a differential of about 40% because of the inclusion of white-collar workers and other industries. Thus, the results for the occupation and establishment components below would almost certainly be larger in a broader sample--because more diverse occupations and establishments would be represented. The effects on the individual and work group components are difficult to predict.

First, log wages of individuals are regressed on a constant term and four regressors: a female dummy, and the proportion female in the individual's occupation, establishment, and work group. The coefficients and standard errors from this regression are reported in the first column of Table 3. All estimated coefficients are negative and significant, except for the individual term in machinery. The coefficients on the individual dummy in both industries are very small, suggesting that males and females in the same occupation and establishment (i.e., work group) are not paid very differently.

The fact that inclusion of simple linear measures of "femaleness" of occupation, establishment, and work group reduces the coefficient on the female dummy to 1% or less suggests that the specification used is appropriate. There is no algebraic reason that the individual term should be reduced so dramatically. Although more complex measures and nonlinearities could be introduced, the maximum additional impact of such terms is limited to less than 2%, the size of the individual component in Table 3.

In both industries, the three coefficients on the proportion female are all large, and occupation has the largest coefficient. Converting from log differences to percentage differences, a switch from an all-male to an all-female occupation would mean a wage loss of about 22% for a worker in plastics and a loss of 36% for a worker in machinery, regardless of the person's sex. The wage impact of such a switch may simply reflect large differences in the average human capital between the sexes.

The results for work group and establishment are less consistent across industry. A switch either to an establishment or to a work group dominated by the other sex entails a wage change of about 9% in plastics. In machinery, the coefficient on a switch in the sex composition of one's establishment is much larger (.330) than the effect of a sex-of-work-group switch (.058).

The second column of Table 3 shows the extent of segregation among occupations, establishments, and work groups; that is, the likelihood of switches such as those mentioned above. Consistent with Bielby and Baron (1984), work groups are highly segregated by sex. It is very unusual for a worker to have a job in a work group dominated by the opposite sex--more unusual than for the worker to work in an integrated occupation. The variance of proportion female in work groups is 65% to 75% of what it would be in a totally segregated society (i.e., where men and women always worked in single-sex work groups). In plastics, occupations are more segregated than establishments, while the opposite is true in machinery.

The third column for each industry reports the product of columns 1 and 2 for each labor market structure. In each case, this number is the size of the wage differential that would be observed in the population if this were the only source of female/male wage differences. It is also the amount by which the observed wage differential would decrease, were this source of the differential to be eliminated.

Consistent with Blau (1977), Buckley (1971), McNulty (1967) and Bielby and Baron (1984), the results from the two industries agree that the smallest source of the differential is individual sex within work group. In plastics, elimination of this source would narrow the wage gap between men and women by only about 1.6%, while in machinery it would leave the gap unchanged.

In plastics, although the coefficients on proportion female in establishment and work group are similar, the greater amount of segregation by work group causes a larger differential component. Establishment contributes only -.029 log points, while work group is the source of -.078 log points of the total -.240 difference. In machinery, establishments are more highly segregated than occupations, and more than compensate for a lower wage penalty.

Occupation, by virtue of the large wage penalty (i.e., coefficient) on proportion female and the amount of segregation among its constituents, is associated with half of the observed difference in wages between men and women. This is consistent with much of the literature on occupational segregation (e.g., Beller [1984] and Johnson and Solon [1986]). In both industries, however, even if occupations were evenly integrated, wages of men would still be 12% higher than those of women.

Another way to look at the results is to note that in plastics, for example, a woman in a 50% female occupation earns about .14 log wage points less (-.016 plus one half of -.242) than the average man in the same establishment. But if she worked in an all-female work group, her wages would be as low as if she worked in an all-female occupation. And if she worked at an all-female establishment, her wages would be .34 log wage points lower than those of a man working in an all-male establishment in the same occupation.

But how likely are these scenarios? The amount of segregation by each of these structures suggests that single-sex work groups are quite common. Apparently, it is unusual for a woman to be employed in an integrated or, particularly, predominantly male occupation or work group. For whatever reason (human capital, preferences, or discrimination), people work in work groups composed predominantly of members of their own sex.

2. <u>Decomposition of the Differential in Three Service Industries</u>

Table 4 reports the decomposition of the femalelmale wage differential in three service industries. The total differential between the wages of men and women in the samples is about -.45 log wage points. This differential is similar to that of the U.S. and is substantially more than the differential in the two manufacturing industries, where the occupations were not as varied. Nevertheless, the service industry results are fairly consistent with the manufacturing results.

Most consistent is the size of the individual coefficient. It is again very small (-.013 to -.017) and virtually the same as the -.016 estimate in plastics. Most of the femalelmale differential arises from rates applied to all individuals in a category, rather than from differences in the treatment of individuals.

Occupations in the services are about as segregated as those in plastics and machinery. However, banking and life insurance establishments are far less segregated than those in computers and the manufacturing industries. Work groups appear to be somewhat less segregated in the services.

Counteracting lower segregation, estimated coefficients on proportion female are generally larger (in absolute value) in the service samples. Practically the entire extra differential in the service samples (relative to those in manufacturing) can attributed to the magnitude of the occupation coefficient in the service industries. Although in services men and women are in the same work group more often, wages are so strongly linked to proportion male in service occupations that women earn significantly less than men in these three industries. This could reflect higher variation in the human capital requirements (perhaps, technical training) of nonsupervisory jobs in the service industries.

