NBER WORKING PAPER SERIES

CONTINUING PROGRESS? TRENDS IN OCCUPATIONAL SEGREGATION IN THE UNITED STATES OVER THE 1970'S AND 1980'S

Francine D. Blau
Patricia Simpson
Deborah Anderson

Working Paper 6716
http://www.nber.org/papers/w6716

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
September 1998

We are indebted to Myra Strober, Marianne Ferber, Robert Hutchens, Lawrence Kahn, Barbara Reskin, and two anonymous referees for helpful comments and suggestions. We also thank Denise Chachere, Stephen Blumenfeld, Lisa Reavlin, Jennifer Berdahl, HoWan Park, and Rachel Valente for excellent research assistance. Any opinions expressed are those of the author and not those of the National Bureau of Economic Research.

Continuing Progress? Trends in Occupational
Segregation in the United States Over the 1970s and 1980s
Francine D. Blau, Patricia Simpson, and Deborah Anderson
NBER Working Paper No. 6716
July 1998

ABSTRACT

This study uses comparable data on 470 detailed occupations from the 1970, 1980 and 1990 Censuses to analyze trends in occupational segregation in the United States in the 1980s and compare them in detail to the 1970s experience of declining segregation. We find that the trend towards reduced segregation did indeed continue into the 1980s at only a slightly slower pace. In both decades, changes in sex composition within occupations accounted for the major share of the decline in segregation (compared to changes in the mix of occupations in the economy). We also find that the pattern of changes in the sex composition of occupations and in the employment distribution of workers that produced the observed reductions in segregation were remarkably similar in each of these two periods. This similarity potentially poses some problems for the future. As women continue to enter the same areas, resegregation, which we found to have relatively moderate effects in the 1970s and 1980s, becomes an increasing possibility. Continued progress towards reducing occupational segregation requires that women succeed in entering a broader range of traditionally male occupations and/or a greater flow of men into traditionally female occupations.

Francine D. Blau
School of Industrial and Labor Relations
Cornell University
265 Ives Hall
Ithaca, NY 14853-3901
and NBER

Patricia Simpson
Institute of Human Resources and
Industrial Relations
Loyola University Chicago
820 Michigan Avenue, Room 1250
Chicago, IL 60611

Deborah Anderson
Department of Economics
University of New Mexico
1915 Roma NE - SSCI 1019
Albuquerque, NM 87131

I. Introduction

Occupational segregation by sex exists in virtually all countries (see, for example, Francine Blau, Marianne Ferber, and Anne Winkler 1998). In pathbreaking work in the early 1970s, Barbara Bergmann (1971, 1974) focused the attention of economists on the pervasiveness of occupational segregation by sex and race, and provided a highly persuasive analysis of its negative consequences for male-female and white-black wage differentials. Since then, occupational segregation by sex has been repeatedly cited by scholars as a major determinant of the gender pay gap.[1] Empirical investigations suggest that from 12 to 37 percent of the gender wage gap in the United States can be explained by occupational segregation (Ronald Ehrenberg and Robert Smith 1997; Macpherson and Hirsch 1995; Sorensen 1990).[2] While it is unclear to what extent this disparity reflects occupational crowding of women (Bergmann 1974) versus skill differences across male and female jobs (Solomon Polachek 1981), there can be little doubt that the extent of occupational segregation is an important indicator of women's economic status in the labor market.

Differences in the distribution of women and men across a wide number of occupational categories may be summarized by a segregation index which gives the percentage of women (or men) who would have to change jobs for the occupational distribution of the two groups to be the same (Otis Duncan and Beverly Duncan 1955). Historical evidence suggests that for the United States, after a period of declining segregation from 1870 to 1900 (Nancy Bertaux 1991), the level of this index was substantial and relatively stable throughout the first half of the 20th century at about 66 to 68 percent (Edward Gross 1968, Jerry Jacobs 1989). Beginning in 1960, however, the index began to fall, declining by 3.1 percentage points over the decade (Francine Blau and Wallace Hendricks 1979). After 1970, this trend accelerated markedly, with a drop of 8.5

[1] For reviews, see Francine Blau (1984) and Elaine Sorensen (1990). More recent evidence comes from Francine Blau and Lawrence Kahn (1997), Barbara Reskin and Patricia Roos (1990) and David Macpherson and Barry Hirsch (1995).

[2] A much larger effect is suggested in a study by Erica Groshen (1991) which uses highly detailed occupational categories. On the other hand, Macpherson and Hirsch (1995) estimate that occupational segregation explains as little as 5 percent of the gender wage gap based on a fixed effects model.

percentage points between 1970 and 1980 (Andrea Beller 1985; Suzanne Bianchi and Nancy Rytina 1986).[3]

It was not clear *a priori* whether the pattern of decreasing occupational segregation would continue into the 1980s. On the one hand, a number of factors that contributed to the decrease in segregation undoubtedly persisted. Women's labor force attachment continued to increase and gender differences in patterns of educational attainment (e.g. college attendance, fields of specialization) continued to narrow (Blau, Ferber, and Winkler 1998). On the other hand, the federal government's enforcement of anti-discrimination laws and regulations was scaled back in the 1980s (Jonathan Leonard 1989).[4] In addition, some have expressed concern that continued inflows of women into recently integrated jobs would eventually result in these jobs becoming newly segregated as female; and, indeed, there is some evidence that this occurred during the 1970s (Barbara Reskin and Patricia Roos 1987; Reskin and Roos 1990; Myra Strober 1984; Rosemary Wright and Jerry Jacobs 1994). A continued or intensified pattern of "resegregation" into the 1980s could have resulted in a deceleration in the decline in segregation, and possibly even a reversal of this trend.

This study uses data from the 1970, 1980 and 1990 Censuses to ascertain trends in the extent of occupational segregation in the United States over the 1980s and compare them to the 1970s experience. We seek to answer two questions. First, did the decrease in segregation continue into the 1980s and was similar progress achieved? Second, how similar were the underlying shifts in the sex composition of occupations and in the employment patterns of workers that produced the observed reduction in each of these two periods? Our detailed analyses of this latter question shed new light on the sources of the 1970s changes as well.

While some research suggests that occupational segregation declined in the 1980s (e.g., Joyce Jacobsen 1994; Macpherson and Hirsch 1995), ours is the first detailed comparison of the

[3] This figure was obtained by Bianchi and Rytina (1986) using census data and 1980 occupational categories. Similarly, Beller (1985) found an average annual decrease of .74 percentage points over the 1972 to 1981 period using data from the Current Population Survey and 1970 occupational categories.

[4] In the U.S., the major anti-discrimination legislation is Title VII of the Civil Rights Act of 1964 which is enforced by the Equal Employment Opportunity Commission (EEOC).

experience over the two decades using comparable data from each of three Censuses.[5] Although there were substantial changes in the Census occupational classification scheme between 1970 and 1980, comparison of 1970 and 1980 occupational distributions is possible based on a Census Bureau publication which utilized a sample of double-coded 1970 questionnaires to produce the 1970 distributions in 1980 occupational categories (U.S. Department of Commerce, Bureau of the Census 1984a). Fortunately, there was little modification in the Census occupational classification system between 1980 and 1990 (U.S. Department of Commerce, Bureau of the Census 1992). In all, we are able to report results across 470 detailed occupations for all Census years.

II. Causes of Occupational Segregation, Integration, and Resegregation

Economic theory suggests that occupational segregation may be due to either supply- or demand-side factors, or a combination of both. The major supply-side theory is the human capital explanation which holds that since women generally anticipate shorter and less continuous work lives than men, it will be in their interest to choose occupations which require smaller human capital investments and have lower wage penalties for time spent out of the labor market (Polachek 1981). Similarly, women may select occupations which are more compatible with the performance of their household tasks (Gary Becker 1985). Supply-side effects may also be due to what has been labeled "societal discrimination" which occurs when women are socialized to enter traditionally female pursuits and/or face barriers to obtaining education and pre-job training in traditionally male fields (e.g., Blau, Ferber, and Winkler 1998). On the demand side, discrimination against women, based either on the tastes of employers, coworkers or customers (Gary Becker 1957) or on employers' perceptions that women are on average less well qualified for male jobs (e.g., Dennis Aigner and Glen Cain 1977) may contribute to occupational

[5] A recent study by Mary King (1992) found that occupational segregation increased from 1980 to 1988. However, the long time period considered by King (1940-1988) required her to drop a considerable number of occupational categories in order to obtain comparability in occupational classifications. In addition, her work was based on a comparison of Census and Current Population Survey (CPS) data, and there is evidence that even when the same occupational categories are employed, levels of segregation indexes computed from these two data sources are not strictly comparable (Beller 1985).

segregation. Such occupational differences arise when employers discriminate against equally qualified women in hiring, placement, access to on-the-job training programs or promotion for traditionally male jobs.

Some empirical evidence has been obtained for each type of explanation, suggesting that both supply- and demand-side factors play a role in producing the segregation which we observe in the U.S. labor market.[6] Similarly, it is likely that both supply- and demand-side shifts contributed to the reduction in occupational segregation which occurred in the 1970s. Labor force attachment among women, especially younger women, increased over the 1970s (James Smith and Michael Ward 1984; Claudia Goldin 1990) raising their incentives to invest in job-oriented training. At the same time, perhaps in part due to their longer expected worklife, women increased their representation in college and graduate and professional schools and in traditionally male fields of study (Jerry Jacobs 1995; Blau, Ferber, and Winkler 1998).

On the demand side, enforcement of the government's anti-discrimination laws and regulations most likely lowered the barriers to women's entry into formerly male pursuits (Andrea Beller 1982). Furthermore, this process may well have been reinforced by feedback effects. That is, women's incentives to invest in job-oriented human capital would be enhanced by their perception that labor market discrimination against them had diminished, and the reluctance of employers to hire women in traditionally male jobs would decline in response to their perceptions that women's labor force attachment and job skills had increased.

Most of these supply- and demand-side factors extended into the 1980s, suggesting that occupational segregation would continue to decline during this period. However, as noted above, enforcement of equal employment opportunity legislation declined during this period, while there

[6] For example, support for the human capital model is provided by empirical evidence that a substantial portion of the lower pay in female jobs is accounted for by differences in the skills required in male and female occupations (Macpherson and Hirsch 1995); see also Polachek (1981). On the other hand, research by Paula England (1982) does not support the human capital explanation. If women select male or female jobs based on their willingness to undertake extensive on-the-job training investments, we would expect earnings profiles of women in male jobs to start below those in female jobs but to be more steeply sloped; this has not been found to be the case. In addition, evidence has been obtained which is consistent with discrimination in access to on the job training (e.g., Greg Duncan and Saul Hoffman 1979; Anne Royalty 1996) and in promotion (e.g., Robert Cabral, Marianne Ferber and Carole Green 1981).

was the possibility of an increased tendency toward resegregation of formerly male and integrated occupations into female occupations.

The reasons for resegregation may be tied to the factors that initially produce segregated occupations. Discrimination may still prevent women from entering many traditionally male jobs, and cause them to "crowd" into those areas where, for whatever reason, the barriers have been lowered. Women may also be attracted to jobs which they know other women have successfully entered, assuming, perhaps erroneously, that an extremely low representation of women in an occupation signals that there is a high degree of discrimination, or that it is difficult for individuals with family responsibilities to work in those jobs. Finally, Bergmann's (1974) crowding model suggests that a significant influx of women into a formerly male area will reduce relative wages by expanding the supply of labor.[7] This would have the effect of discouraging male incumbents from remaining in, and new male workers from entering, the occupation.

Resegregation is not a new phenomenon. The currently predominantly female occupations of elementary school teacher, secretary, and bank teller, for example, were all initially predominantly male (Alice Kessler-Harris 1982; Strober 1984; Myra Strober and Carolyn Arnold 1987). Indeed, without some resegregation—a process which brings new occupations into the "female" sector—it is unlikely that a stable degree of occupational segregation by gender could have persisted for so long in the face of rising female labor force participation. However, the particular circumstances of the 1970s may have increased the rate at which women entered new occupations which would eventually become female.

Technological change in the form of the telecommunications revolution appears to have facilitated the entry of women into a number of male jobs by lowering skill requirements. This seems to have occurred with the computerization of a number of occupations during the 1970s, including, for example, insurance adjusters, examiners and investigators, where women's representation increased from 30 percent in 1970 to 60 percent in 1980, and typesetters and compositors, where women's share rose from 17 percent in 1970 to 56 percent in 1980. Both

[7] See also Strober (1984).

occupations were at least 70 percent female by 1990. In addition, it may be that the affirmative action pressures of the 1970s were applied unevenly, resulting in considerably greater access of women to some traditionally male jobs than to others. At the same time, the large increases in female labor force participation rates during the 1970s[8] combined with declines in the demand for labor in a number of traditionally female occupations[9] would be expected to make women workers particularly responsive to any new opportunities. Since resegregation takes time to work itself out, some of the occupational integration observed during the 1970s may have been illusory, or at least transient, rather than permanent. The consequence would be a slower pace of progress during the 1980s as the continued entry of women into a number of formerly male areas resulted in increasing overrepresentation of women in these jobs. Thus, the extent of resegregation is an important empirical question which we examine below.

