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Trends in Occupational Segregation by Gender 1970–2009: Adjusting for the Impact of Changes in the Occupational Coding System

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Abstract In this article, we develop a gender-specific crosswalk based on dual-coded Current Population Survey data to bridge the change in the census occupational coding system that occurred in 2000 and use it to provide the first analysis of the trends in occupational segregation by sex for the 1970–2009 period based on a consistent set of occupational codes and data sources. We show that our gender-specific crosswalk more accurately captures the trends in occupational segregation that are masked using the aggregate crosswalk (based on combined male and female employment) provided by the U.S. Census Bureau. Using the 2000 occupational codes, we find that segregation by sex declined substantially over the period but at a diminished pace over the decades, falling by only 1.1 percentage points (on a decadal basis) in the 2000s. A primary mechanism by which segregation was reduced was through the entry of new cohorts of women, presumably better prepared than their predecessors and/or encountering less labor market discrimination; during the 1970s and 1980s, however, occupational segregation also decreased within cohorts. Reductions in segregation were correlated with education, with the largest decrease among college graduates and very little change in segregation among high school dropouts.

Keywords Occupational segregation · Gender · Discrimination

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Introduction

Occupational segregation by sex, the tendency of men and women to work in different occupations, has been widely found to be a source of gender differences in wages (e.g., Levanon et al. (2009); see also Blau et al. (2010: chap. 7) for a review). At the same time, the movement of women into higher-paying, traditionally male occupations contributed to the narrowing of the gender pay gap in the 1980s and 1990s (e.g., Blau and Kahn 2006). This implies that a slowing or stalling of the trend toward reduced occupational segregation could retard convergence in the gender pay gap[1] and might also adversely affect increases in female labor force participation, of which the female wage rate is an important determinant (e.g., Blau and Kahn 2007).

While it is important to identify the trends in occupational segregation, there are considerable challenges to doing so accurately.[2] U.S. census data are probably the best source of occupational data for estimates of segregation, giving access to large sample sizes and a detailed occupational breakdown into a large number of categories—around 500 using the 1990 or 2000 codes. (With a small number of categories, predominantly female and predominantly male occupations may be combined into apparently integrated categories.) However, the census occupational classifications are revised periodically to take into account changes in the labor force, thus breaking the comparability of the series. Since the estimate of segregation depends on which specific occupations are distinguished by the coding scheme (because of the possibility that some classification schemes may capture more or less segregation than others), a consistent set of occupational categories is needed to accurately measure the trends. Most recently, in 2000, the Census Bureau substantially revised its codes; a prior major revision occurred in 1980. (The Current Population Survey (CPS) adopted the revised census codes with a short lag.) Another problem is that the long form of the census, which contained the occupational data, was ended after the 2000 census.

In this study, we overcome a number of data issues to provide the first estimates of the trends in occupational segregation by sex over a nearly 40-year period (1970–2009) using a consistent set of detailed occupational codes and data sources. We use data from the U.S. census and the American Community Survey (ACS) and 2000 occupational codes (presenting some results for 1990 codes for comparative purposes). The ACS, which is fielded by the Census Bureau, is considered to be a replacement for the discontinued long form of the census and has been conducted annually since 2005 for a large sample (about 1 % of the population) (U.S. Census Bureau 2009a).[3] A major contribution of our study is the development and application of a new crosswalk to bridge the changes in the census occupational coding

[1] Blau and Kahn (2006) found, based on controls for 19 occupations, that slowing occupational convergence of men and women explained some of the slowing convergence in the gender pay gap in the 1990s compared with the 1980s.

[2] For useful discussions of data issues, see Blau et al. (2010: chap. 5), Cotter et al. (1995), England (1981), and King (1992).