The coefficients on proportion female in establishment are tightly clustered (-.256 to -.375) and larger (in absolute value) than those for work group (+.023 to -.283).[7] Extensive segregation among work groups magnifies the impact of the relatively small coefficients on proportion female in work group. Thus, the sum of the contributions of establishment and work group is quite tightly clustered among industries, ranging from a low of .08 log points (computers) to a high of .18 log points (machinery).

3. Unionism and the Structure of the Female/Male Wage Differential

Tables 5 and 6 perform the same decomposition as in Table 3, for the union and nonunion establishments in the plastics and machinery industries separately. The results are intriguing and suggest some major differences between the union and nonunion sectors. While the total differentials and the patterns of extent of segregation are about the same size in the union and nonunion sectors, the distribution among components changes considerably.

At the top of the tables, the individual portion of the differential in plastics is about 2% in nonunion jobs and is nonexistent in union jobs, which is consistent with the impact of union standard-rate policies (Freeman [1982]). In machinery, virtually no difference exists within work group in either the union or nonunion sector.

Moving to the fourth row, the size of the work group component is about the same in the union and nonunion sectors for plastics, but is worse for union women in the machinery sample (due to differences in coefficients).

Two results stand out. Among occupations, union standard-rate policies substantially diminish the contribution of occupational segregation to the wage differential in both industries. In effect, unions institute some moderate amount of comparable worth. That is, while occupations are equally segregated in the union and nonunion sectors, the coefficient on percent female in occupation is one-third to four-sevenths lower in the union sector. Unionization may not diminish occupational segregation, but it apparently substantially reduces the wage penalty associated with such segregation.

The most unexpected difference between the sectors is in the establishment component. In plastics, the estimated coefficient on percent female in the nonunion sector is zero, compared to -.156 under unionization. In machinery, the nonunion coefficient is -.152, which rises to -.406 under unionization. This effect has a number of potential explanations that cannot be distinguished here:

1. Unions with more male workers are more successful at extracting rents from employers;

2. Union employers forced to pay above-market wages to workers select proportionally more males from the queue of applicants attracted by the high wages;

3. Establishments employing more men are more productive, but only in a unionized setting can workers claim some of these rents; or

4. Women have a greater taste for nonwage compensation and can voice their preferences in a unionized setting.

A final effect in these industries is that union employers in both industries employ fewer women than their nonunion counterparts, consistent with Blau (1977). In short, these results invite more investigation into the relationship between unionization and the structure of the femalelmale wage differential.

V. Conclusion

1. Findinqs

This paper applies a decomposition of the female/male wage differential that clarifies the connection between segregation and wage disparities. For a labor market institution to be associated with inequality, two conditions are necessary: its constituents must be segregated, and wages must decline with increasing proportions of female workers. The variance of proportion female among constituents must be sizable, and the coefficient on proportion female in the combined wage regression must be significant and negative, or segregation associated with that institution is not a large source of the femalelmale wage differential.

This decomposition suggests that policy attempts to reduce inequality may be evaluated on the basis of the potential impact of the proposal on the differential. Furthermore, there are two potential targets in the reduction of segregation-based sources of inequality: the extent of segregation and the size of the wage penalty. Elimination of either is sufficient to eliminate a source of inequality, but one may be easier to implement than the other.

The empirical findings reported in this paper are remarkably consistent across the five industries studied:

1. Wages of males and females in the same occupation and establishment differ by about 1%.

2. The largest source of the female/male wage differential is the association between wage rates and proportion female in occupations, which accounts for half to three-quarters of the differential observed, or a difference in wages of 11% (manufacturing) to 26% (services) when converted to percentages. The wage loss associated with a switch from an all-male to an all-female occupation ranges from 21% to 57% in the five industries studied.

3. Segregation by establishment within industry and by work group (i.e., the structures most under control of employers) also contributes significantly to wage inequality.[8] Work groups are far more segregated than establishments, but the wage penalty associated with an increasing proportion female is larger for establishments than for work groups. These offsetting factors cause variation in the relative impact of establishment and work group segregation among industries; segregation by each of these two structures reduces women's wages by 6% to 7%, for a total loss of 8% to 16% (or from one-quarter to one-half of the total differential).[9]

4. In two manufacturing industries, unionism has a pronounced effect on the composition of the femalelmale wage differential without affecting patterns of segregation. Any wage disparity that exists between men and women in the same work group disappears under unionism. Unionism is also associated with two other interesting effects: wages are less closely tied to the percent female in one's occupation, but are more closely tied to the proportion female in one's establishment.

These figures suggest that men and women who work in the same occupation and establishment earn about the same amount. However, occupations are either mostly male or mostly female, and within establishments, occupations are almost completely segregated. Furthermore, establishments as a whole tend to employ either more men or more women than average in the work force for the industry.

Thus, the role of high-wage employers in segregation takes one of two forms. If their wages for all occupations are higher than average, they tend to concentrate on hiring men for all occupations. Just as important empirically, when they pay a subset of occupations more than their occupational average (adjusting for overall establishment differential), they hire a disproportionate number of men for those work groups.

So, even a worker who has chosen an integrated occupation will probably be hired to work primarily with members of his/her own sex. If he is male, this will tend to raise his wages. If she is female, it will lower them.