III. Empirical Results

A. Trends in the total labor force

In this section we present the trends in the extent of occupational segregation over the 1970s and 1980s. The magnitude of gender differences in occupations is most commonly measured by an index of segregation developed by Duncan and Duncan (1955), and, for comparability with other studies, we employ that measure here.[10] In any year, the index is computed as:

$$S_t = (0.5)\sum_i |m_{it} - f_{it}| \quad (1)$$

[8] The female labor force participation rate increased from 43.4 percent in 1970 to 51.6 percent in 1980 and 57.5 percent in 1990 (Blau, Ferber, and Winkler 1998).

[9] For example, job opportunities declined in a number of clerical jobs (e.g., typist, telephone operator, stenographer, and tabulating machine operator) due to technological change (Heidi Hartmann, Robert Kraut, and Louise Tilly 1986).

[10] For a consideration of alternative segregation measures, see Robert Hutchens (1991).

where m_{it} (f_{it}) is the proportion of the male (female) labor force employed in occupation *i* at time *t*. This measure, generally expressed as a percentage, indicates the proportion of women (or men) who would have to change occupations for the occupational distribution of men and women to be the same. A value of zero indicates complete integration (i.e., the distribution of women across occupations is the same as that of men, or, equivalently, the female share of each occupation is identical to the female share of the total labor force), while a value of 100 percent indicates complete segregation (i.e., women and men work in completely separate occupations).

For this analysis, the employment distribution of all male and female workers in each year was computed across 470 detailed occupational categories for which it was possible to obtain comparable data. Each of the included occupations consists of a 3-digit Census category or, in a very small number of cases, a combination of closely related categories. Together these 470 occupations account for the entire labor force in each year. See Appendix Table A-1 for a listing of occupations and percent female in 1970, 1980, and 1990.[11]

Our results, reported in Table 1, show that the index of segregation fell in both periods, declining from 67.68 in 1970 to 59.25 in 1980 and 52.98 in 1990. Although the index fell somewhat less in absolute terms over the 1980s than over the 1970s, the relative decline was fairly similar in both decades (10.6 percent in 1980s and 12.5 percent in 1970s).[12] Certainly, the decrease of 6 to 8 percentage points in each of the two decades was considerably larger than the 3 percentage point fall that occurred during the 1960s (Blau and Hendricks 1979). Our findings of declining segregation over the 1970s and 1980s broadly match results in other studies (e.g., Macpherson and Hirsch 1995; Jacobsen 1994). Our study is, however, the first to use census data

[11] Note that the occupations in Appendix Table A-1 are listed in the same order as in census publications. The Census (U.S. Department of Commerce, Bureau of the Census 1984a) lists 486 detailed occupations for which data are available in 1970 and 1980. We were required to condense these into 470 occupations due to (1) zero employment in seven very small occupations in 1970, and (2) incomparability of occupation schemes between 1980 and 1990, resulting in a loss of nine additional occupations. As we note in the text, the included occupations account for the entire labor force in all years. While forcing one historical period to take on the occupational classifications of another may be problematic over an extended period of time, due to the double-coding of the 1970 data and the short period of time considered here, this is not a problem in this study.

[12] The figures we obtain for the level and change in the index over the 1970-80 period are essentially the same as those reported by Bianchi and Rytina (1986) using the full set of 1980 Census occupations.

throughout and a consistent set of occupations across all years. This consistency is extremely important to an investigation of trends, since the amount of segregation captured in each year may differ depending on the occupational categories employed. Further, census data provide large samples which not only increase the accuracy of our estimates but also permit us to distinguish a larger number of occupations.[13]

Thus, it appears that the widely noted decline in occupational segregation which occurred in the 1970s did indeed continue into the 1980s and that, moreover, the rate of change in the index was only slightly slower in the second decade. However, a recent paper by William Carrington and Kenneth Troske (1997) suggests that the interpretation of the Duncan index as a measure of occupational segregation may be biased when the number of individuals in any given occupation is small, since in this case even random allocations of individuals across occupations may generate relatively high levels of dissimilarity purely by chance. This might not appear to be an issue when the large sample sizes available in census data are employed to estimate the index. However, as noted above, the 1970 (but not the 1980 or 1990) estimates are based on a subset of the initial Census sample which was double-coded using the 1980 as well as the 1970 occupation codes, and, in some cases, sample sizes in particular occupations are fairly small. To test for biases due to small cell size, we reestimated the segregation indexes excluding in all years occupations in which there were fewer than 50 or fewer than 100 workers. (This was only an issue in 1970, as the smallest cell sizes in 1980 and 1990 were 332 and 253, respectively.) Fortunately, although this resulted in the exclusion of a fair number of occupations, estimated trends in segregation were virtually identical.[14] Thus, this issue does not appear to be a concern for our study.

---

[13] Using CPS data and without limiting the analysis to the same occupations in all years, Macpherson and Hirsch (1995) obtain the following values for the segregation index: 68.5 in 1973/74, 62.8 in 1980, and 55.5 in 1990. Using a consistent set of 238 occupations in the 1970 and 1980 Censuses and 1990 CPS, Jacobsen (1994) reports that the index falls from 62 in 1970 to 55 in 1980 and 51 in 1990.

[14] Using the sample of 305 (218) occupations with cell sizes no less than 50 (100) in 1970, the segregation index is 65.73 (62.89) in 1970; 57.23 (54.63) in 1980; and 50.55 (47.98) in 1990, yielding decreases in the segregation index of 8.50 (8.26) over the 1970s and 6.68 (6.65) over the 1980s. See also Blau (1977) for an additional discussion of this issue.

When considering the mechanism that produces a decrease in the segregation index, we normally think first of a change in sex composition within an occupation, as occurs when women enter predominantly male jobs in large numbers or, less frequently, men enter predominantly female occupations. However, as Victor Fuchs (1975) first pointed out, changes in the degree of segregation may also occur as a byproduct of shifts in the occupation mix of the economy which affect the relative size of predominantly male, predominantly female, and integrated occupations. So, for example, a secular decline in employment in predominantly male manufacturing occupations would cause a decrease in the index, even if "within occupation" segregation remained unchanged. Alternatively, an increase in the relative importance of predominantly female service occupations in the overall economy could mask the effects of increasing integration within occupations.

In order to better understand the similarities and differences in the sources of observed changes in the index over the 1970s and 1980s, we decompose the change in the index over each period into (1) a “sex composition effect” due to changes in sex composition within occupations, holding the size of occupations constant, and (2) an “occupation mix effect” due to changes in the occupational mix of the economy, holding sex composition within occupations constant (Blau and Hendricks 1979; Fuchs 1975). We begin by noting that if F_{it} (M_{it}) is the number of females (males) in occupation i in year t and $T_{it} = F_{it} + M_{it}$ is the total employment in occupation i in year t, then equation (1) may be rewritten as:

$$S_t = (0.5)\sum_i \left| \frac{q_{it} T_{it}}{\sum_i q_{it} T_{it}} - \frac{p_{it} T_{it}}{\sum_i p_{it} T_{it}} \right| \tag{2}$$

where $p_{it} = F_{it} / T_{it}$ is the proportion women comprise of each occupation’s employment and $q_{it} = (1 - p_{it}) = M_{it} / T_{it}$ is the proportion men comprise of each occupation’s employment.

The sex composition and occupation mix effects are then defined as follows:

$$(3) \qquad \textit{Sex Composition Effect} = \left[(0.5) \sum_i \left| \frac{q_{i2} T_{i1}}{\Sigma_i q_{i2} T_{i1}} - \frac{p_{i2} T_{i1}}{\Sigma_i p_{i2} T_{i1}} \right| \right] - S_1$$

$$(4) \qquad \textit{Occupation Mix Effect} = S_2 - \left[(0.5) \sum_i \left| \frac{q_{i2} T_{i1}}{\Sigma_i q_{i2} T_{i1}} - \frac{p_{i2} T_{i1}}{\Sigma_i p_{i2} T_{i1}} \right| \right]$$

where S_1 and S_2 denote the segregation index, as defined in equation (2) above, in the beginning and end years, respectively.

The sex composition effect gives the *change in the index* that would have occurred if the size of each occupation had remained fixed at its initial level, so that all variation in the index between the two years would be due to changes in sex composition within occupations. The occupation mix effect indicates the *change in the index* that would have occurred taking end year sex composition of each occupation as given, so that all variation in the index between the two years would be due to changes in the size of occupations. It should be noted that this is an index number formulation and thus suffers from the traditional index number problems. First, the selection of any particular set of weights is arbitrary and the results obtained may differ depending on the weights selected. Second, for the sex composition and occupation mix effects to sum to the total change in segregation requires the use of an inconsistent set of weights. An alternative approach would be to use consistent weights and allow for an interaction effect. We have chosen to do the former in order to simplify the presentation of our results. Fortunately, however, our findings are robust to the allowance for interaction effects and the use of either beginning or end year weights to compute the sex composition and occupation mix effects.

The results of the decomposition of the change in the segregation index for the total labor force are shown in Table 1. They indicate that most of the reduction in occupational segregation in both the 1970s and the 1980s was due to changes in sex composition within occupations—76

percent in the 1970s and 68 percent in the 1980s—but that the changing occupational mix of the economy took on somewhat greater importance in the latter decade.[15]

One question that arises regarding the observed changes due to shifts in the sex composition of occupations is to what extent they represent shifts in female or male employment. To address this question, distributions of men and women by sex composition of occupation are shown in Table 2. Results are presented both when the sex composition of each occupation is defined on the basis of percent female in the occupation in the current year (IA, IIA, IIIA) and when sex composition is defined based on percent female in the occupation in the initial year of each period (IB, IIB). It is the latter that sheds light on the movements of men and women into occupations traditionally held by the other sex. Occupations are classified as "male," "female," or "integrated" based on the divergence between sex composition in the occupation and in the labor force as a whole. Specifically, in each year t, an occupation is classified as male if $p_{it} < (P_t - .10)$ and female if $p_{it} > (P_t + .10)$, where p_{it} is the proportion that women comprise of employment in occupation i and P_t is the proportion that women comprise of the labor force (equal to .380 in 1970; .425 in 1980; and .457 in 1990). The remaining jobs are classified as integrated.

In both periods, the decrease in occupational segregation due to changes in sex composition of occupations was primarily due to shifts in the distribution of women into initially male jobs rather than of men into initially female jobs. Given the pay differentials which have been observed between male and female occupations, this is probably not surprising. Between 1970 and 1980, the percentage of men employed in occupations which were classified as male in 1970 declined by only 1 percentage point, while the percentage of women in occupations which were initially female fell by about 9 percentage points. Most women moved into jobs that were initially male, as opposed to integrated occupations. Similarly, over the 1980s, the percentage of men in

[15] As noted above, these results are robust to changes in weighting schemes. Using end year weights, the sex composition effect is equal to -7.02 and -4.39 for the 1970s and 1980s, respectively. The occupation mix effect for the two decades is -1.40 (1970s) and -1.88 (1980s) when calculated using beginning year weights. The small remainder of the total change in the segregation index in each period (that is, the total change minus sex composition and occupation mix effects estimated using consistent weights) is attributed to an interaction of sex composition and occupation mix effects.

initially male occupations fell by 1.6 percentage points, while the percentage of women in initially female occupations decreased by 5 percentage points.

Of course as women and, to a lesser extent, men move into sex atypical occupations, the sex composition of these jobs changes. The cumulative effect of such movements may be seen by comparing the distribution of men and women across occupations classified by their sex composition in 1970 with their distribution across occupations classified by their sex composition in 1990. The picture that emerges is of a substantial decline in segregation. Between 1970 and 1990, the percentage of all women working in female occupations fell from 78 to 64 percent, while the share of men employed in male occupations fell from 79 to 72 percent.

Taking a higher cut-off for sex typical occupations, as exemplified in Table 3, shows far more dramatic changes. The share of male employment in highly (80 percent or more) male occupations fell from 71 percent in 1970 to 43 percent in 1990, while the share of female employment in highly (over 80 percent) female occupations fell from 55 percent to 37 percent. Thus, while in 1970 the majority of men and women worked in jobs where individuals of the same sex comprised the overwhelming majority of workers, by 1990 this was true of only about one third to two-fifths of each group.

The results in Table 2 raise some question regarding the sources of the occupation mix effect since we see no evidence of a decrease in overall employment in jobs which were initially female over the 1970s or the 1980s, and only a small decrease in employment in initially male jobs. However, Table 3 sheds light on this issue and indicates a decline in the share of total employment in the most heavily segregated male and female occupations (0-10 and 91-100 percent female in the 1970s, and 0-20 and 81-100 percent female in the 1980s). The result of these shifts was that the occupation mix effect worked to reduce segregation in both periods, as the most highly segregated occupations declined in importance relative to those that were less highly segregated.

B. Trends across major occupational groups

While trends in occupational segregation at the economy-wide level are interesting in their own right, to understand the nature of these shifts better as well as to identify any important differences between the experiences of the 1970s and the 1980s, it is desirable to clarify the role of major occupation groups and specific detailed occupations in producing these changes. To do this, we follow Bertaux (1991) and disaggregate the sex composition and occupation mix effects. That is, as may be seen in equations (3) and (4), each of these effects may be obtained at the level of the individual occupation and then summed over occupations to obtain its value for the labor force as a whole. Thus, to see the role of major occupations in producing the overall change, we simply obtain subtotals of each effect at the level of the major occupation category, or, within major occupation, by initial sex composition of the occupation.[16] This permits us to learn how much of the *total change* was due to changes in sex composition or size of occupations within each major occupational category. To further capture the nature of the shifts that occurred, we also present illustrative results by detailed occupation.