[3] "The American Community Survey (ACS) is the new source for the information previously collected through the decennial census long form" (U.S. Census Bureau 2009a: 1). However, we note that there are differences in sample design between the ACS, which uses a series of monthly samples, and the census, which collects data once per decade (U.S. Census Bureau 2009b).

scheme that occurred in 2000. As we show in this article, although the Census Bureau has provided a crosswalk that may be used to convert earlier occupational data into the 2000 categories (Bradley and Earle 2001; Scopp 2003), its usefulness for the study of trends in sex segregation by occupation is limited because it is based on aggregate employment (i.e., men and women combined). Our alternative crosswalk is gender-specific; it is based on a dual-coded CPS data set we constructed from files provided by the Bureau of Labor Statistics that contain both the 1990 and 2000 occupation codes at the individual level. There were relatively few changes in the census occupational coding scheme between the 1980 and 1990 censuses, allowing for suitable comparisons over this period with just a few simple adjustments. Although there was a significant change in the census occupation coding scheme between 1970 and 1980, the census did provide a gender-specific crosswalk in that case, allowing us to incorporate the 1970 data into the analysis as well.

We apply our new crosswalk to examine the trends in occupational segregation by sex over the period. This allows us to update previous research on the trends into the 2000s and also to see whether findings for earlier periods are confirmed using the new occupational coding scheme, which may capture more or less gender segregation than the 1990 codes. Although previous research has cast some light on the broad outlines of the trends, suggesting that occupational segregation by sex has been declining at a diminishing pace, it does not cover this full period (none examine the 2000s trends), sometimes requires comparisons between estimates based on different data sources (e.g., the census and the CPS), and does not utilize the new 2000 codes. Research designed to more fully understand the determinants and consequences of occupational segregation, as well as of its trends, will benefit from a long, accurate time series for occupational distributions, and a method by which current and future estimates of occupational segregation and occupational distributions of men and women may be linked back to earlier years. For example, England et al. (2007) argued that more years of data are important for estimating the relationship between occupational segregation and wages so that occupation fixed effects may be employed in the analysis (see also Levanon et al. 2009). More broadly, we would argue that a gender-specific crosswalk should be used in any application that needs to bridge the discontinuity created by the change in the occupation codes in 2000 to produce occupational data for men and women separately. This would include computing indexes of occupational standing or status, which have long been a focus of research in sociology (see Nam and Boyd (2004) for a summary).

Previous Research

Previous research using census data indicates that occupational segregation by sex was substantial and relatively stable throughout the first half of the twentieth century (Gross 1968; Jacobs 1989). Beginning in 1960, however, segregation began to fall slightly (Blau and Hendricks 1979). This trend accelerated markedly over the 1970s (Bianchi and Rytina 1986; see also Beller 1985). The decline in occupational segregation continued over the 1980s, but at a slightly slower pace (Blau et al.

1998; Cotter et al. 1995).[4] Evidence on trends over the 1990s based on CPS data (Jacobs 2003), when compared with estimated changes based on census data for earlier years (Blau et al. 1998), suggests that the pace of decline slowed further over that decade.[5] More recent work has used census data to analyze the entire period from 1950 to 2000, confirming the aforementioned trends (Levanon et al. 2009). However, in order to obtain a consistent set of occupations for the whole period, the analysis uses just 165 occupations, which potentially limits the amount of segregation that can be detected.

Data

The U.S. Census Bureau Crosswalk

The need for a crosswalk to bridge changes in occupation codes—between 1990 and 2000, for example—arises because all the incumbents of a particular 1990 occupational category do not necessarily fall within the same 2000 occupational category, but rather may be split across a number of 2000 categories. This problem may be illustrated by using data on aggregate (male plus female) employment from the census crosswalk (Scopp 2003). For the 1990 occupation of "managers, medicine, and health," the census crosswalk indicates that, although 94 % of incumbents were classified as "medical and health services managers" using the 2000 occupation codes, 2 % were classified as "education administrators," and 4 % were classified as "secretaries and administrative assistants." For each 1990 occupation, the census crosswalk lists each of the 2000 occupations in which incumbents from the original 1990 occupation were reclassified and provides "conversion factors" that may be applied to the 1990 (and previous years') data to convert them to the 2000 coding system. Conversion factors give the percentage of employment within each 1990 occupational category that was recoded into each of the 2000 occupations.