2. Relevance to Theory

In order to fully evaluate policy to reduce the femalelmale wage differential, it is necessary to know the source(s) of the differential. Although this decomposition cannot fully distinguish among the three major models of the source of the femalelmale wage differential, it throws some light on which versions of each model are most consistent with observed patterns. In particular, any version invoked must predict no sex differential within work group, and wide segregation by sex, especially among work groups.

Omission of human capital or worker quality variables that are negatively correlated with proportion female would bias downward the estimated coefficient on proportion female for institutions whose constituents are sorted by human capital. No doubt, a significant portion of the occupation component is due to differences in the human capital of men and women. As a corollary, there are no sizable differences in human capital between men and women within the work group. That makes problematic the importance of the work group and establishment components (controlling for proportion female in occupation) within a pure human capital framework. Research is needed on the question of whether firms effectively sort among applicants on the basis of quality within occupation. If such sorting does not take place, one-third to one-half of the differential (the work group and establishment components) is not due to differential productivity.

Previous empirical evidence for the existence of substantial compensating differentials is weak, both for working conditions (Brown [1980], Smith [1979], somewhat countered by Filer [1983]) and for fringe benefits (Freeman [1981]), Smith and Ehrenberg [1981], and Atrostic [1983]). In this study, the individual component is not positive, and the work group component is sizable. Combined with weak evidence on the impact of compensating differentials in general, these results argue against equalizing differences, except, perhaps, among occupations.

As in other studies, evidence of discrimination in this case consists partly of providing direct evidence to eliminate competing theories." However, the pattern uncovered here (primarily the size of the work group and establishment components) is consistent with the existence of discrimination by employers. To the extent that this pattern arises from discriminatory behavior, the direction of causality is of great interest, but these results cannot distinguish whether (exogenously) high-wage employers tend to discriminate, or whether discriminators are forced to pay high wages.

The decomposition performed here suggests some important topics for further research. In particular, to what extent do employers sort among job applicants by productivity-related characteristics? Are discriminators forced to pay high wages, or do high-wage employers tend to discriminate? What determines the sex composition of a work group? What is the reason for the higher association between proportion female and wages in union establishments?

3. Relevance to Policy

These findings are best interpreted in light of extant and proposed policies to reduce wage inequality between men and women. Table 7 presents a summary of five such policies: four federal acts or orders, and comparable worth (which has been proposed, not enacted). Table 8 relates the provisions described in Table 7 to the decomposition performed in this paper. Each component's factors and their mean values (as estimated here) are listed with the provisions intended to reduce them, distinguishing between provisions aimed at human capital and employer discrimination models.

The compensating differential model is not included because all behavior is efficient under this model, so to the extent that the sex differential is a compensating differential, no corrective policies are necessary. Under a human capital model, equal access to education may increase the productivity of women, reducing the individual and occupational components.[11]

In contrast, discrimination explanations generate two potential policy instruments for the three components of the differential associated with segregation. The individual component (which is not associated with segregation) has only one potential instrument: lowering the wage penalty associated with an individual's sex within work group--via equal pay and perhaps EEO training. For the other three components, the two potential instruments are reduction of segregation (through EEO provisions and affirmative action) and reduction of the wage penalty (through comparable worth).

How effective could each of these policies be? Taking the four components individually, wages of women are only 1% below those of men in their work group. This, then, is the maximum possible effect of the provisions targeted at this component: in particular, equal pay, but also parts of equal education and EEO training. Either these provisions have already been quite successful, or this component was never the main source of the differential.[12]

In contrast, policies that reduce the occupation component could cut the female/male wage differential by one-half (manufacturing) to three-quarters (services) in our samples.

The next largest components are work group and establishment, which together account for about a 13% reduction in women's relative wages. Unless establishments and work groups are sorted by human capital that is unequally distributed between men and women, the provisions based on models of discrimination offer the only solutions.

EEO, affirmative action, and equal education have been on the books for more than a decade, while the female/male wage differential remains large. These policies aim to reduce wage inequality by reducing all three types of segregation, i.e., S^o, S^e, and S^w. If people have judged them ineffective, it is no surprise that those interested in reducing the differential would support comparable worth--because its targets are B^o and B^w, the otherwise unregulated factors of the two largest components of the wage differential.

Footnotes

1. In this paper, the term "work group" refers to the occupation-establishment interaction; that is, to all employees with the same occupation (job classification) in a particular establishment.

2. Industry wage differentials persist in the face of attempts to attribute them to human capital. See Dickens and Katz (1986) and Krueger and Summers (1986) for recent summaries of these investigations. Also, Groshen (1986) shows that even within industries, substantial stable wage differentials exist among employers and work groups, controlling for very detailed occupation, whereas wage variation among individuals within a work group is minimal.

3. See Blau and Ferber (1986) and Reskin and Hartmann (1986) for summaries.

4. Williams and Register (1986) perform a similar analysis on U.S. Census data for 50 cities and eight occupations and find that wages are negatively correlated with proportion male within occupation in a city, controlling for various characteristics of the city.

5. The properties of the displacement index are explored in Duncan and Duncan (1955).

6. This constraint is appropriate because establishment wage policies are (by law) designed to be sex-blind in their application. What differs between the sexes is their access to positions. Oaxaca (1973) estimates separate equations for men and women, dividing the differentials between the portions due to differences in slopes from those due to differences in mean values of independent variables.

   A positive coefficient suggests that wages increase with the proportion female, counteracting the effect of the negative coefficients to some extent.