To guide our interpretation of these results, it is helpful to clarify a couple of points about the segregation index and what influences the change in the segregation index and its components, the sex composition and occupation mix effects. First, in a given year, a job in which women comprise the same proportion of total employment as their share of the labor force contributes zero to the segregation index. Controlling for the size of the occupation, the further the departure of percent female in the occupation from this non-segregation norm (in either direction), the greater is the contribution of the occupation to the segregation index. Thus, an increase in percent female in predominantly male jobs or a decrease in percent female in traditionally female jobs will generally cause a negative sex composition effect (working to *decrease* the segregation index). However, it is important to realize that when the share of women in the labor force is increasing, as has occurred during our period, we essentially have a "moving target." An initially female job

[16] Bertaux (1991) reports results for specific occupational categories, but the principle is the same. We also present illustrative results by detailed occupation below.

in which percent female remains constant, or rises by less than the increase in women's representation in the labor force as a whole, therefore contributes a negative sex composition effect, since it is coming closer to the (rising) non-segregation norm. Conversely, an initially male job in which percent female does not increase, or rises by less than the increase in women's representation in the labor force as a whole, causes a positive sex composition effect (working to *increase* the segregation index) as it gets further from the (rising) non-segregation norm. Consequently, in addition to examining the contribution of each major occupation category to the sex composition effect, in the results presented below we additionally break this down by initial sex composition of the occupation to see which of these processes is at work. The results for the occupation mix effects are similarly disaggregated to illustrate the role played by declines in predominantly female versus predominantly male jobs.

Second, as equations (2)-(4) indicate, the contribution of an occupation to the change in the segregation index and the sex composition and occupation mix effects depends on its size. The sex composition effect holds *changes* in the size of occupations constant, but, for example, a given increase in the representation of women in an occupation will have a greater effect the larger the initial size of the occupation. And, similarly, a given growth rate of occupational employment will have a greater impact on the occupation mix effect, the larger is occupational employment in the initial year. The same is true for major occupational categories: their contribution to the overall change in the segregation index or the sex composition and occupation mix effects will depend on their size. This greater weighting of larger occupations is appropriate for evaluating the impact of changes in their sex composition or size on the overall amount of segregation, since shifts in larger occupational categories result in larger employment redistributions of men and women across categories. However, it is also of interest to compare the 1970s and 1980s with respect to differences across major occupations in the extent of changes in sex composition *per se*, regardless of the impact on measures of segregation, since this permits us to identify areas where women have found doors increasingly open up to them, as well as areas where they have not. We examine this issue in the next section where we present the results of

descriptive regressions analyzing the extent of changes in percent female within occupations by major occupation group.

Our results for the disaggregated segregation measures are presented in Table 4 which shows the contribution of each major occupation to the sex composition and occupation mix effects in each period and further disaggregates these effects within major occupations by initial sex composition of the occupation. In Tables 5 and 6, we present illustrative listings of individual occupations which made especially large contributions to the sex composition or occupation mix effects.

Looking first at the sex composition effects in Panel A of Table 4, we see that, in both the 1970s and the 1980s, the bulk of the negative sex composition effect was attributable to changes in the representation of women within white collar occupations—especially the managerial, professional, sales, and administrative support categories—and service jobs. Blue collar occupations, as well as technicians and farming, played a relatively small role. Calculations based on Table 4 indicate that the relative contribution of the various major occupations to the overall sex composition effect was remarkably similar in the 1970s and 1980s, with the only notable shift being an increase in the importance of changes in the sex composition of sales occupations in the latter decade.[17]

Further inspection of Table 4 shows that, in both periods, the contribution of the managerial category was almost entirely due to an increase in the representation of women in predominantly male jobs, including managers and administrators (not elsewhere classified), accountants and auditors, and public relations managers, among others (Table 5).

The pattern for professional and sales jobs was more mixed. In the 1970s, the bulk of the contribution of the professional category was due to a decrease in the degree of segregation of female jobs, especially elementary school teachers, where the representation of men increased substantially, and occupations like registered nurses, where the very high percentage women

[17] For 1970 - 1980, the percentages of the sex composition effect attributable to these major occupations were: 20 (managers); 13 (professionals); 17 (sales); 13 (administrative support); and 30 (services). For 1980 - 90, the figures were: 17 (managers); 11 (professionals); 23 (sales); 16 (administrative support); and 29 (services).

comprise of all workers fell very slightly or failed to increase (Table 5). In contrast, a rise in the representation of women in male jobs accounted for most of the effect attributed to professional occupations in the 1980s. Despite the dominant effect of increasing integration of male professional jobs, registered nurses again contributed a relatively large (negative) effect as women's representation fell a bit more during the 1980s. This illustrates that, when women's share of the labor force is rising, large female occupations in which percent female simply increases at less than the rate for the labor force as a whole can have a large impact on the index.

The opposite pattern prevailed for the sales category, with an increase in the representation of women in male jobs accounting for most of the contribution of this category in the 1970s, but diminished segregation within female jobs accounting for most of the effect in the 1980s. Although the relative impact of shifts in male and female jobs differed in the two decades, there is considerable overlap in the list of specific occupations involved (Table 5). Moreover, it should be noted that the effect of male jobs remained large in absolute value in the 1980s.

In both decades, the sizable negative contribution to the sex composition effect of administrative support and service jobs principally reflected a decrease in the degree of segregation in female jobs relative to women's share of the labor force. However, the negative effect of the increasing representation of women in predominantly male jobs was fairly substantial for administrative support jobs in the 1970s and for service occupations in both periods. The magnitude of these effects and that obtained for sales jobs, as noted above, are comparable to the contribution of the changing sex composition of male jobs in the professional category. This latter finding underscores the usefulness of our decomposition of the sex composition effect, since this is really the only way to assess the quantitative importance of observed changes in the sex composition of male jobs in any particular major occupational category for the degree of segregation in the labor force as a whole.

As noted above, sex composition effects in other categories, including blue collar, technical and farm jobs, were considerably smaller. While it is important to note that the magnitude of these effects reflects the size of these occupations, as well as the degree of change in

their sex composition, in the case of craft and operator jobs, changes in the sex composition of male occupations actually worked to increase segregation (see Table 4). These results support the general perception that change has been particularly slow in blue collar occupations. Further evidence of this will emerge in the regression analysis in the next section.

Summarizing our findings for the sex composition effect, we have seen that the contribution of major occupational categories may be traced to either male or female jobs. It is, of course, the former which we traditionally think of as indicating expansions in opportunities for women. Integration of male jobs has occurred throughout the occupational distribution. The quantitatively largest effects in both decades were for executive and managerial jobs, but professional, sales, and service jobs also made substantial contributions in both periods, as did administrative support jobs in the 1970s. The largest effects for female jobs were in administrative support and service jobs, in both decades; in professional jobs, in the 1970s; and in sales jobs, in the 1980s. In some cases, this was due to increases in men's representation in female occupations. In others, however, it represented rough stability in women's proportion of already heavily female occupations in the face of their rising share of the labor force; in some instances, women's representation, already in the high 90s, could not increase much further. Nonetheless, these results are of interest because they indicate the areas from which women were released (in the aggregate sense), so that their share of employment in male jobs could increase. Moreover, they identify the extent to which this release was accomplished by constant or declining percentages of women within female occupations as compared to reductions in the size of such jobs (i.e., changes in occupation mix).

The results in panel B of Table 4 indicate that the favorable occupation mix effect in both the 1970s and 1980s was due to the declining relative importance of female administrative support jobs, male farm, craft and laborer jobs, and both male and female operative jobs. There were some differences between the two periods however. A decline in female service occupations was important in the 1970s, but less so in the 1980s, while the contribution of administrative support and craft jobs grew in the 1980s and that of farm occupations declined.

Table 6 provides examples of the specific occupations involved in these shifts. The list of female administrative support occupations which made the largest contributions spans a partly overlapping set of female clerical occupations for the two decades, including typists, bookkeepers, telephone operators, and secretaries. The application of computers and of information processing and related computer technologies have been linked to the decline of female occupations like these (Hartmann, Kraut, and Tilly 1986; Jeremy Rifkin 1995).

The relative contraction of highly segregated male and female blue collar occupations likely reflects the widely noted decline in the relative importance of blue collar jobs which has been attributed to the impact of technological change as well as competition from low-cost imports (e.g., Lawrence Katz and Kevin Murphy 1992). The individual jobs making the largest contributions include the female occupation of textile sewing machine operator in both decades, as well as a variety of male occupations.

The negative contribution of service occupations in the 1970s reflects in part the relative decline in private household employment, including private household cleaners and child care workers. This development, while continuing into the 1980s, had a considerably smaller impact in that decade. Moreover, additional tabulations indicate that the decline of such jobs was partly offset by the rapid growth of other female service occupations, including child care workers (except private household) and nursing aides, orderlies and attendants. And, Table 6 shows that growing employment in nursing also worked to increase the occupation mix effect. Taken together, these results suggest that the expansion of the demand for health services and child care have worked to increase segregation due to the highly segregated nature of some of the related occupations.

As we saw above, a driving force behind the negative occupation mix effect was the movement of total employment out of highly segregated male and female occupations into less segregated ones, with the *net effect* being to reduce the segregation index. While some of this reallocation occurred within major occupation categories, we can identify in Table 4 broad occupation groups which had positive overall occupation mix effects, including executive and

managerial workers, professional and technical workers, and, for the 1980s, sales jobs. Consistent with this, we see in Table 6 that a number of the detailed occupations which made large contributions to the positive occupation mix effects for these broad occupations were not highly segregated initially.[18] In addition, a number of the initially male jobs which grew in relative size also experienced large increases in percent female. In the next section, we present some evidence that suggests, at least for the 1980s, women were especially likely to enter occupational categories with above average rates of employment growth.

C. Analyzing the Trends in Sex Composition within Occupations

As we noted earlier, while the disaggregation of the segregation indexes presented above is useful for identifying the contribution of major occupation categories to the observed changes, it is influenced by the size of each major occupation. So, for example, technical occupations contribute relatively little to the sex composition effect, but it is unclear whether this reflects the relatively small size of this category, less than 3 percent of total employment in each decade, or lesser progress in integrating male jobs. A further limitation of what we can learn from the approach pursued above is that major occupation categories may differ in other characteristics that limit the scope for changes in sex composition within them. For example, it has been suggested that slow employment growth in blue collar jobs is one reason for the lesser progress in integrating male occupations in these categories. Or, as another example, a relatively small contribution of male administrative support jobs in the 1980s could simply reflect that there are relatively few male occupations in the category. To address these types of questions, we estimate a descriptive regression model of the change in percent female within occupations over the 1970s and 1980s.

---

[18] Based on a more extensive listing of occupations than is shown in Table 6, examples of such occupations include, in the 1970's, managers and administrators (nec), financial managers, accountants and auditors, elementary school teachers, and social workers, and, in the 1980's, managers and administrators (nec), management-related occupations (nec), elementary school teachers, health technicians, legal assistants, computer programmers, and salaried supervisors and proprietors in sales.

To facilitate comparisons in the magnitude of the regression coefficients across equations for the two periods (1970-80, 1980-1990), the dependent variable is defined as the change in the proportion female in an occupation between 1970 and 1980 (1980 and 1990) minus the change in the proportion female in the total labor force over the same period.[19] Variables representing initial sex composition of the occupation, growth of employment within the occupation, and major occupation group are employed as explanatory variables. As above, we define the sex composition of an occupation in terms of deviations of the proportion female within the occupation (p_{it}) from the female proportion of the labor force as a whole (P_t) in the initial year. Table 7 gives definitions and means (for the 1970-80 and 1980-90 periods) for all variables used in the regression analysis, and presents the regression results.

As may be seen in the table, the patterns of change in sex composition are quite similar in the 1970s and 1980s.[20] All else equal, percent female consistently increased more in occupations which were male or integrated at the start of the period than in initially female occupations, a pattern that, in the absence of resegregation, works to reduce segregation. Above average growth in employment in an occupation is found to have a positive and significant effect on that occupation's representation of women in the 1980s, but not in the 1970s.

Controlling for initial sex composition of the occupation and employment growth over the period, women increased their representation in most of the white collar categories and in service jobs relative to operator, laborer, and farm jobs (the omitted category).[21] Relatively large and significant coefficients are obtained for the managerial and administrative support occupational

[19] Note that each observation summarizes information about many individuals within an occupation, so there is a potential heteroscedasticity problem common to grouped data. Consequently, we have weighted the regression by the square root of the total size of the occupation in the beginning year (William Greene 1997). Additionally, since the occupations are the same in both years, the regressions were estimated using a SUR (Seemingly Unrelated Regressions) model. This allows the error terms to be correlated across equations, generating more efficient estimates than OLS (Greene 1997). Results from OLS estimation do not differ significantly.