However, because it is based on aggregate employment, the census crosswalk presents a significant problem for studying trends in occupational segregation by sex. A significant amount of segregation is lost when the crosswalk is applied because the distribution of incumbents of the 1990 occupations across the new 2000 codes is implicitly assumed to be the same for both sexes. The underlying data employed by the Census Bureau in creating its aggregate crosswalk are no longer available and, moreover, did not include a gender breakdown.[6] For this reason, we have developed a gender-specific crosswalk using a CPS data set with 2000 occupation codes provided by the Bureau of Labor Statistics (BLS) that may be combined with the standard monthly CPS data (containing 1990 occupation codes) to produce dual-coded data,

[4] See also Jacobsen (1997) for the 1980s. For an excellent summary of studies and findings by decade for the 1950s through the 1980s, see Cotter et al. (1995: Table 1).

[5] This comparison is reported in Blau et al. (2010: chap. 5). They noted that the 1990 values of the index differ across the studies (data sets) but argued that the *changes* in the index may be compared. Beller (1985) made a similar assumption when comparing the 1960s and 1970s decreases in segregation using the census and CPS.

[6] Personal communication from Barbara Downs, Chief, Industry and Occupation Statistics Branch, Housing and Household Economic Statistics Division, U.S. Census Bureau (email, September 19, 2008).

with both the 1990 and 2000 occupation codes at the individual level. The dual-coded data may be constructed for each month of CPS data from 2000 to 2002 and include all the standard CPS variables, including the sex of the respondent.[7]

The bias introduced by using an aggregate crosswalk may be illustrated using the dual-coded CPS data. Consider the 1990 occupation "maids and housemen." For all workers, 87.0 % of incumbents would be reclassified as "maids and housekeeping cleaners" in the 2000 codes and 8.2 % would be reclassified as "janitors and building cleaners" (the remaining 5 % would be distributed across 61 other occupations). However, when the data are broken down by sex (which is not possible using the census crosswalk), they indicate that only 59.1 % of men, compared with 92.6 % of women, should be reclassified as "maids and housekeeping cleaners" in the 2000 codes, while 31.1 % of men but only 3.6 % of women should be reclassified as "janitors and building cleaners." When such classification errors are aggregated across a large number of occupational categories, the resulting estimate of segregation may be biased downward substantially.

Data Sources

We use two primary data sources to conduct our analysis of the trends in occupational segregation: the U.S. census and the ACS. In addition, as noted previously, we use CPS data to construct our gender-specific crosswalk. We also present some analyses using the CPS as a robustness check on our census results based on a different data source that is available annually. Further, because the CPS adopted the 2000 census codes with a lag, it is possible to observe the trends in occupational segregation based on the 1990 codes for the entire 1990–2000 period without relying on a crosswalk. All data sets were obtained from Integrated Public Use Microdata Series (IPUMS) (see King et al. 2010; and Ruggles et al. 2010). We use data from the 1 % samples of the 1970, 1980, 1990, and 2000 censuses, and data from the 2005–2009 ACS. We use CPS data beginning in 1971 because the 1960 occupation codes were used in 1970.[8] There are 505 occupations identified in the 2000 occupational coding scheme and 501 identified in the 1990 coding scheme. Not every occupation is represented in the March CPS data in every year. Thus, the included occupations change slightly from year to year, but any resulting bias should be minimal because, on average, 503 of the 505 occupations in the 2000 occupation codes are represented in each year. The main sample restrictions we implement for all our analyses are to focus on employed, working-age individuals (18–64 years old) who are not living in group quarters and who are in the civilian labor force.

[7] These data sets are available online (http://thedataweb.rm.census.gov/ftp/cps_ftp.html). The data file titled "2000 Based Public Use Extract" contains the 2000 occupation (and industry) codes for each respondent in the CPS for each month over the 2000–2002 period. These data may be merged (using the combination of month, household ID, and person ID) with the standard CPS data sets (titled "Basic Monthly CPS"), which contain the 1990 occupation codes.

[8] The CPS uses the 1970 occupation codes from 1971 to 1982, the 1980 occupation codes from 1983 to 1991, the 1990 occupation codes from 1992 to 2002, and the 2000 occupations codes starting in 2003.