   Work group segregation is controlled by employers in the sense that they apparently have a strong tendency not to employ both men and women in the same occupation. Even in heavily female occupations, the few males in the occupation are clustered in just a few establishments.

9. Note that if segregation by industry were added to the establishment effect (as in Blau [1977]), the establishment component would clearly dominate the work group component.

10. This phenomenon is not unexpected when the type of discrimination under investigation is illegal.

11. Policy prescriptions will be ineffective or inefficient if they interfere with unconstrained optimization on the part of market participants. Thus, equal access to education for women will reduce the differential only to the extent that previous inequalities in access led to differential acquisition of human capital. An equal distribution of human capital would eliminate the correlation between proportion female and the human capital requirements of a job, so the estimated coefficient would be zero. The real reason for decline in inequality would be the reduction in segregation by sex. All correctly measured wage differentials would remain the same, because they are based on productivity differences, but women would hold more of the high-wage jobs. The potential efficacy of equal education on the establishment and work group components depends on whether some establishments require more human capital in all or some occupations than do others.

12. A third possibility is that employers adapted to the intrusion of equal pay legislation by redefining job titles. Workers of different sex were given slightly different responsibilities in order to preserve traditional wage disparities between women and men within work group and to justify their different pay schedules. The size of the work group component will increase with the extent to which jobs were redefined arbitrarily for this purpose by independent establishments.

References

Atrostic, B.K. "Alternative Pay Measures and Labor Market Differentials," U.S. Department of Labor Office of Research and Evaluation, Bureau of Labor Statistics Working Paper No. 127, March 1983.

Beller, Andrea. "Trends in Occupational Segregation by Sex and Race, 1960-1981," in Barbara F. Reskin, Ed., Sex segregation in the Workplace: Trends, Explanations, Remedies, 1984: National Academy Press, Washington, D.C., 11-26.

Bielby, William T., and James N. Baron. "A Woman's Place is With Other Women: Sex Segregation Within Organizations," in Barbara F. Reskin, Ed., Sex Segregation in the Workplace: Trends, Explanations, Remedies, 1984: National Academy Press, Washington, D.C., 27-55.

Blau, Francine D. Equal Pay in the Office, 1977: D.C. Heath and Co., Lexington, Mass.

Blau, Francine, and Marianne Ferber. The Economics of Women, Men and Work, 1986: Prentice-Hall, Simon & Schuster, Inc., Englewood Cliffs, New Jersey.

Blinder, Alan. "Wage Discrimination: Reduced Form and Structural Estimates," Journal of Human Resources, vol. 8, no. 4 (Fall 1973), 436-455.

Brown, Charles. "Equalizing Differences in the Labor Market," Quarterly Journal of Economics, vol. 94, no. 1 (February 1980), 113-134.

Buckley, John E. "Pay Differences Between Men and Women in the Same Job," Monthly Labor Review, vol. 94, no. 11 (November 1971), 36-39.

Bureau of Labor Statistics. "Industry Wage Survey: Banking, February 1980," U.S. Department of Labor, Bulletin 2099, September 1981.

__________. "Industry Wage Survey: Life Insurance, February 1980," U.S. Department of Labor, Bulletin 2119, December 1981.

__________. "Industry Wage Survey: Miscellaneous Plastics, September 1974," U.S. Department of Labor, Bulletin 1914, June 1976.

Dickens, William, and Larry Katz. "Industry Wage Patterns and Theories of Wage Determination," unpublished paper, March 1986.

Duncan, Otis D., and Beverly Duncan. "A Methodological Analysis of Segregation Indexes," American Sociological Review, vol. 20 (April 1955), 210-217.

Filer. Randall K. "Sexual Differences in Earnings: The Role of Individual personalities and Tastes," Journal of Human Resources, vol. 18, no. 1 (Winter 1983), 82-99.

Freeman, Richard B. "The Effect of Unionism on Fringe Benefits," Industrial and Labor Relations Review, vol. 34, no. 4 (July 19811, 489-509.

__________. "Union Wage Practices and Wage Dispersion Within Establishments," Industrial and Labor Relations Review, vol. 36, no. 1 (October 19821, 3-21.

__________, and Jonathan S. Leonard. "Union Maids: Unions and the Female Workforce," Paper presented at the Conference on Gender in the Workplace, The Brookings Institution, November 15-16, 1984.

Groshen, Erica. "Sources of Wage Dispersion: How Much Do Employers Matter?" Ph.D. Dissertation, Harvard University, Cambridge, Mass., 1986.

Johnson, George, and Gary Solon. "Estimates of the Direct Effects of Comparable Worth Policy," American Economic Review, vol. 76, no. 5 (December 19861, 1117-1125.

Krueger, Alan B., and Lawrence H. Summers. "Efficiency Wages and the Wage Structure," National Bureau of Economic Research Working Paper No. 1952, June 1986.

McNulty, Donald J. "Differences in Pay Between Men and Women Workers," Monthly Labor Review, vol. 90, no. 12 (December 19671, 40-43.

Oaxaca, Ronald. "Male-Female Wage Differentials in Urban Labor Markets," International Economic Review, vol. 14, no. 3 (October 19731, 693-709.

Polachek, Solomon W. "Occupational Self-selection: A Human Capital Approach to Sex Differences in Occupational Structure," Review of Economics and Statistics, vol. 63, no. 1 (February 19811, 60-69.

Reskin, Barbara F., and Heidi I. Hartmann, Eds. Women's Work, Men's Work: Sex Segregation on the Job, 1986: National Academy Press, Washington, D.C.