[20] The vector of coefficients are jointly significantly different across years, but this is driven mainly by the individually significant differences of a few coefficients. Specifically, the positive effect of integrated occupations decreased by the latter decade. In addition, the differences in coefficients for employment growth and for professional, technical and craft jobs, as described in the text below, are found to be significant at the 10 percent level.

[21] Our findings for the 1970s are consistent with trends reported on the basis of tabular analysis by Beller (1985) and Bianchi and Rytina (1986).

dummy variables in both periods. Especially large effects were also obtained for sales jobs in the 1970s and for professional jobs in the 1980s. The coefficient for technical jobs is positive in both periods, though statistically significant only in the 1970s. Women were found to be even less likely to enter craft jobs than other blue collar occupations, although this difference was not significant in the 1980s. While there has been speculation that slower growth in blue collar jobs might help to explain women's lesser penetration into these areas, it can be seen that these differences persist even after controlling for employment growth.

Integrated occupations appear to have had a diminished effect on the increase in percent female over the 1980s compared to the 1970s. Since it is a rapid increase in the representation of women in integrated jobs which is most likely to result in resegregation, this finding would suggest that resegregation occurring entirely within the period would be quantitatively less important in the 1980s than in the 1970s. And, we do indeed find this to be the case in results presented below.

We saw above that the 1980s differed from the 1970s in having a somewhat smaller decrease in the segregation index as well as a smaller share of its decline being due to the sex composition effect. The regression results presented in Table 7 shed some light on this. The great similarity in the pattern of changes in the representation of women in occupations in the two periods means that the process tends to be self-limiting to some extent. For example, an increase in women’s representation in male jobs potentially has the largest beneficial effect on reducing the segregation index, and, as we have seen, the coefficient on predominantly male occupations was about the same in each decade. However, precisely because of the progress made in reducing segregation in the 1970s, the number of male occupations declined, from 294 in 1970 (encompassing 53 percent of total employment) to 273 in 1980 (comprising 49 percent of all workers). This means that even if women continue to enter male jobs at the same rate, the impact on segregation will be reduced. This is compounded by the fact that women’s entry was not distributed evenly throughout male occupations, but rather was concentrated in particular white collar and service categories. The consequences of this may be illustrated by the managerial

category which had the largest coefficient in both decades. In 1970, 21 out of the 25 detailed occupations included in the managerial category were predominantly male; by 1980, this was true of only 12. Clearly a given coefficient on executive and managerial jobs will have a smaller impact on reducing segregation in the 1980s relative to the 1970s.

The similarity of the changes in occupational composition over the two decades also suggests that segregation or resegregation may be a factor in the declining rate of change in the segregation index and the smaller sex composition effect in the 1980s. That is, perhaps sex composition effects were less important during this period in part because, as more and more women entered particular male or integrated jobs, some of these jobs resegregated as female occupations. While we have seen that the coefficient on integrated occupations was a bit smaller in the 1980s than the 1970s, if women continued to enter the occupations which became newly female in the 1970s, the cumulative effect of resegregation could indeed be larger in the 1980s. Those cases in which increases in the representation of women work to increase rather than to decrease segregation act as a "drag" slowing the fall in the segregation index.

There is some evidence consistent with this view. Appendix Table A-1 identifies the initially male or integrated occupations which became predominantly female between 1970 and 1980 (marked with superscript “a”) or between 1980 and 1990 (marked with superscript “b”).[22] In the 1970s, there were twenty-one such occupations which, as may be seen in Table 8, jointly accounted for a sex composition effect of 0.31. In other words, in the absence of such resegregation, occupational segregation would potentially have fallen an additional 4 percent (0.31/8.43 = 0.037). Similarly, nine additional occupations resegregated between 1980 and 1990, contributing to a sex composition effect for the 1980s of 0.23. This is lower than the figure for the 1970s, but it also corresponds to 4 percent (0.23/6.27 = 0.037) of the actual decline in the index

[22] The 1970-80 change in percent female for chief communications operators from 81.8 to 34.4 does not appear credible. Dropping this occupation from the list of those which resegregated in the 1980s would alter the 1970s change in the segregation index attributed to these jobs to -0.006 and their 1970s sex composition effect to -0.034. It would, however, have little effect on the results for the 1980s; it is these results which are emphasized in our discussion.

over the 1980s. These results suggest that resegregation had only a moderate effect of roughly the same magnitude in percentage terms on the overall segregation trends in each of the two decades.

The estimated impact of resegregation in the latter decade is increased, however, if we recognize that the consequences of resegregation in the 1970s reached into the 1980s. Seventeen of the twenty-one occupations which resegregated in the 1970s continued to experience above average increases in the representation of women in the next period, contributing to a sex composition effect of 0.19 from 1980 to 1990. Taking these effects into account raises our estimate of the effect of resegregation for the 1980s to 0.42 (0.23 + 0.19) or 7 percent of the actual 1980s decline. In addition, while occupation mix effects are minor for the within period effects of resegregating occupations, twelve occupations which resegregated over the 1970s experienced especially rapid employment growth in the 1980s, resulting in an occupation mix effect of 0.54 in the latter period.[23] It is not clear, however, that this occupation mix effect should be included in the estimate of the effect of resegregation in the 1980s. As we saw above, the negative effect of occupation mix in the 1970s and 1980s was due to below average employment growth in highly segregated male and female occupations and above average growth in more moderately segregated occupations. As may be seen in Appendix Table A-1, occupations which resegregated in the 1970s tended to fall into the moderately segregated category in the 1980s. Thus, while at the occupation level we estimate a positive occupation mix effect for these jobs, their expansion was part of a redistribution of employment away from the most highly segregated female occupations which, on balance, contributed to a reduction in segregation. Note that zero is the smallest value the occupation mix effect may take for an expanding occupation—and that will occur only if the percent female within the occupation exactly equals the percent female in the labor force as a whole.

Overall, we conclude that the effect of resegregation over the 1970s and 1980s was to moderately reduce the fall in the segregation index by 4 to 7 percent in each decade, based solely

[23] The occupations making the largest contribution to the occupation mix effect were management-related occupations (nec), investigators and adjusters (except insurance), transportation ticket and reservation agents, insurance adjusters, examiners, and investigators, and computer operators.

on the sex composition effects of these jobs. Were we to further include occupation mix effects, our 1980s estimate would be raised to 15 percent. Thus while resegregation is a process which has had discernible effects, these effects have not been extremely large. This does not mean, however, that we should be unconcerned about this phenomenon. Unless women succeed in entering a broader range of formerly male jobs, resegregation could become a larger problem in the future.

IV. Conclusion

This paper investigates whether the dramatic trend towards reduced occupational segregation in the United States which began in the 1970s continued into the 1980s. We found that the trend did continue at only a slightly slower pace. Moreover, the underlying shifts in the sex composition of occupations and in the occupation mix of the economy which produced the reduction in segregation were remarkably similar in the two decades. Changes in sex composition within occupations—principally due to the entry of women into traditionally male jobs—accounted for two-thirds to three-quarters of the decline in segregation. Overall, these shifts had a profound impact on the employment situation of both sexes. While, in 1970, 71 percent of men and 55 percent of women worked in jobs where individuals of the same sex comprised the overwhelming majority (80 percent or more) of workers, by 1990 this was true of only about two-fifths of men and one third of women.

Using a technique suggested by Bertaux (1991) in a study of changes in occupational segregation in the United States at the close of the nineteenth century, we were able to provide a more detailed picture than previous studies of the role of major occupational categories in accounting for these aggregate results for 1970 to 1990. In line with expectations based on earlier work, we found that women have had considerably greater success in entering previously male white collar and service occupations than blue collar categories. In both decades, the largest sex composition effects for integration of male occupations were for executive and managerial occupations. However, a new insight provided by this approach was that the roles of

administrative support occupations in the 1970s and sales and service jobs in both decades were of considerable quantitative importance, comparable in size to the shifts in professional jobs which have received considerably more attention. This is particularly interesting in that it reflects a continuation of a pattern which prevailed in previous episodes of declining segregation, both in the late 1800s (Bertaux 1991) and for the modest declines of the 1960s (Blau and Hendricks 1979). While it has been speculated that slower growth in blue collar jobs might help to explain women's lesser penetration into these areas, regression analyses indicate that these differences persist even after controlling for employment growth.

In assessing our results it is important to note the limitations of what can be learned in studies like these. First, calculations based on Census occupational categories are likely to underestimate the full extent of employment segregation of women, since employers' job categories are far more detailed than those used by the Census. Thus, it is possible that some Census listings combine individual job categories which are predominantly male with some which are predominantly female producing apparently integrated occupations. Moreover, it has been found that, even in occupations where both sexes are substantially represented, workers are often segregated at the firm level (William Bielby and James Baron 1986; Francine Blau 1977; William Carrington and Kenneth Troske 1995; Groshen 1991). For example, restaurants often employ only waiters or waitresses, but not both (David Neumark 1996). Furthermore, women are often clustered at the lower level of hierarchies within occupations. These dimensions of employment segregation cannot be observed using Census data, and it is unknown the extent to which their magnitude has changed over time, possibly affecting our estimated trends.

Second, while there is considerable evidence that occupational segregation is related to the gender pay gap, it is less certain how the occupational shifts of the 1970s and 1980s affected women's pay relative to men's. Based on the estimated effect of occupational sex composition in earnings regressions, it has been found that reductions in occupational segregation had a relatively modest effect on trends in the gender gap over the 1970s and 1980s (e.g., Francine Blau and Andrea Beller 1988, Macpherson and Hirsch 1995; June O'Neill and Solomon Polachek 1993).

However, such estimates do not take into account the labor market-wide effects of declines in segregation which potentially open additional employment opportunities to women and reduce overcrowding. This may raise women's wages in both male and female jobs. Further, the negative effects of occupational segregation are not limited to the gender wage gap. Occupational segregation may adversely affect the economic status of women by reinforcing exaggerated notions of gender differences in capabilities, preferences and social and economic roles. If so, reductions in segregation are likely to mitigate these effects.

Finally, our results do not of course imply that occupational segregation by gender is no longer a problem in the United States. We have emphasized the substantial declines in segregation which have occurred over the 1970s and 1980s. These decreases are all the more significant in that they follow an extremely long period in which there was little evidence of significant improvement. However a segregation index of 53 percent for 1990 is still substantial and the further reduction of segregation remains an important goal. Our finding of similar changes in occupational sex composition over the two decades suggests that women did not find doors that had opened for them in the 1970s closing to them in the 1980s. At the same time, this similarity potentially poses some problems for the future. As women continue to enter the same areas, resegregation, which we found to have relatively moderate effects in the 1970s and 1980s, becomes an increasing possibility. Continued progress towards reducing occupational segregation will require that women succeed in entering a broader range of traditionally male occupations and/or a greater flow of men into traditionally female occupations.

REFERENCES

Aigner, Dennis J. and Glen G. Cain. 1977. "Statistical Theories of Discrimination in Labor Markets." *Industrial and Labor Relations Review* 30(2): 175-187.

Becker, Gary S. 1957. *The Economics of Discrimination*. Chicago: University of Chicago Press.

Becker, Gary. 1985. "The Allocation of Effort, Specific Human Capital, and the Differences Between Men and Women in Earnings and Occupations." *Journal of Labor Economics* 3(1, Part 2): S33--S58.

Beller, Andrea H. 1982. "Occupational Segregation by Sex: Determinants and Changes." *Journal of Human Resources* 17(3): 371-392.

Beller, Andrea H. 1985. "Changes in the Sex Composition of U.S. Occupations, 1960-1981." *Journal of Human Resources* 20(2): 235-50.

Bergmann, Barbara R. 1971. "The Effect on White Incomes of Discrimination in Employment." *Journal of Political Economy* 79(2): 294-313.

Bergmann, Barbara R. 1974. "Occupational Segregation, Wages and Profits When Employers Discriminate by Race or Sex." *Eastern Economic Journal* 1(2): 103-10.

Bertaux, Nancy E. 1991. "The Roots of Today's 'Women's Jobs' and 'Men's Jobs': Using the index of Dissimilarity to Measure Occupational Segregation by Gender." *Explorations in Economic History* 28(4): 433-459.

Bianchi, Suzanne M. and Nancy Rytina. 1986. "The Decline in Occupational Sex Segregation During the 1970s: Census and CPS Comparisons." *Demography* 23(1): 79-86.

Bielby, William T. and James N. Baron. 1986. "Sex Segregation Within Occupations." *American Economic Review* 76(2): 43-47.

Blau, Francine D. 1977. *Equal Pay in the Office*. Lexington, MA: Lexington Books.

Blau, Francine D. 1984. "Occupational Segregation and Labor Market Discrimination," in Barbara F. Reskin (ed) *Sex Segregation in the Workplace: Trends, Explanations, Remedies*, pp. 117-43. Washington, D.C.: National Academy Press.

Blau, Francine D. and Andrea Beller. 1988. "Trends in Earnings Differentials by Gender, 1971-1981." *Industrial and Labor Relations Review* 41(4): 513-529.

Blau, Francine D., Marianne A. Ferber, and Anne E. Winkler. 1988. *The Economics of Women, Men, and Work*. Upper Saddle River, N.J.: Prentice-Hall, 3rd ed.

Blau, Francine D. and Wallace E. Hendricks. 1979. “Occupational Segregation by Sex: Trends and Prospects.” *Journal of Human Resources* 14(2): 197-210.