We exclude observations for which occupation was imputed.[9] Sampling weights (where available) are used in all analyses.[10]

To construct our new gender-specific crosswalk,[11] we pooled all 36 months of CPS data, retaining only those in the Outgoing Rotation Group, so that individuals are included only once in each year of data. After applying our sampling restrictions, the pooled monthly CPS sample had 534,958 observations; this can be compared with the 97,902 observations used to create the U.S. census crosswalk (Scopp 2003). One compatibility issue that arises is that, in the CPS, separate data on three occupations ("legislators," "postmasters," and "judges") have been suppressed to maintain confidentiality, and the incumbents have been included in other categories.[12] For these three occupations, we augmented our CPS-based crosswalk using aggregate employment information from the census crosswalk. The calculated indexes were virtually the same when, as an alternative, we reduced the number of occupations and combined individuals in these three occupations into the appropriate categories.

Although it would have been preferable to develop a crosswalk based on census data for our census-based analysis, as we have previously noted, the requisite data are unfortunately not available. We believe that a crosswalk based on CPS data is a reasonable alternative, although census data are generally preferred to CPS data because of the smaller size of CPS samples, as we have seen. But by pooling 36 months of data for the outgoing rotation group, we are able to base our crosswalk on a very large sample of observations. To check the comparability of the CPS crosswalk with the census, we generated an aggregate crosswalk from the CPS data and calculated the correlation between the conversion factors in the census crosswalk and our CPS-based crosswalk. We obtained a coefficient of 0.95; this is a very high correlation, particularly given that the crosswalks are based on data from different years—for the Census from 1990 and for the CPS from 2000-2002—and might be expected to differ on that basis alone. This suggests that the CPS-based crosswalk can reasonably be applied to convert census data to the 2000 codes.

As noted earlier, only a few changes were needed to make the 1980 codes compatible with the 1990 classifications. Six pairs of occupations in 1980 were merged in the 1990 codes and thus are combined. There were also two 1980 occupations that were each split into three separate occupations in the 1990 codes. To convert the 1980 data into the 1990 categories, we redistributed the 1980 incumbents across the 1990 categories by assuming that the distribution by gender of workers across the three occupations in 1980 was the same as in 1990. The same procedures were applied to the 1970 data that we had converted into 1980 codes using the gender-specific crosswalk provided by the census for this purpose.[13]

[9] The percentage of observations that had imputed occupations ranged from 4.0 % to 11.4 % for various years in the census/ACS data, and from 2.6 % to 2.9 % in the CPS data used in the crosswalk. The extent of imputation was similar by gender.

[10] Sampling weights are not provided for the 1970 and 1980 census data.

[11] A CPS crosswalk, based on aggregate employment, is available from the BLS in versions for converting the codes both forward and backward; see the BLS's Tables 5 and 6, available online (www.bls.gov/cps/cpsoccind.htm).

[12] Legislators and postmasters were included in "managers, all other," and "judges" were classified with "lawyers"; separate reporting of these occupations was suppressed beginning in 1996 (personal communication from Gregory Weyland of the U.S. Census Bureau, e-mail, Aug. 25, 2010).

[13] The crosswalk is available at IPUMS (http://usa.ipums.org/usa/resources/chapter4/occ_70-80.pdf).

Some small adjustments were also needed to make the data from the 2005–2009 ACS consistent with the full 2000 occupation codes because the number of occupations available in each year's data is slightly reduced as a result of privacy concerns. To make the codes consistent, we followed the same procedure that we used to make the 1970 and 1980 data consistent with the 1990 codes in the case of occupations that had split; that is, we redistributed the incumbents in the affected categories across the full set of 2000 codes by assuming that the distribution by gender of workers in the relevant occupations was the same as in the 2000 census data. As a robustness check, we also examined the trends when we contracted the set of occupations to the number available in all years (including the 1980 census data and various years of the ACS) by combining occupational categories, leaving 468 categories. The estimated indexes were virtually identical.