Smith, Robert S. "Compensating Wage Differentials and Public Policy: A Review," Industrial and Labor Relations Review, vol. 32, no. 3 (April 19791, 339-352.

Smith, Robert, and Ronald G. Ehrenberg. "Estimating Wage-Fringe Trade-offs: Some Data Problems," National Bureau of Economic Research Working Paper No. 827, December 1981.

Williams, Donald R., and Charles A. Register. "Regional Variations in Earnings and the Gender Composition of Employment: Is 'Women's Work' Undervalued?" Journal of Economic Issues, vol. 20, no. 4 (December 1986), 1121-1134.

Table 1

Summary of Terms in the Decomposition of the Female/Male Wage Differential in a Population

Component (Estimated Size)	Factor	Definition	Interpretation
Individual (G)	G	Estimated coefficient on female dummy in the wage equation below.	Average difference in wages between men and women in the same occupation in the same establishment (i.e., in the same work group).
Occupation Segregation ($B^o \cdot S^o$)	B^o	Estimated coefficient on proportion female of occupation in the wage equation below.	Wage penalty associated with increasing proportion female in an occupation. The difference between an all-female and an all-male occupation.
	S^o	Sample variance of proportion female across occupations, divided by maximum possible variance.	Extent of segregation by sex in occupations, on a scale from 0 (fully integrated) to 1 (completely segregated).
Establishment Segregation ($B^e \cdot S^e$)	B^e	Estimated coefficient on proportion female of establishment in the wage equation below.	Wage penalty associated with increasing proportion female in an establishment. The difference between an all-female and an all-male establishment.
	S^e	Sample variance of proportion female across establishments, divided by maximum possible variance.	Extent of segregation by sex in establishments, on a scale from 0 (fully integrated) to 1 (completely segregated).
Work Group Segregation ($B^w \cdot S^w$)	B^w	Estimated coefficient on proportion female of work group in the wage equation below.	Wage penalty associated with increasing proportion female in a work group. The difference between an all-female and an all-male work group.
	S^w	Sample variance of proportion female across work groups, divided by maximum possible variance.	Extent of segregation by sex in work groups, on a scale from 0 (fully integrated) to 1 (completely segregated).

Wage equation estimated:

$$w_i = A + G'f_i + B^o \cdot r^o_i + B^e \cdot r^e_i + B^w \cdot r^w_i + e_i,$$

where w_i = natural log of wage of individual i, A = constant term,
f_i = 1 if individual i is female, 0 otherwise,
r^o_i, r^e_i, r^w = proportion female in individual i's occupation, establishment, and work group, respectively.

Table 2

Summary of Industry Wage Survey Sample Characteristics

	Miscellaneous Plastics Products (1974)	Nonelectrical Machinery (1983)	Life Insurance (1980)	Banking (1980)	Computer and Data Processing (1983)
Mean Wage	$3.31	$10.20	$6.67	$4.73	$5.91
Variance ln (Wage)	.063	.068	.145	.452	.263
Percent Male	48.1%	84.5%	24.1%	17.0%	55.5%
Percent in Mostly Union Plants	52.5%	61.6%	2.1%	0.5%	0.7%
Mode Establishment Size	100-249	2,500+	5,000+	2,500+	100-249
Sample Size	70,355	54,838	30,976	76,026	14,520
Number of Occupations	42	77	49	87	26
Number of Establishments	876	795	221	580	355
Number of Work Groups	6,198	7,619	4,246	8,028	2,221
Average Number of Persons per Work Group	11.4	7.2	7.3	9.5	6.5
Female/Male Wage Differential	-.240	-.298	-.469	-.426	-.421

Source: Tabulations from BLS Industry Wage Surveys.

Table 3

Decomposition of the Female/Male Wage Differential in Two Manufacturing Industries

Labor Market Structure	Miscellaneous Plastics Products: 1 Coefficient on Proportion Female[1] (s.e.)	2 Extent of Segregation[2]	3 Structure Contribution[3]	Nonelectrical Machinery: 1 Coefficient on Proportion Female[1] (s.e.)	2 Extent of Segregation[2]	3 Structure Contribution[3]
Individual	-.016 (.003)	1.0	-.016	.003 (.004)	1.0	.003
Occupation	-.242 (.004)	.485	-.117	-.452 (.006)	.268	-.121
Establishment	-.099 (.004)	.288	-.029	-.330 (.007)	.432	-.143
Work Group[4]	-.103 (.005)	.761	-.078	-.058 (.007)	.646	-.037
R-Square	.329			.357		
Total Observed Differential[5]			-.240			-.298

[1] Coefficient and standard errors from an OLS regression of log wage on proportion female in occupation, proportion female in establishment, proportion female in work group, and an individual female dummy.

[2] Extent of segregation = (sample variance of proportion female among constituents of labor market structure) / (maximum possible variance).

[3] Coefficient (from column 1) multiplied by extent of segregation (from column 2).

[4] An individual's work group is defined as all workers in the same occupation at the same establishment.

[5] Any difference between the observed differential and the total of the contributions of the structures is due to rounding error.

Source: Tabulations from the BLS Plastics and Nonelectrical Machinery Industry Wage Surveys.