Blau, Francine D. and Lawrence Kahn. 1997. “Swimming Upstream: Trends in the Gender Wage Differential in the 1980s.” *Journal of Labor Economics* 15(1, Part 1): 1-42.

Cabral, Robert, Marianne A. Ferber and Carole A. Green. 1981. “Men and Women in Fiduciary Institutions: A Study of Sex Differences in Career Development.” *Review of Economics and Statistics* 63(4): 573-80.

Carrington, William J. and Kenneth R. Troske. 1995. “Gender Segregation in Small Firms.” *Journal of Human Resources* 30(3): 503-533.

Carrington, William J. and Kenneth R. Troske. 1997. “On Measuring Segregation in Samples with Small Units.” *Journal of Business and Economic Statistics* 15(4): 402-409.

Duncan, Greg J. and Saul Hoffman. 1979. “On-the-Job Training and Earnings Differences by Race and Sex.” *Review of Economics and Statistics* 61(4): 594-603.

Duncan, Otis Dudley and Beverly Duncan. 1955. “A Methodological Analysis of Segregation Indexes.” *American Sociological Review* 20: 210-217.

Ehrenberg, Ronald G. and Robert S. Smith. 1997. *Modern Labor Economics: Theory and Public Policy*. Reading, MA: Addison-Wesley Longman, Inc., 6th ed.

England, Paula. 1982. “The Failure of Human Capital Theory to Explain Occupational Sex Segregation.” *Journal of Human Resources* 17(3): 358-370.

Fuchs, Victor R. 1975. “A Note on Sex Segregation in Professional Occupations.” *Explorations in Economic Research* 2: 105-11.

Goldin, Claudia. 1990. *Understanding the Gender Gap: An Economic History of American Women*. New York: Oxford University Press.

Greene, William. 1997. *Econometric Analysis.* Englewood Cliffs, NJ: Prentice-Hall, 3rd ed.

Groshen, Erica L. 1991. “The Structure of the Female/Male Wage Differential: Is it Who You Are, What You Do, or Where You Work?” *Journal of Human Resources* 26(3): 457-472.

Gross, Edward. 1968. “Plus Ca Change...? The Sexual Structure of Occupations Over Time.” *Social Problems* 16(2): 198-208.

Hartmann, Heidi I., Robert E. Kraut, and Louise A. Tilly, eds. 1986. *Computer Chips and Paper Clips: Technology and Women's Employment*. Washington, D.C.: National Academy Press.

Hutchens, Robert M. 1991. “Segregation Curves, Lorenz Curves, and Inequality in the Distribution of People Across Occupations.” *Mathematical Social Sciences* 21(1): 31-51.

Jacobs, Jerry A. 1989. “Long-Term Trends in Occupational Segregation by Sex.” *American Journal of Sociology* 95(1): 160-173.

Jacobs, Jerry A. 1995. “Gender and Academic Specialties: Trends among Recipients of College Degrees in the 1980s.” *Sociology of Education* 68(2): 81-98.

Jacobsen, Joyce P. 1994. “Trends in Workforce Sex Segregation, 1960-90.” *Social Science Quarterly* 75(1): 204-211.

Katz, Lawrence F. and Kevin M. Murphy. 1992. “Changes in Relative Wages, 1963-1987: Supply and Demand Factors.” *Quarterly Journal of Economics* 107(1): 35-78.

Kessler-Harris, Alice. 1982. *Out to Work: A History of Wage Earning Women in the United States*. New York, N.Y.: Oxford University Press.

King, Mary C. 1992. “Occupational Segregation by Race and Gender, 1940-1988.” *Monthly Labor Review* 115(4):30-37.

Leonard, Jonathan. 1989. “Women and Affirmative Action.” *Journal of Economic Perspectives* 3(1):61-75.

Macpherson, David A. and Barry T. Hirsch. 1995. “Wages and Gender Composition: Why Do Women’s Jobs Pay Less?” *Journal of Labor Economics* 13(3): 426-471.

Neumark, David, with the assistance of Roy J. Blank and Kyle D. Van Nort. 1996. “Sex Discrimination in Restaurant Hiring: An Audit Study.” *Quarterly Journal of Economics* 111(3): 915-941.

O’Neill, June and Solomon Polachek. 1993. “Why the Gender Gap in Wages Narrowed in the 1980s.” *Journal of Labor Economics* 11(1, Part 1): 205-228.

Polachek, Solomon W. 1981. “Occupational Self-Selection: A Human Capital Approach to Sex Differences in Occupational Structure.” *The Review of Economics and Statistics* 63(1): 60-69.

Reskin, Barbara F. and Patricia Roos. 1987. “Status Hierarchies and Sex Segregation,” in Christine Bose and Glenna Spitze (eds) *Ingredients for Employment Policy*, pp. 3-21. Albany, N.Y.: State University of New York Press.

Reskin, Barbara F. and Patricia Roos. 1990. *Job Queues, Gender Queues: Explaining Women's Inroads into Male Occupations*. Philadelphia: Temple University Press.

Rifkin, Jeremy. 1995. *The End of Work: The Decline of the Global Labor Force and the Dawn of the Post-Market Era*. New York: G. P. Putnam's Sons.

Royalty, Anne Beeson. 1996. "The Effects of Job Turnover on the Training of Men and Women." *Industrial and Labor Relations Review* 49(3): 506-521.

Smith, James P. and Michael P. Ward. 1984. *Women's Wages and Work in the Twentieth Century*. Santa Monica, CA: The Rand Corporation.

Sorensen, Elaine. 1990. "The Crowding Hypothesis and Comparable Worth." *Journal of Human Resources* 25(1): 55-89.

Strober, Myra H. 1984. "Toward a General Theory of Occupational Sex Segregation: The Case of Public School Teaching," in Barbara F. Reskin (ed) *Sex Segregation in the Workplace: Trends, Explanations, Remedies*, pp. 144-156. Washington, D.C.: National Academy Press.

Strober, Myra H. and Carolyn L. Arnold. 1987. "The Dynamics of Occupational Segregation among Bank Tellers," in Clair Brown and Joseph A. Pechman (eds) *Gender in the Workplace*, pp. 107-148. Washington, D.C.: Brookings Institution.

U.S. Department of Commerce, Bureau of the Census. 1984a. *Census of the Population: 1980 Detailed Occupation of the Experienced Civilian Labor Force by Sex for the United States and Regions: 1980 and 1970*, Supplementary Report PC80-S1-15. Washington, D.C.

U.S. Department of Commerce, Bureau of the Census. 1984b. *1980 Census of the Population: Earnings by Occupation and Education*, Subject Report PC80-2-8B. Washington, D.C.

U.S. Department of Commerce, Bureau of the Census. 1992. *Census of the Population: 1990 Detailed Occupation and Other Characteristics from the EEO File for the United States*, Supplementary Report CP-S-1-1. Washington, D.C.

Wright, Rosemary and Jerry Jacobs. 1994. "Male Flight from Computer Work: A New Look at Occupational Resegregation and Ghettoization." *American Sociological Review* 59(4): 511-36.

Table 1. Indexes of Segregation (percent), 1970-1990

	A. Level of Segregation		
	1970	1980	1990
Index of Segregation	67.68	59.25	52.98

	B. Change in Segregation			
	1970-80		1980-90	
Total	-8.43		-6.27	
Due to:	Absolute	% of total	Absolute	% of total
1) Sex Composition	-6.42	76.2	-4.28	68.3
2) Occupational Mix	-2.01	23.8	-1.99	31.7

Notes: See text for definitions of the segregation index and its components.

Sources: U.S. Department of Commerce, Bureau of the Census, *Census of the Population: 1980 Detailed Occupation of the Experienced Civilian Labor Force by Sex for the United States and Regions: 1980 and 1970*, Supplementary Report, PC80-S1-15 (March 1984); U.S. Department of Commerce, Bureau of the Census, Census of Population: *1990 Detailed Occupation and Other Characteristics from the EEO File for the United States*, Supplementary Report, CP-S-101 (March 1992).

Table 2 . Distribution of Workers by Sex Composition of Occupational Category (percent)

	Sex Composition of Occupation			
	Male	Integrated	Female	Total
I. 1970 Definition				
A. 1970				
Men	78.5	10.3	11.2	100.0
Women	12.7	9.3	78.0	100.0
Total	53.5	9.9	36.6	100.0
B. 1980				
Men	77.5	10.5	12.0	100.0
Women	19.9	11.2	68.9	100.0
Total	53.0	10.8	36.2	100.0
II. 1980 Definition				
A. 1980				
Men	72.9	14.5	12.5	100.0
Women	15.7	14.0	70.3	100.0
Total	48.6	14.3	37.1	100.0
B. 1990				
Men	71.3	14.2	14.6	100.0
Women	20.1	14.6	65.3	100.0
Total	47.9	14.4	37.8	100.0
III. 1990 Definition				
A. 1990				
Men	71.8	15.2	13.0	100.0
Women	19.7	16.1	64.2	100.0
Total	48.0	15.6	36.4	100.0

Notes: In each indicated year (t), an occupation is classified as male if $p_{it} < (P_t - .10)$ and female if $p_{it} > (P_t + .10)$, where p_{it} is the proportion that women comprise of occupational employment and P_t is the proportion that women comprise of the labor force as a whole (equal to .380 in 1970, .425 in 1980, and .457 in 1990). The remaining jobs are classified as integrated. For example, the number in the first row and first column says that in 1970, 78.5 percent of male workers were in occupations which were predominantly male (as defined in 1970); the number in the fourth row and first column says that in 1980, this percentage was 77.5.

Table 3. Distribution of Workers by Percent Female in Occupational Category

	Women as a Percent of Total in Occupation							
	0-10	11-20	21-40	41-60	61-80	81-90	91-100	Total
I. 1970 Categories:								
A. 1970								
Men	50.0	21.4	14.4	5.5	5.1	2.5	1.0	100.0
Women	3.2	5.8	9.2	8.1	18.5	21.3	33.9	100.0
Total	32.2	15.5	12.4	6.5	10.2	9.7	13.5	100.0
B. 1980								
Men	48.4	22.2	14.5	4.9	5.8	2.9	1.3	100.0
Women	5.1	9.5	12.4	7.9	17.5	20.1	27.6	100.0
Total	30.0	16.8	13.6	6.2	10.8	10.2	12.5	100.0
II. 1980 Categories:								
A. 1980								
Men	36.8	16.1	27.5	11.2	5.1	2.6	0.7	100.0
Women	2.1	4.0	15.0	15.6	17.4	21.5	24.4	100.0
Total	22.1	10.9	22.2	13.1	10.3	10.6	10.8	100.0
B. 1990								
Men	34.9	14.0	29.3	11.9	5.9	3.1	1.0	100.0
Women	2.6	4.3	19.1	16.0	17.9	18.7	21.3	100.0
Total	20.2	9.6	24.6	13.8	11.3	10.2	10.3	100.0
III. 1990 Categories:								
A. 1990								
Men	28.9	13.9	31.5	14.2	8.3	2.6	0.6	100.0
Women	1.6	2.9	17.1	16.8	25.1	18.7	17.8	100.0
Total	16.4	8.8	24.9	15.4	16.0	10.0	8.4	100.0

Notes: The table reads as follows: the number in, for example, the first row and first column of the table indicates that in 1970, 50 percent of male workers were in occupations which were between 0 and 10 percent female (as defined in 1970); the number in the fourth row and first column indicates that this percentage was 48.4 in 1980.

Table 4. Breakdown of the Contribution of Major Occupation to the Sex Composition and Occupation Mix Effects by Male, Female and Integrated Occupations, 1970-80 and 1980-90

	1970 - 1980				1980 - 1990			
Occupational Category	Male	Integrated	Female	Total	Male	Integrated	Female	Total
A. Sex Composition Effect				-6.42				-4.28
Executive and managerial	-1.21	-0.02	-0.02	-1.25	-0.95	0.20	0.02	-0.73
Professional specialty	-0.24	0.15	-0.73	-0.83	-0.41	0.04	-0.09	-0.47
Technicians	-0.14	0.00	-0.04	-0.19	-0.02	0.03	-0.04	-0.02
Sales occupations	-0.75	-0.01	-0.36	-1.12	-0.39	0.07	-0.64	-0.97
Administrative support	-0.30	0.18	-0.74	-0.85	-0.15	0.04	-0.56	-0.67
Service occupations	-0.46	-0.01	-1.48	-1.94	-0.33	0.05	-0.96	-1.24
Farming	-0.19	0.02	0.01	-0.16	0.02	0.00	0.00	0.02
Precision production	0.23	0.03	-0.06	0.19	0.14	0.02	-0.04	0.12
Operators and fabricators	0.15	0.02	-0.34	-0.18	0.09	0.01	-0.22	-0.13
Handlers and laborers	-0.02	n.a.	-0.08	-0.10	-0.13	n.a.	-0.05	-0.19
B. Occupation Mix Effect				-2.01				-1.99
Executive and managerial	0.71	0.01	0.00	0.72	0.22	0.06	0.19	0.46
Professional specialty	0.01	0.04	0.47	0.53	0.28	0.07	0.43	0.78
Technicians	0.09	0.00	0.23	0.32	0.16	-0.02	0.16	0.30
Sales occupations	-0.13	-0.01	-0.05	-0.19	0.36	0.01	0.18	0.56
Administrative support	-0.01	0.08	-0.37	-0.30	0.05	-0.06	-1.35	-1.36
Service occupations	0.06	0.02	-0.43	-0.34	0.19	0.01	-0.18	0.02
Farming	-0.47	0.00	-0.01	-0.48	-0.16	0.00	0.02	-0.14
Precision production	-0.33	-0.05	-0.14	-0.52	-1.04	0.01	0.03	-1.00
Operators and fabricators	-0.58	0.01	-0.71	-1.28	-0.86	-0.25	-0.29	-1.39
Handlers and laborers	-0.36	n.a.	-0.10	-0.45	-0.10	n.a.	-0.13	-0.22

Notes: See Table 2 for the definition of male, female and integrated occupations. This designation corresponds to the first year of the indicated period. n.a. = not applicable; that is, there are no integrated detailed occupations in this major occupation.