Although the CPS-based, gender-specific crosswalk was based on a large sample, especially given the extent of occupational segregation by sex, there are occupation cells with just a small number of men or women. If a gender-occupation cell had five or fewer observations, we used the total number of workers for that cell (in place of the gender-specific number) in constructing the crosswalk. Our results were robust to experimentation with two other small occupation cutoffs (i.e., 1 or fewer and 10 or fewer observations); see Table 7 in the Appendix. The dual-coded data set also had many transitions (i.e., recodes of 1990 occupational employment into specific 2000 occupational categories) that were based on small numbers of observations. We include all of the recorded transitions in our crosswalk, although results were similar when we dropped transitions with less than 0.05 % of occupational employment (again, see Table 7 in the Appendix). This is the cutoff the BLS uses for inclusion in its published crosswalk (see the BLS's Tables 5 and 6, available online at www.bls.gov/cps/cpsoccind.htm).

Methods

Differences in the distribution of women and men across a wide number of occupational categories may be summarized by a segregation index. The most commonly employed measure is that developed by Duncan and Duncan (1955), and for comparability with other studies, we employ that measure here. The index of segregation is computed as

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

where m_{it} (f_{it}) is the proportion of all employed males (females) who are employed in occupation i at time t. This measure, generally expressed as a percentage, indicates the proportion of women (or men) that would have to change occupations for the occupational distribution of men and women to be the same. If the share of women in all occupations is the same as their share of total employment, then the segregation index is 0. Hence, a value of 0 indicates complete integration, whereas a value of 100 indicates complete segregation.

When considering the mechanism that produces a decrease in the segregation index, we normally think first of a change in sex composition within occupations—for example, as when women enter predominantly male jobs in large numbers or, less frequently, men enter predominantly female occupations. However, as Gibbs

(1965) first pointed out, the degree of occupational segregation also depends on occupational structure—the relative size of segregated versus integrated occupations. This implies that changes in the degree of segregation over time may occur as a byproduct of shifts in the occupation mix of the economy. 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 could mask the effects of increasing integration within occupations.

In order to better understand the sources of observed changes in the segregation index over time, we employ a decomposition method, initially proposed by Fuchs (1975), that decomposes the overall change in segregation into sex composition and occupation mix components. Fuchs used this decomposition to analyze trends in segregation within the professions. Blau and Hendricks (1979) were the first to employ it to analyze trends across the labor force as a whole; versions have also been used by Beller (1985), Bianchi and Rytina (1986), Blau et al. (1998), and Cotter et al. (1995). We do not use the standardized index proposed by Gibbs (1965) because it entails making all occupations of equal size in order to net out the effect of occupational structure, which in our view gives too much weight to small, possibly unrepresentative occupations. In the Fuchs decomposition, the sex composition effect measures how much the segregation index would have changed if just the percentage male (female) within occupations changed but the relative size of each occupation remained constant; the occupation mix effect measures how much occupational segregation would have changed if just the relative size of occupations changed but the sex composition of each occupation remained constant.

To compute these effects, it is helpful to change the representation of how the occupational segregation index is calculated. If F_{it} (M_{it}) is the number of females (males) in occupation i at time t, and $T_{it} = F_{it} + M_{it}$ is total employment for occupation i, then the segregation index can be rewritten as

$$S_t = (0.5)\sum_i \left| \frac{q_{it}T_{it}}{\sum_j q_{jt}T_{jt}} - \frac{p_{it}T_{it}}{\sum_j p_{jt}T_{jt}} \right|,$$

where $p_{it} = F_{it} / T_{it}$ is the percentage of women in each occupation, and $q_{it} = (1 - p_{it}) = M_{it} / T_{it}$ is the percentage of men. For the change in segregation between periods 1 and 2, the sex composition and occupation mix effects are defined as follows:

$$\text{Sex composition effect} = \left[(0.5)\sum_i \left| \frac{q_{i2}T_{i1}}{\sum_j q_{j2}T_{j1}} - \frac{p_{i2}T_{i1}}{\sum_j p_{j2}T_{j1}} \right| \right] - S_1.$$

$$\text{Occupation mix effect} = S_2 - \left[(0.5)\sum_i \left| \frac{q_{i2}T_{i1}}{\sum_j q_{j2}T_{j1}} - \frac{p_{i2}T_{i1}}{\sum_j p_{j2}T_{j1}} \right| \right].$$