Table 4

Decomposition of the Female/Male Wage Differential in Three Service Industries

	Life Insurance			Banking			Computer and Data Processine		
Labor Market Structure	1 Coefficient on Proportion Female[1] (s.e.)	2 Extent of Seareaation[2]	3 Structure Contribution[3]	1 Coefficient on Proportion Female[1] (s.e.)	2 Extent of Seareaation[2]	3 Structure Contribution[3]	1 Coefficient on Proportion Female' (s.e.)	2 Extent of Segregation[2]	3 Structure Contribution[3]
Individual	-.013 (.006)	1.0	-.013	-.017 (.009)	1.0	-.017	-.015 (.008)	1.0	-.015
Occupation	-.686 (.011)	.477	-.327	-.655 (.021)	.383	-.251	-.852 (.017)	.390	-.332
Establishment	-.256 (.004)	.050	-.013	-.375 (.031)	.042	-.016	-.339 (.015)	.257	-.087
Work Group[4]	-.195 (.005)	.596	-.116	-.283 (.020)	.501	-.142	.023 (.016)	.528	.012
R-Square	.513			.121			.531		
Total Observed Differential[5]			-.469			-.426			-.444

1 Coefficient and standard errors from an OLS regression of log wage on proportion female in occupation, proportion female in establishment, proportion female in work group, and an individual female dummy.

2 Extent of segregation = (sample variance of proportion female among constituents of labor market structure) / (maximum possible variance).

3 Coefficient (from column 1) multiplied by extent of segregation (from column 2).

4 An individual's work group is defined as all workers in the same occupation at the same establishment.

5 Any difference between the observed differential and the total of the contributions of the structures is due to rounding error.

Source: Tabulations from the BLS Industry Wage Surveys.

Table 5

Union Effects on the Structure of the **Female/Male** Wage Differential in the Miscellaneous Plastics Products Industry

Labor Market Structure	Nonunion Establishments: 1 Coefficient on Proportion Female[1] (s.e.)	Nonunion Establishments: 2 Extent of Segregation[2]	Nonunion Establishments: 3 Structure Contribution[3]	Union Establishments: 1 Coefficient on Proportion Female[1] . .	Union Establishments: 2 Extent of Segregation[2]	Union Establishments: 3 Structure Contribution[3]
Individual	-.025 (.005)	1.0	-.025	-.008 (.004)	1.0	-.008
Occupation	-.297 (.006)	.477	-.142	-.204 (.005)	.498	-.102
Establishment	-.000 (.006)	.288	-.000	-.156 (.005)	.283	-.044
Work Group[4]	-.097 (.007)	.761	-.074	-.097 (.006)	.756	-.073
R-Square	.338			.322		
Total			-.241			-.227
Observed Differential[5]			-.246			-.223
Percent Female		56.2			48.1	

1 Coefficient and standard errors from separate union and nonunion OLS regressions of log wage on proportion female in occupation, proportion female in establishment, proportion female in work group, and an individual female dummy.

2 Extent of segregation = (sample variance of proportion female among constituents of labor market structure) / (maximum possible variance).

3 Coefficient (from column 1) multiplied by extent of segregation (from column 2).

4 An individual's work group is defined as all workers in the same occupation at the same establishment.

5 Differences between the observed differential and the total of the contributions of the structures are due to use of industry-wide proportion female in occupation rather than sector-specific estimates.

Source: BLS Plastics Industry Wage Survey.

Table 6

Union Effects on the Structure of the Female/Male Wage Differential in the Nonelectrical Machinery Industry

Labor Market Structure	Nonunion Establishments: 1 Coefficient on Proportion Female[1]	Nonunion Establishments: 2 Extent of Segregation[2]	Nonunion Establishments: 3 Structure Contribution[3]	Union Establishments: 1 Coefficient on Proportion Female[1]	Union Establishments: 2 Extent of Segregation[2]	Union Establishments: 3 Structure Contribution[3]
Individual	.002 (.006)	1.0	.002	.005 (.004)	1.0	.005
Occupation	-.694 (.010)	.212	-.147	-.313 (.007)	.365	-.114
Establishment	-.152 (.010)	.444	-.068	-.406 (.009)	.353	-.143
Work Group[4]	-.015 (.011)	.634	-.010	-.080 (.009)	.624	-.050
R-Square	.373			.298		
Total			-.223			-.302
Observed Differential[5]			-.249			-.277
Percent Female		25.2			9.4	

[1] Coefficient and standard errors from separate union and nonunion OLS regressions of log wage on proportion female in occupation, proportion female in establishment, proportion female in work group, and an individual female dummy.

[2] Extent of segregation = (sample variance of proportion female among constituents of labor market structure) / (maximum possible variance).

[3] Coefficient (from column 1) multiplied by extent of segregation (from column 2).

[4] An individual's work group is defined as all workers in the same occupation at the same establishment.

[5] Differences between the observed differential and the total of the contributions of the structures are due to use of industry-wide proportion female in occupation rather than sector-specific estimates.

Source: BLS Nonelectrical Machinery Industry Wage Survey.