Table 5. Detailed Occupations with Largest* Negative Sex Composition Effects, Selected Major Occupations, 1970 - 1980 and 1980 - 1990

I. 1970 - 1980 Occupations	Sex Composition Effect	Percent Female 1970	Percent Female 1980
Executive, administrative and managerial	-1.25		
Male occupations			
Managers and administrators, nec	-0.60	15	27
Accountants & auditors	-0.17	25	38
Professional specialty	-0.83		
Female occupations			
Elementary school teachers	-0.54	84	75
Registered nurses	-0.14	97	96
Sales occupations	-1.12		
Male occupations			
Supervisors & proprietors, salaried	-0.21	14	28
Sales reps., mining, manufacturing, wholesale	-0.13	7	15
Insurance sales occupations	-0.12	13	25
Sales occupations, other business services	-0.10	8	37
Female occupations			
Cashiers	-0.15	84	83
Sales workers, other commodities	-0.11	70	73
Administrative support, including clerical	-0.85		
Male occupations			
Stock & inventory clerks	-0.09	24	35
Traffic, shipping, & receiving clerks	-0.08	13	24
Female occupations			
Secretaries	-0.37	98	99
Typists	-0.10	95	97
Telephone operators	-0.09	94	91
Supervisors, general office	-0.08	63	56
Service occupations	-1.94		
Male occupations			
Janitors & cleaners	-0.29	13	23
Bartenders	-0.08	21	44
Female occupations			
Maids & housemen	-0.31	94	76
Waiters & waitresses	-0.26	91	88
Cooks	-0.25	63	56
Miscellaneous food preparation occupations	-0.19	64	55
Private household cleaners & servants	-0.16	96	95

II. 1980 - 1990 Occupations	Sex Composition Effect	Percent Female 1980	Percent Female 1990
Executive, administrative and managerial	-0.73		
Male occupations			
Managers and administrators, nec	-0.58	27	34
Managers, marketing, advertising & public relations	-0.17	18	32

Table 5 (continued). Detailed Occupations with Largest* Negative Sex Composition Effects, Selected Major Occupations, 1970 - 1980 and 1980 - 1990

II. 1980 - 1990 Occupations (continued)	Sex Composition Effect	Percent Female 1980	1990
Professional specialty	-0.47		
Male occupations			
Lawyers	-0.09	14	24
Female occupations			
Registered nurses	-0.11	96	94
Sales occupations	-0.97		
Male occupations			
Sales reps., mining, manufacturing, wholesale	-0.15	15	23
Supervisors & proprietors, salaried	-0.11	28	35
Insurance sales occupations	-0.09	25	35
Female occupations			
Sales workers, other commodities	-0.29	73	66
Cashiers	-0.25	83	79
Administrative support, including clerical	-0.67		
Female occupations			
Secretaries	-0.21	99	99
Bookkeepers, accounting, & auditing clerks	-0.10	90	90
Service occupations	-1.24		
Male occupations			
Janitors & cleaners	-0.26	23	31
Female occupations			
Cooks	-0.30	56	48
Waiters & waitresses	-0.30	88	80
Miscellaneous food preparation occupations	-0.11	55	50
Nursing aides, orderlies, & attendants	-0.08	88	87

* Sex composition effect of 0.08 or larger in absolute value.

Table 6. Detailed Occupations with Large* Positive and Negative Occupation Mix Effects, Selected Major Occupations, 1970 - 1980 and 1980 - 1990

I. 1970 - 1980 Occupations	Occupation Mix Effect	Percent Female 1970	1980
Executive, administrative and managerial	0.72		
Managers and administrators, nec	0.54	15	27
Professional and technical	0.85		
Registered nurses	0.29	97	96
Elementary school teachers	0.20	84	75
Administrative support, including clerical	-0.30		
Typists	-0.64	95	97
Bookkeepers, accounting, & auditing clerks	-0.33	81	90
Telephone operators	-0.22	94	91
Service occupations	-0.34		
Private household cleaners & servants	-0.77	96	95
Child care workers, private household	-0.17	98	97
Blue collar occupations	-2.25		
Textile sewing machine operators	-0.37	95	94
Garage & service station related occupations	-0.19	3	8
Freight, stock, &material handlers, nec	-0.18	6	6
II. 1980 - 1990 Occupations	**Occupation Mix Effect**	**Percent Female 1980**	**1990**
Executive, administrative and managerial	0.46		
Managers and administrators, nec	0.22	27	34
Management-related occupations, nec	0.17	53	78
Professional and technical	1.08		
Registered nurses	0.26	96	94
Administrative support, including clerical	-1.36		
Secretaries	-0.72	99	99
General office clerks	-0.38	82	82
Bookkeepers,Accounting, & Auditing clerks	-0.28	90	90
Typists	-0.19	97	94
Sales occupations	0.56		
Supervisors & proprietors, salaried	0.32	28	35
Cashiers	0.31	83	79
Blue collar occupations	-2.61		
Supervisers, production occupations	-0.39	15	18
Textile sewing machine operators	-0.23	94	88
Welders & cutters	-0.18	6	5
Industrial machinery repairers	-0.16	3	4

* Detailed occupations were selected on the basis of two criteria: occupation mix effect is 0.15 or greater in absolute value, and detailed occupation's mix effect is illustrative of occupation category's mix effect.

Table 7. Results of Weighted SUR Regressions

Dependent Variable = (Change in proportion female in occupation) minus (Change in proportion female in labor force)

Independent Variables	1970-1980 Coeff. (Std. Err.)	1970-1980 Mean	1980-1990 Coeff. (Std. Err.)	1980-1990 Mean
Predominantly male occupation in initial year = 1 if percent female within occupation < 28.0 in 1970 and < 32.5 in 1980, and 0 otherwise.	0.076 ** (0.007)	0.535	0.071 ** (0.005)	0.486
Integrated occupation in initial year = 1 if percent female within occupation is between 28.0 and 48.0 in 1970 and between 32.5 and 52.5 in 1980), and 0 otherwise.	0.087 ** (0.009)	0.099	0.051 ** (0.006)	0.143
Growth of occupational employment = growth rate of employment within occupation (1970-1980 or 1980-1990) minus growth rate of the total labor force.	-0.001 (0.005)	0	0.020 ** (0.004)	0
Executive and managerial = 1 if executive, administrative, managerial or management-related occupation, and 0 otherwise.	0.080 ** (0.011)	0.075	0.082 ** (0.007)	0.100
Professional specialty = 1 if professional specialty occupation, and 0 otherwise.	0.023 * (0.009)	0.110	0.057 ** (0.007)	0.118
Technicians = 1 if technicians or related support occupation, and 0 otherwise.	0.045 ** (0.017)	0.023	0.013 (0.011)	0.030
Sales occupations = 1 if a sales occupation, and 0 otherwise.	0.055 ** (0.009)	0.101	0.022 ** (0.007)	0.099
Administrative support = 1 if an administrative support, including clerical, occupation, and 0 otherwise.	0.066 ** (0.009)	0.166	0.061 ** (0.006)	0.169
Service occupations = 1 if a service occupation, and 0 otherwise.	0.020 * (0.009)	0.128	0.028 ** (0.006)	0.131
Precision production = 1 if a precision production, craft, or repair occupation, and 0 otherwise.	-0.020 * (0.008)	0.141	-0.002 (0.006)	0.131
Constant	-0.081 ** (0.007)	1.000	-0.084** (0.005)	1.000
Adjusted R-squared	.478			

* Significant at the 5 percent level on a two tailed test.
** Significant at the 1 percent level on a two tailed test.

Notes: Standard errors are in parentheses. Number of observations (occupations) is 470. Regressions are weighted by the square root of cell size in the initial year. The omitted occupation category is operative, laborer, and farm occupations. Equations are estimated by Seemingly Unrelated Regressions (SUR) techniques.

Table 8. Contribution to Change in Segregation Index, and Sex Composition and Occupation Mix Effects of Resegregating Occupations

	Occupation is Male or Integrated in 1970 and Female in 1980	Occupation is Male or Integrated in 1980 and Female in 1990
1970-80		
Change in segregation index	0.35	-0.05
Sex composition effect	0.31	-0.08
Occupation mix effect	0.04	0.03
1980-90		
Change in segregation index	0.73	0.24
Sex composition effect	0.19	0.23
Occupation mix effect	0.54	0.01

Notes: See text for definitions of the segregation index and its components.

Table A-1. List of Occupations and Percent Female, 1970, 1980, 1990

Occupation	Percent Female 1970	1980	1990
Executive, administrative and managerial			
Legislators, chief executives & general admin., public admin.	0.0	25.6	33.1
Administrators & officials, public administration	21.7	33.6	45.6
Administrators, protective services	0.0	9.4	28.6
Financial managers	19.4	31.4	46.0
Personnel & labor relations managers	21.2	36.0	48.7
Purchasing managers	8.5	21.2	33.6
Managers, marketing, advertising & public relations	7.9	17.6	31.8
Administrators, education & related fields	27.8	38.1	52.7
[b] Managers, medicine & health	60.6	50.8	66.6
Managers, properties & real estate	32.1	41.1	46.1
Postmasters & mail superintendents	31.8	43.5	45.8
Funeral directors	7.1	8.7	13.4
Managers and administrators, not elsewhere classified (nec)	15.3	26.9	34.5
Accountants & auditors	24.6	38.1	52.7
[a] Underwriters	0.0	58.3	67.6
Other financial officers	25.4	44.9	51.7
Management analysts	10.3	25.2	33.7
[b] Personnel, training, & labor relations specialists	33.4	47.0	57.7
Purchasing agents & buyers, farm products	2.5	7.9	17.1
Buyers, wholesale & retail trade, except farm products	27.8	44.5	53.1
Purchasing agents & buyers, nec	15.3	31.8	45.1
Business & promotion agents	18.9	33.1	46.4
Construction inspectors	0.6	4.9	6.5
Inspectors & compliance officers, except construction	7.1	17.8	30.5
[a] Management-related occupations, nec	20.1	53.5	77.6
Professional Specialty			
Architects	4.0	8.3	15.1
Aerospace engineers	1.8	3.2	8.1
Metallurgical & minerals engineers	0.8	5.2	11.5
Mining engineers	1.2	3.4	6.4
Petroleum engineers	1.4	3.6	6.7
Chemical engineers	1.3	5.2	11.1
Nuclear engineers	0.0	3.7	6.4
Civil engineers	1.3	2.9	7.0
Electrical & electronic engineers	1.7	5.0	10.0
Industrial engineers	2.6	10.0	13.9
Mechanical engineers	1.0	2.1	5.3
Marine & naval architects	0.0	1.9	3.7
Engineers, nec	2.3	4.0	9.8
Surveyors & mapping scientists	0.0	4.2	7.8

[a] Occupation was predominantly male or integrated in 1970 but predominantly female in 1980.

[b] Occupation was predominantly male or integrated in 1980 but predominantly female in 1990.

Table A-1. List of Occupations and Percent Female, 1970, 1980, 1990

Occupation	Percent Female 1970	1980	1990
Computer systems analysts & scientists	13.6	22.5	30.7
Operations & systems researchers & analysts	11.1	27.7	42.6
Actuaries	23.4	25.6	33.7
Statisticians	41.6	48.1	50.6
Mathematical scientists, nec	22.9	19.0	25.5
Physicists & astronomers	4.5	5.4	12.9
Chemists, except biochemists	11.7	20.1	27.4
Atmospheric & space scientists	9.0	17.0	12.9
Geologists & geodesists	4.0	11.1	14.4
Physical scientists, nec	14.6	20.4	29.0
Agricultural & food scientists	12.3	22.7	26.7
Biological & life scientists	37.8	33.1	41.7
Forestry & conservation scientists	6.6	10.1	13.2
Medical scientists	60.6	40.7	42.7
Physicians	9.7	13.4	20.7
Dentists	3.5	6.7	12.8
Veterinarians	5.3	13.3	26.6
Optometrists	4.1	8.3	14.7
Podiatrists	7.7	8.4	11.3
Health diagnosing practitioners, nec	10.8	12.5	31.6
Registered nurses	97.3	95.9	94.3
Pharmacists	12.1	24.0	36.8
Dietitians	92.0	89.9	89.3
[a] Inhalation therapists	28.6	56.5	60.1
Occupational therapists	75.0	91.6	89.6
Physical therapists	71.4	73.9	75.5
Speech therapists	92.6	89.1	91.1
Therapists, nec	51.4	56.5	66.3
Biological science teachers	24.0	32.3	33.9
Chemistry teachers	12.2	20.4	25.6
Physics teachers	5.0	9.8	12.5
Other natural science teachers	4.7	18.2	28.1
Psychology teachers	40.5	40.0	46.7
Economics teachers	7.6	20.0	22.7
History teachers	17.7	23.8	27.3
Other social science teachers	12.8	28.0	33.6
Engineering teachers	5.6	11.4	16.6
Mathematical & Computer science teachers	19.3	31.3	38.7
Medical science teachers	0.0	23.6	28.0
Health specialties teachers	74.2	86.7	75.9
Business, commerce, & marketing teachers	30.9	47.2	54.8
Art, drama, & music teachers	39.7	48.1	50.5

[a] Occupation was predominantly male or integrated in 1970 but predominantly female in 1980.