Table 7

Summary of U.S. Equal Opportunity Policy Provisions

Policy (Year)	Provisions (Description)[1]	Enforcing Body
Equal Pay Act (1963)	Equal Pay (prohibits pay inequality on the basis of sex among workers performing equal jobs in the same establishment)	Federal Courts
Title VII, Civil Rights Act (1964)	Equal Pay and Equal Employment Opportunity (EEO) (prohibits sex discrimination [by employers with more than 15 employees1 in virtually all aspects of employment: hiring, firing, training, promotions, and other terms and conditions of employment)	Equal Employment Opportunity Commission
Executive Orders 11246 (1965) and 11376 (1967)	Equal Pay, Equal Employment Opportunity (EEO) and Affirmative Action (requires setting goals and timetables to reduce under-representation of women in an firm's employment patterns as a condition of receipt of federal contracts or subcontracts)	Office of Federal Contract Compliance
Title IX, Civil Rights Act (1975)	Equal Education (prohibits sex discrimination in course offerings, athletic activities and facilities, financial assistance, counseling, textbooks, etc., in educational institutions receiving federal funds)	Equal Employment Opportunity Commission
proposed	Comparable Worth (requires equal pay for jobs of comparable value to the employer or worth, i.e., of comparable skill, responsibility, working conditions, knowledge, etc.)	--

'Some provisions of these acts are repetitive. For brevity, descriptions are included only once in this table.

Table 8

Relationship Between Equal Opportunity Policy Provisions
and Components of the Female/Male Wage Differential

Component (Estimated Mean % Diffl.[2])	Factor[3] (Estimated Mean)	Policy Provision[1] to Reduce Component, Assuming Source is: Employer Discrimination	Human Capital
Individual (-1%)	G (-.01)	Equal Pay, EEO Training	Equal Education
Occupation Segregation (mfg: -11% svc: -26%)	B^o (mfg: -.35 svc: -.73)	Comparable Worth	n.a.
	S^o (.40)	EEO Hiring and Promotion, EEO Training, Affirmative Action	Equal Education
Establishment Segregation (-6%)	B^e (-.28)	none	n.a.
	S^e (.21)	EEO Hiring, Affirmative Action	n.a.[4]
Work Group Segregation (-7%)	B^w (-.12)	Comparable Worth	n.a.
	S^w (.61)	EEO Hiring and Promotion, EEO Training, Affirmative Action	n.a.[4]
TOTAL WAGE DIFFERENTIAL (mfg: -23%, svc: -36%)			

n.a.: Not applicable; no policy remedy will affect this factor.

[1]See Table 7 for summary of these policy provisions and the legislation and regulations that contain them. EEO an acronym for Equal Employment Opportunity. This table lists only short-run effects of these policies; long-run effects are very likely to be sizable, but are difficult to classify. For instance, EEO promotions presumably enhance the skills of the women promoted, increasing their human capital.

[2]Expressed as percentage deviations from the geometric mean wage.

[3]These factors are defined in the text and in Table 1. Estimates are simple means for the values reported in Tables 3 and 4. G, B^o, B^e and B^w are estimated OLS coefficients for the wage effects of increasing proportion female. S^o, S^e and S^w are measures of the amount of segregation by constituents of the components.

[4]If establishments or work groups are sorted by quality of worker, then Equal Education could reduce this component. Otherwise, no policy remedies would affect this factor.

Appendix

Job Classifications Surveyed in Industry Wage Surveys[1]

MISCELLANEOUS PLASTICS PRODUCTS (1974)

Processing Jobs

010 Blenders
020 Blow-molding-machine operators (set up and operate)
030 Blow-molding-machine operators (operate only)
040 Compression-molding-machine operators (set up and operate)
050 Compression-molding-machine operators (operate only)
060 Extrusion-press operators (set up and operate)
070 Extrusion-press operators (operate only)
080 Finishers, molded plastics products
090 Injection-molding-machine operators (set up and operate)
100 Injection-molding-machine operators (operate only)
110 Laminating-press operators
120 Mandrel men
130 Plastics cutters, machine
140 Preform-machine operators
150 Scrap-preparing operators

Setup Men, Plastic-Molding Machines
161 Blow-molding machines
162 Compression-molding machines
163 Extrusion presses
164 Injection-molding machines
165 Vacuum-plastics-forming machines
166 Other (including combination of above)

170 Tumbler operators
180 Vacuum-plastics-forming-machine operators (set up and operate)
190 Vacuum-plastics-forming-machine operators (operate only)

Maintenance Jobs

200 Electricians, maintenance
210 Helpers, trades, maintenance
220 Machine-tool operators, toolroom
230 Machinists, maintenance
240 Maintenance men, general utility
250 Mechanics, maintenance
260 Pipefitters, maintenance
270 Tool and die makers

---

[1]SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, Division of Occupational Wage Structures.

PLASTICS, continued

Miscellaneous Jobs

310 Inspectors, molded products
320 Janitors
330 Laborers, material handling
340 Packers, shipping
350 Receiving clerks
360 Shipping clerks
370 Shipping and receiving clerks

Truckers, Power
381 Forklift
382 Other than forklift
390 Watchmen

2. NONELECTRICAL MACHINERY (1983)

Machine-Tool Operator, Production

Automatic-Lathe Operator
5111 Class A
5112 Class B
5113 Class C
5114 N/C, set up and operate
5115 N/C, operate only

Drill-Press Operator, Radial
5121 Class A
5122 Class B
5123 Class C
5124 N/C, set up and operate
5125 N/C, operate only

Drill-Press Operator, Single- or Multiple-Spindle
5131 Class A
5132 Class B
5133 Class C
5134 N/C, set up and operate
5135 N/C, operate only

Engine-Lathe Operator
5141 Class A
5142 Class B
5143 Class C
5144 N/C, set up and operate
5145 N/C, operate only

Grinding-Machine Operator
5151 Class A
5152 Class B
5153 Class C
5154 N/C, set up and operate
5155 N/C, operate only

MACHINERY, continued

Machine-Tool Operator, Miscellaneous
5161 Class A
5162 Class B
5163 Class C
5164 N/C, set up and operate
5165 N/C, operate only

Milling-Machine Operator
5171 Class A
5172 Class B
5173 Class C
5174 N/C, set up and operate
5175 N/C, operate only

Screw-Machine Operator, Automatic
5181 Class A
5182 Class B
5183 Class C
5184 N/C, set up and operate
5185 N/C, operate only

Turret-Lathe Operator, Hand
5191 Class A
5192 Class B
5193 Class C
5194 N/C, set up and operate
5195 N/C, operate only

Other Jobs

Set-Up Worker, Machine Tools
5201 Conventional machines
5202 N/C machines

Punch-Press Operator
5211 Class A
5212 Class B

Assembler
5221 Class A
5222 Class B
5223 Class C

5230 Polisher and buffer, metal
5240 Polishing- and buffing-machine operator

Welder, Hand
5251 Class A
5252 Class B

Welder, Machine
5261 Class A
5262 Class B

MACHINERY, continued

Tool and Die Maker
5271 Tool and die maker (jobbing)
5272 Tool and die maker (other than jobbing)

Inspector
5281 Class A
5282 Class B
5283 Class C

5290 Tool clerk

3070 Machinist, maintenance
5330 Machinist, production
3100 Mechanic, maintenance
3010 Carpenter, maintenance
3020 Electrician, maintenance
4030 Janitor, porter, or cleaner
4070 Laborer, material handling

Machine-Tool Operator, Toolroom (Operates Only One Type of Machine Tool)

3061 Drill-press operator, radial
3062 Engine-lathe operator
3063 Grinding-machine operator
3064 Milling-machine operator
3065 Other (not specified) toolroom machine
3068 Operates more than one type of machine tool

3. LIFE INSURANCE CARRIERS (1979)

Selected Insurance Occupations

Actuaries
101 Class A
102 Class B

Claim Approvers
201 Class A
202 Class B

300 Clerks, policy evaluation
310 Clerks, premium-ledger-card

Correspondents
321 Class A
322 Class B

330 Premium acceptors

Underwriters
401 Class A
402 Class B

INSURANCE, continued

Selected General Clerical Occupations

Clerks, Accounting
501 Class A
502 Class B
503 Not classifiable by level

Clerks, File
511 ClassA
512 Class B
513 Class C
514 Not classifiable by level

Key Entry Operators
521 ClassA
522 Class B
523 Not classifiable by level .

Secretaries
531 ClassA
532 Class B
533 Class C
534 Class D
535 Class E
536 Not classifiable by level

Stenographers
541 General
542 Senior
543 Not classifiable by level

Switchboard Operators
551 Class A
552 Class B

560 Transcribing-machine typists

Typists
571 Class A
572 Class B
573 Not classifiable by level

Selected Computer Occupations

Computer Operators
601 Class A
602 Class B
603 Class C
604 Not classifiable by level

INSURANCE, continued

Computer Programmers, Business
611 Class A
612 Class B
613 Class C
614 Not classifiable by level

Computer Systems Analysts, Business
621 Class A
622 Class B
623 Class C
624 Not classifiable by level

630 Data librarians

4. BANKING (1979)

Selected General Clerical Occupations

Bookkeeping-Machine Operators
1010 Class A
1020 Class B

Clerks, File
1030 Class A
1040 Class B
1050 Class C
1053 Not classifiable by level

Clerks, Accounting
1055 Class A
1056 Class B
1057 Not classifiable by level

Key Entry Operators
1060 Class A
1070 Class B
1075 Not classifiable by level

Secretaries
1101 Class A
1102 Class B
1103 Class C
1104 Class D
1105 Class E
1106 Not classifiable by level

Stenographers
1110 General
1120 Senior
1125 Not classifiable by level

BANKING, continued

Switchboard Operators
1130 Class A
1140 Class B

Typists
1150 Class A
1160 Class B
1165 Not classifiable by level

Selected Computer Occupations

Computer Operators
2010 Class A
2020 Class B
2030 Class C
2035 Not classifiable by level

Computer Programmers, Business
2040 Class A
2050 Class B
2060 Class C
2065 Not classifiable by level

Computer Systems Analysts, Business
2070 Class A
2080 Class B
2090 Class C
2095 Not classifiable by level

Selected Banking Occupations

1080 Proof-machine operators
1090 Safe-deposit-rental clerks

Tellers
3010 Note
3020 Commercial-savings (paying and receiving)
3030 Commercial
3040 Savings
3050 All-round

Loan Officers
4010 Personal credit
4011 Commercial loans
4012 Mortgage
4013 Not classifiable by type of loan

5. COMPUTER AND DATA PROCESSING SERVICES (1982)

Computer Operators
101 Level I
102 Level II
103 Level III
104 Level IV
105 Level V
106 Level VI

110 Data Librarians

Electronics Technicians
121 Level I
122 Level II
123 Level III

Key Entry Operators
131 Level I
132 Level II

140 Peripheral Equipment Operators

Programmer/Programmer Analysts
151 Level I
152 Level II
153 Level III
154 Level IV
155 Level V

Systems Analysts
161 Level I
162 Level II
163 Level III

Systems Programmers
171 Level I
172 Level II
173 Level III
174 Level IV