[b] Occupation was predominantly male or integrated in 1980 but predominantly female in 1990.

Table A-1. List of Occupations and Percent Female, 1970, 1980, 1990

Occupation	Percent Female 1970	1980	1990
[c] English teachers	42.3	55.0	57.8
[a] Foreign language teachers, post-secondary	34.2	59.4	70.4
Other specified teachers	30.1	34.7	37.6
Postsecondary teachers, subject not specified	30.6	34.4	39.2
Prekindergarten & kindergarten teachers	97.9	96.4	97.8
Elementary school teachers	83.9	75.4	78.4
Secondary school teachers	49.6	56.5	56.8
Special education teachers	100.0	69.1	82.2
Teachers, nec	63.5	61.3	62.2
[a] Counselors, educational & vocational	43.0	54.3	61.5
Librarians	82.1	82.5	81.3
Archivists & Curators	30.2	49.5	55.5
Economists	15.9	29.7	43.9
[b] Psychologists	38.8	47.2	58.6
Sociologists	36.1	41.6	47.9
Social scientists, nec	24.3	39.3	47.5
Urban planners	12.6	24.1	32.7
Social workers	63.3	64.9	68.9
[a] Recreation workers	45.4	67.6	70.8
Clergy	2.9	5.8	10.4
Religious workers, nec	56.1	57.4	57.3
Lawyers	4.9	13.8	24.5
Judges	6.1	17.1	22.8
Authors	29.5	44.5	49.5
Technical writers	22.4	37.5	49.8
Designers	36.2	49.9	55.5
Musicians & composers	34.9	29.5	32.8
Actors & directors	34.5	34.4	38.1
Painters, sculptors, craft-artists, & artist printmakers	39.2	48.1	52.5
Photographers	14.8	23.5	30.2
Dancers	81.3	74.6	76.7
Artists, performers, & related workers, nec	29.0	40.9	49.8
Editors & reporters	41.6	49.3	50.7
[b] Public relations specialists	26.6	48.8	58.8
Announcers	6.4	18.3	20.8
Athletes	11.2	23.8	26.7
Technicians and related support			
Clinical lab. technologists & technicians	72.3	74.5	75.1
Dental hygienists	94.0	98.5	98.4
Health record technologists & technicians	92.2	91.3	91.6
Radiologic technicians	67.9	71.6	72.3

[a] Occupation was predominantly male or integrated in 1970 but predominantly female in 1980.

[b] Occupation was predominantly male or integrated in 1980 but predominantly female in 1990.

Table A-1. List of Occupations and Percent Female, 1970, 1980, 1990

Occupation	Percent Female 1970	1980	1990
Licensed practical nurses	96.1	96.6	93.6
Health technologists & technicians, nec	54.0	63.4	71.0
Electrical & electronic technicians	6.1	11.5	13.9
Industrial engineering technicians	25.0	21.0	21.8
Mechanical engineering technicians	3.9	6.4	8.4
Engineering technicians, nec	12.4	23.9	30.5
Drafting occupations	8.1	16.6	18.7
Surveying & mapping technicians	4.2	8.5	10.1
Biological technicians	32.9	42.0	42.8
Chemical technicians	14.9	22.7	24.7
Science technicians, nec	26.3	33.3	32.8
Airplane pilots & navigators	1.6	1.4	3.5
Air traffic controllers	5.6	15.0	22.3
Broadcast equipment operators	22.1	44.0	23.3
Computer programmers	24.2	31.2	32.5
Tool programmers, numerical control	17.1	26.4	14.4
Legal assistants	60.9	69.0	75.9
Technicians, nec	26.6	29.7	29.3
Sales Occupations			
Supervisors & proprietors, salaried	13.7	28.2	34.8
Supervisors & proprietors, self-employed	21.7	28.0	34.5
Insurance sales occupations	12.9	25.4	35.3
Real estate sales occupations	31.2	45.2	50.4
Securities & financial services sales occupations	9.2	18.6	27.8
Advertising & related sales occupations	20.5	41.6	51.7
Sales occupations, other business services	8.4	37.4	36.7
Sales engineers	0.7	3.2	5.1
Sales representatives-mining, manufacturing, & wholesale	7.0	14.9	22.8
Sales workers, motor vehicles & boats	2.3	7.8	10.6
Sales workers, apparel	80.2	81.8	81.3
[a] Sales workers, shoes	44.5	56.6	62.2
Sales workers, furniture & home furnishings	41.2	42.1	45.2
Sales workers, radio, TV, hi-fi, appliances	24.5	28.7	28.6
Sales workers, hardware & building supply	15.4	25.0	22.6
Sales workers, parts	4.4	8.4	9.9
Sales workers, other commodities	70.4	72.7	66.3
Sales counter clerks	70.3	73.5	65.5
Cashiers	84.2	83.5	79.1
Street & door-to-door sales workers	78.7	78.5	66.5
News vendors	17.1	33.3	39.0
Demonstrators, promoters & models, sales	75.9	79.1	81.6

[a] Occupation was predominantly male or integrated in 1970 but predominantly female in 1980.

[b] Occupation was predominantly male or integrated in 1980 but predominantly female in 1990.

Table A-1. List of Occupations and Percent Female, 1970, 1980, 1990

Occupation	Percent Female 1970	1980	1990
Auctioneers	6.2	14.5	13.9
Sales support occupations, nec	100.0	51.1	51.3
Administrative support, including clerical			
Supervisors, general office	63.3	56.2	63.0
Supervisors, computer equipment operators	20.1	29.6	36.6
[b] Supervisors, financial records processing	44.0	49.1	69.8
[b] Chief communications operators	81.8	34.4	60.7
Supervisors, distribution, scheduling, & adjusting clerks	11.7	19.5	30.9
[a] Computer operators	33.9	59.1	61.7
Peripheral equipment operators	61.1	61.7	53.7
Secretaries	97.8	98.8	98.7
Stenographers	93.7	90.9	90.5
Typists	94.8	96.8	94.4
Interviewers	81.4	77.4	75.8
Hotel clerks	51.4	68.2	72.0
[a] Transportation ticket & reservation agents	44.2	57.6	70.5
Receptionists	95.3	95.8	95.7
Information clerks, nec	71.5	78.9	78.8
Classified-ad clerks	75.1	78.2	82.8
Correspondence clerks	66.1	81.3	83.1
Order clerks	77.4	67.4	71.8
Personnel clerks, except payroll & timekeeping	90.0	87.4	85.4
Library clerks	78.7	81.2	78.8
File clerks	81.4	80.0	80.6
Records clerks	64.7	84.7	78.6
Bookkeepers, accounting, & auditing clerks	80.9	89.7	89.6
Payroll & timekeeping clerks	70.2	83.1	88.7
Billing clerks	82.8	89.0	90.6
Cost & rate clerks	59.0	68.8	74.2
Billing, posting, & calculating machine operators	90.1	87.0	85.8
Duplicating machine operators	59.2	60.8	53.3
Mail preparing & paper handling machine operators	78.2	62.5	57.9
Office machine operators, nec	61.9	68.9	63.4
Telephone operators	94.0	91.0	87.3
[a] Communications equipment operators, nec	29.5	62.6	62.0
Postal clerks, excluding mail carriers	31.6	35.9	45.0
Mail carriers, postal service	8.0	13.1	26.8
Mail clerks, except postal service	44.3	47.5	49.9
Messengers	19.8	25.4	24.8
Dispatchers	14.6	31.5	47.4
Production coordinators	20.2	44.4	47.2

[a] Occupation was predominantly male or integrated in 1970 but predominantly female in 1980.

[b] Occupation was predominantly male or integrated in 1980 but predominantly female in 1990.

Table A-1. List of Occupations and Percent Female, 1970, 1980, 1990

Occupation	Percent Female 1970	1980	1990
Traffic, shipping, & receiving clerks	13.4	23.6	29.0
Stock & inventory clerks	24.3	34.7	36.6
Meter readers	2.6	10.5	14.1
Weighers, measurers, & checkers	28.9	38.0	46.6
[a] Expediters	35.4	54.1	65.5
Material recording, scheduling, & distributing clerks, nec	69.2	75.3	67.9
[a] Insurance adjusters, examiners, & investigators	29.6	60.2	70.7
[a] Investigators & adjusters (except insurance)	43.6	62.6	73.9
Eligibility clerks, social welfare	77.8	81.8	89.6
[a] Bill & account collectors	41.3	60.8	66.2
General office clerks	75.3	82.1	82.3
Bank tellers	86.9	91.1	89.8
Proofreaders	75.0	78.8	75.9
Data-entry keyers	93.7	92.4	87.0
Statistical clerks	64.9	74.9	67.2
Teachers' aides	89.6	92.5	89.2
Administrative support occupations, nec	64.4	67.3	71.6
Service occupations			
Launderers & ironers	95.4	76.2	82.8
Cooks, private household	94.3	86.5	89.1
Housekeepers & butlers	96.6	96.4	93.9
Child care workers, private household	98.0	97.4	97.3
Private household cleaners & servants	95.9	94.6	94.0
Supervisors, firefighting & fire prevention	0.0	0.5	2.8
Supervisors, police & detectives	2.3	3.4	11.5
Supervisors, guards	7.7	9.6	14.0
Fire inspection & fire prevention occupations	0.0	9.5	13.9
Firefighting occupations	1.5	1.1	2.7
Police & detectives, public service	3.7	6.0	12.0
Sheriffs, bailiffs, & other law enforcement officers	5.8	12.6	19.3
Correctional institution officers	14.2	14.3	18.9
Crossing guards	65.2	72.5	71.7
Guards & police, excluding public service	4.0	13.5	16.6
Protective service occupations, nec	22.2	42.3	45.7
Supervisors, food preparation & service occupations	48.8	57.4	57.5
Bartenders	21.2	44.3	49.6
Waiters & waitresses	90.8	88.0	80.5
Cooks	63.2	56.1	47.6
Food counter, fountain & related occupations	56.8	81.1	72.3
Kitchen workers, food preparation	91.8	78.2	75.3
Waiters' / waitresses' assistants	32.1	41.6	42.6

[a] Occupation was predominantly male or integrated in 1970 but predominantly female in 1980.

[b] Occupation was predominantly male or integrated in 1980 but predominantly female in 1990.

Table A-1. List of Occupations and Percent Female, 1970, 1980, 1990

Occupation	Percent Female 1970	1980	1990
Miscellaneous food preparation occupations	63.6	55.4	49.8
Dental assistants	97.9	97.9	97.1
Health aides, except nursing	84.0	84.5	79.8
Nursing aides, orderlies, & attendants	87.0	87.8	87.2
Supervisors, cleaning & building, service workers	31.3	28.4	29.6
Maids & housemen	94.3	75.8	80.7
Janitors & cleaners	13.1	23.4	31.5
Elevator operators	27.9	23.3	15.1
Pest control occupations	0.0	5.8	6.1
[b] Supervisors, personal service occupations	42.4	43.8	69.3
Barbers	4.9	13.8	21.2
Hairdressers & cosmetologists	90.0	87.8	89.6
Attendants, amusement & recreation facilities	26.9	38.3	37.1
[a] Guides	32.9	57.2	53.3
Ushers	29.6	32.1	33.0
Public transportation attendants	81.3	78.1	79.4
Baggage porters & bellhops	2.8	7.0	10.8
Welfare service aides	80.6	88.4	83.7
Child care workers, except private household	92.5	93.2	95.6
Personal service occupations, nec	69.7	72.5	69.2
Farming, forestry and fishing			
Farmers, except horticultural	4.7	9.8	14.4
Horticultural specialty farmers	42.1	16.3	10.0
Managers, farms, except horticulture	4.6	9.5	12.9
Managers, horticultural specialty farms	0.0	16.4	25.0
Supervisors, farm workers	8.5	16.8	14.2
Farm workers	14.9	21.7	19.8
Nursery workers	45.0	46.6	49.2
Supervisors, related agricultural occupations	1.6	7.7	7.9
Groundskeepers & gardeners, except farm	2.9	7.4	7.4
[a] Animal caretakers, except farm	30.7	59.0	62.6
Graders & sorters, agricultural products	52.0	75.4	67.8
Supervisors, forestry & logging workers	0.0	3.2	4.5
Forestry workers, except logging	0.0	18.6	17.5
Timber cutting & logging occupations	3.3	2.5	3.0
Captains & other officers, fishing vessels	8.3	3.6	3.0
Fishers	4.1	6.5	6.4
Hunters & trappers	0.0	11.4	15.8
Precision production, craft and repair			
Supervisors, mechanics & repairers	3.6	2.9	8.4

[a] Occupation was predominantly male or integrated in 1970 but predominantly female in 1980.

[b] Occupation was predominantly male or integrated in 1980 but predominantly female in 1990.

Table A-1. List of Occupations and Percent Female, 1970, 1980, 1990

Occupation	Percent Female 1970	1980	1990
Automobile mechanics	1.4	1.3	1.9
Business, truck, & stationary engine mechanics	2.4	0.7	0.9
Aircraft mechanics	6.2	3.3	4.7
Small engine repairers	1.9	1.7	1.8
Automobile body & related repairers	1.2	1.1	2.1
Heavy equipment mechanics	1.2	0.8	1.1
Farm equipment mechanics	1.1	1.0	1.1
Industrial machinery repairers	1.6	3.1	4.1
Machinery maintenance occupations	2.8	3.8	4.5
Electronic repairers, communications & industrial equipment	3.4	5.1	8.1
Data processing equipment repairers	3.2	8.3	13.0
Household appliance & power tool repairers	0.9	3.0	4.1
Telephone line installers & repairers	3.3	5.2	6.8
Telephone installers & repairers	2.8	11.5	13.9
Miscellaneous electrical & electronic equipment repairers	0.0	9.3	5.5
Heating, air conditioning, & refrigerator mechanics	1.0	1.0	1.3
Camera, watch, & musical instrument repairers	6.5	11.9	12.2
Locksmiths & safe repairers	3.5	7.0	6.5
Office machine repairers	1.5	5.2	5.6
Mechanical controls & valve repairers	5.5	3.8	5.0
Elevator installers & repairers	0.0	1.9	1.7
Millwrights	0.9	3.3	3.4
Specified mechanics & repairers, nec	6.5	5.2	6.9
Not specified mechanics & repairers	3.7	4.1	4.0
Supervisors, brickmasons, stonemasons, & tile setters	0.0	0.9	0.7
Supervisors, carpenters & related workers	2.4	0.7	1.2
Supervisors, electricians & power transmission installers	0.0	1.2	2.2
Supervisors, painters, paperhangers, & plasterers	2.0	1.5	5.0
Supervisors, plumbers, pipefitters, & steamfitters	0.0	0.5	2.0
Supervisors, construction, nec	1.2	1.8	2.8
Brickmasons & stonemasons	1.3	1.2	1.3
Tile setters, hard & soft	1.2	2.0	2.3
Carpet installers	1.5	1.7	2.2
Carpenters	1.1	1.6	1.7
Drywall installers	1.3	2.2	2.5
Electricians	2.1	2.1	2.5
Electrical power installers & repairers	1.6	1.7	1.4
Painters, construction & maintenance	3.1	5.8	7.8
Paperhangers	10.5	18.2	25.6
Plasterers	0.8	1.9	2.0
Plumbers, pipefitters, & steamfitters	1.1	1.3	1.5
Concrete & terrazzo finishers	1.4	1.1	1.3

[a] Occupation was predominantly male or integrated in 1970 but predominantly female in 1980.

[b] Occupation was predominantly male or integrated in 1980 but predominantly female in 1990.

Table A-1. List of Occupations and Percent Female, 1970, 1980, 1990

Occupation	Percent Female 1970	1980	1990
Glaziers	4.0	4.5	5.4
Insulation workers	0.0	4.2	4.0
Paving, surfacing, & tamping equipment operators	0.0	3.1	2.5
Roofers	1.2	1.1	1.6
Sheetmetal duct installers	0.0	1.4	1.4
Structural metal workers	1.3	1.2	1.9
Drillers, earth	13.1	2.1	2.5
Construction trades, nec	2.0	2.2	3.1
Supervisors, extractive occupations	0.0	2.1	3.5
Drillers, oil well	0.0	1.3	1.4
Explosives workers	2.3	3.1	5.4
Mining machine operators	0.0	3.0	2.7
Mining occupations, nec	10.8	2.7	2.7
Supervisors, production occupations	9.9	15.0	17.7
Tool & die makers	1.4	1.8	2.4
Precision assemblers, metal	24.9	25.1	22.1
Machinists	3.0	4.9	4.6
Boilermakers	1.3	1.6	2.4
Precision grinders, filers, & tool sharpeners	2.2	5.9	7.3
Patternmakers & model makers, metal	6.2	9.8	4.9
Lay-out workers	1.0	10.4	12.7
Precious stones & metal workers (jewelers)	22.4	32.6	33.7
Engravers, metal	15.7	38.1	37.9
Sheet metal workers	1.9	4.0	5.6
Miscellaneous precious metal workers	0.0	25.4	21.1
Patternmakers & model makers, wood	0.0	2.8	9.8
Cabinet makers & bench carpenters	5.4	7.7	6.4
Furniture & wood finishers	15.4	29.8	25.1
Dressmakers	93.4	93.5	93.4
Tailors	30.8	39.4	48.0
Upholsterers	16.4	21.0	22.7
Shoe repairers	11.6	30.7	28.0
[a] Miscellaneous precision apparel & fabric workers	39.6	60.3	62.2
Hand molders & shapers, excluding jewelers	10.4	14.7	15.8
Patternmakers, lay-out workers, & cutters	23.2	23.5	24.0
[b] Optical goods workers	24.8	40.6	55.7
Dental lab. & medical appliance technicians	23.2	32.3	39.6
Bookbinders	56.0	57.3	53.3
Electrical & electronic equipment assemblers	77.7	75.8	66.4
Miscellaneous precision workers, nec	6.8	18.3	16.2
Butchers & meat cutters	11.4	14.6	19.6
Bakers	25.4	40.7	45.9

[a] Occupation was predominantly male or integrated in 1970 but predominantly female in 1980.

[b] Occupation was predominantly male or integrated in 1980 but predominantly female in 1990.

Table A-1. List of Occupations and Percent Female, 1970, 1980, 1990

Occupation	Percent Female 1970	1980	1990
[b] Food batchmakers	39.2	38.1	60.2
Inspectors, testers & graders	28.7	27.0	24.3
Adjusters & calibrators	100.0	70.7	31.9
Water & sewage treatment plant operators	0.0	3.2	5.1
Power plant operators	2.8	4.9	6.1
Stationary engineers	0.9	3.1	4.7
Miscellaneous plant & system operators	0.0	5.4	7.8
Operators, fabricators and laborers			
Lathe & turning machine set-up operators	3.5	6.4	9.1
Lathe & turning machine operators	11.8	8.8	12.2
Milling & planning machine operators	0.0	9.0	14.5
Punching & stamping press machine operators	31.8	32.0	28.2
Rolling machine operators	5.7	11.3	14.4
Drilling & boring machine operators	18.0	21.3	20.3
Grinding, abrading, buffing, & polishing machine operators	15.3	17.5	15.6
Forging machine operators	4.6	6.9	5.7
Numerical control machine operators	0.0	8.2	16.7
Misc. metal, plastic, stone & glass working machine operators	19.0	14.8	17.4
Fabricating machine operators, nec	31.9	35.0	32.0
Molding & casting machine operators	30.1	34.5	23.7
Metal plating machine operators	12.7	15.3	12.1
Heat treating equipment operators	2.9	5.6	6.6
Miscellaneous metal & plastic processing machine operators	0.0	11.1	15.7
Wood lathe, routing, & planing machine operators	0.0	10.3	12.8
Sawing machine operators	9.0	11.5	12.8
Shaping & joining machine operators	34.5	39.2	30.8
Nailing & tacking machine operators	24.6	34.5	27.2
Miscellaneous woodworking machine operators	10.2	15.9	17.4
Printing press operators	11.0	16.9	18.4
Photoengravers and lithographers	15.1	19.4	27.0
[a] Typesetters & compositors	16.8	55.7	70.1
[a] Miscellaneous printing machine operators	23.8	52.9	54.1
Winding & twisting machine operators	73.3	75.2	72.3
Knitting, looping, taping & weaving machine operators	56.7	64.8	64.7
Textile cutting machine operators	59.7	47.6	42.0
Textile sewing machine operators	94.9	94.1	88.1
Shoe machine operators	71.7	73.9	70.6
Pressing machine operators	76.6	75.1	63.2
Laundering & dry cleaning machine operators	64.5	65.0	62.2
Miscellaneous textile machine operators	45.4	47.8	40.7
Cementing & gluing machine operators	51.1	47.6	38.0

[a] Occupation was predominantly male or integrated in 1970 but predominantly female in 1980.

[b] Occupation was predominantly male or integrated in 1980 but predominantly female in 1990.

Table A-1. List of Occupations and Percent Female, 1970, 1980, 1990

Occupation	Percent Female 1970	1980	1990
[a] Packaging & filling machine operators	43.1	53.7	60.0
Extruding & forming machine operators	21.0	14.1	15.2
Mixing & blending machine operators	6.6	11.0	11.8
Separating, filtering, & clarifying machine operators	3.3	8.5	11.2
Compressing & compacting machine operators	32.0	29.9	22.4
Painting & paint spraying machine operators	16.6	16.0	14.6
Roasting & baking machine operators, food	0.0	14.5	20.1
Washing, cleaning, & pickling machine operators	6.6	24.7	30.7
Folding machine operators	62.9	60.6	67.2
Furnace, kiln, & oven operators, except food	7.0	4.9	6.1
Crushing & grinding machine operators	3.2	8.5	19.1
Slicing & cutting machine operators	25.9	29.2	28.8
Motion picture projectionists	4.3	9.2	14.9
Photographic process machine operators	50.4	53.7	51.7
Miscellaneous machine operators, nec	28.3	33.1	32.7
Machine operators, not specified	35.6	33.5	30.7
Welders & cutters	6.2	5.9	4.7
Solderers & brazers	81.7	78.0	67.0
Assemblers	45.7	49.5	43.3
Hand cutting & trimming occupations	30.4	38.7	37.1
Hand molding, casting, & forming occupations	48.6	33.8	28.8
Hand painting, coating, & decorating occupations	23.5	27.5	31.5
Hand engraving & printing occupations	81.6	31.7	43.3
Miscellaneous hand working occupations	50.2	47.6	36.3
Production inspectors, checkers, & examiners	49.5	51.8	53.0
Production testers	38.5	32.8	32.9
Production samplers & weighers	41.1	42.0	51.0
Graders & sorters, except agricultural	68.4	61.3	58.6
Supervisors, motor vehicle operators	10.1	6.4	15.7
Truck drivers	2.2	3.3	6.0
Driver-sales workers	1.1	7.5	10.1
Bus drivers	28.3	45.8	48.1
Taxicab drivers & chauffeurs	5.7	11.5	10.8
Parking lot attendants	3.7	8.3	10.3
Motor transport occupations, nec	0.0	5.7	4.8
Railroad conductors & yardmasters	0.8	1.6	6.5
Locomotive operating occupations	1.3	1.7	2.7
Railroad brake, signal, & switch operators	1.5	1.4	1.7
Rail vehicle operators, nec	0.0	3.1	6.0
Ship captain & mates, excluding fishing boats	1.3	2.0	2.9
Sailors & deckhands	1.8	2.6	3.7
Bridge, lock, & lighthouse tenders	0.0	8.4	13.1

[a] Occupation was predominantly male or integrated in 1970 but predominantly female in 1980.

[b] Occupation was predominantly male or integrated in 1980 but predominantly female in 1990.

Table A-1. List of Occupations and Percent Female, 1970, 1980, 1990

Occupation	Percent Female 1970	1980	1990
Supervisors, material moving equipment operators	0.0	4.1	6.0
Operating engineers	1.2	1.4	2.0
Longshore equipment operators	0.0	3.0	1.6
Hoist & winch operators	0.0	2.3	2.3
Crane & tower operators	1.5	2.1	2.4
Excavating & loading machine operators	0.0	1.8	1.6
Grader, dozer, & scraper operators	1.7	1.3	1.7
Industrial truck & tractor equipment operators	1.8	4.7	6.3
Miscellaneous material moving equipment operators	14.7	18.2	13.4
Supervisors, handlers, equipment cleaners, & laborers	0.0	15.4	10.7
Helpers, mechanics & repairers	0.0	5.3	5.8
Helpers, construction trades	0.0	3.7	4.5
Helpers, surveyors	1.8	6.9	9.7
Helpers, extractive occupations	0.0	6.4	16.0
Construction laborers	1.9	3.2	4.0
Production helpers	22.5	18.2	21.5
Garbage collectors	1.6	3.0	4.2
Stevedores	1.7	1.4	3.0
Stock handlers & baggers	12.5	21.0	29.5
Machine feeders & offbearers	23.3	31.3	34.7
Freight, stock, & material handlers, nec	5.9	5.6	10.6
Garage & service station related occupations	2.9	7.9	10.7
Vehicle washers & equipment cleaners	10.1	15.1	12.4
Hand pickers & packagers	67.0	66.8	64.7
Laborers, except construction	16.5	19.4	22.0

[a] Occupation was predominantly male or integrated in 1970 but predominantly female in 1980.

[b] Occupation was predominantly male or integrated in 1980 but predominantly female in 1990.