Aggregate Versus Gender-Specific Crosswalks

In this section, we examine the relative usefulness of the aggregate crosswalk provided by the Census Bureau and our CPS-based gender-specific crosswalk. Evidence that the gender-specific crosswalk yields more plausible results is provided in Table 1, which applies the aggregate and gender-specific crosswalks to the dual-coded 2000–2002 CPS data. These data may be used to obtain true measures of occupational segregation in both the 1990 and 2000 occupation coding schemes for each year of data (see columns 1 and 2). We then use column 2 as a benchmark to compare indexes based on alternative crosswalks to convert the data from the 1990 to the 2000 codes. Columns 1 and 2 show that the 2000 occupation codes capture a slightly higher level of segregation, but that the two sets of occupation codes measure roughly the same level of segregation in each year. Column 3 shows the results of applying the census aggregate crosswalk and reveals that a significant amount of segregation is lost in doing so. In column 4, we apply our new CPS-based gender-specific crosswalk and see that it recovers roughly the same amount of segregation as the actual dual-coded data: the difference between columns 2 and 4 is 0.15 percentage points or less.

One difference between the census and CPS-based crosswalks, in addition to how they treat gender, is that they are based on different years. The census crosswalk is based on 1990 data, whereas the CPS data are from 2000–2002, so, the resulting estimates of segregation may differ at least in part because the occupation composition of the workforce changed between 1990 and 2000. To address this issue, we created an aggregate crosswalk from the dual-coded CPS data. The last column in Table 1 shows that this third crosswalk performs even worse than the census-based crosswalk (column 3) in capturing the levels of occupational segregation that exist in the actual CPS data (column 2), thus indicating that it is the treatment of gender, rather than the base year employed, that accounts for the more plausible results found with the gender-specific CPS crosswalk.

Table 1 Occupational segregation indexes by gender using alternative crosswalks and the dual-coded CPS Data, 2000–2002

Year	1990 Codes (1)	2000 Codes (2)	2000 Codes via Aggregate Census Crosswalk (3)	2000 Codes via Gender-specific, CPS Crosswalk (4)	2000 Codes via Aggregate CPS Crosswalk (5)
2000	52.02	52.46	48.60	52.52	46.35
2001	51.77	52.63	48.20	52.47	46.12
2002	52.02	52.59	48.41	52.54	46.20

Trends in Occupational Segregation by Sex, 1970–2009

Overall Trends

The results of applying the CPS-based, gender-specific crosswalk to the census data are shown in Table 2 for both the 1990 and 2000 occupation codes. For ease of interpretation, all changes are computed on a decadal basis, and the 2005–2009 changes are calculated with reference to the year 2000. Under both coding schemes, we confirm prior results of a slowing pace for the decrease in segregation over the 1970–2000 period. Our results for the 2000s further indicate that this pattern continued into that period. There were substantial decreases in the segregation index over the 1970s and 1980s—6.1 percentage points (1970s) and 4.3 percentage points (1980s) using the 2000 codes. However, there was only a 2.1-percentage-point fall in the index over the 1990s,[14] and just a 1.1-percentage-point drop (on a decadal basis) over the 2000s.

Because conclusions about the 2000s could be influenced by the particular ending year used (Beller 1985), the use of 2009 as the endpoint requires some justification in light of the recent, extremely serious recession that began in December 2007 and ended in June 2009[15] and that has been followed by a prolonged period of weakened employment. The recession has had uneven impacts on various occupations (e.g., see U.S. Bureau of Labor Statistics 2011), and this could distort our findings for 2009. For example, the construction industry has been severely affected by the current recession, which will lower the influence of the highly segregated male occupations in that industry. However, as shown in Table 2, the segregation index is only 0.6 percentage points lower in 2009 than in the pre-recession year of 2007. Moreover, the housing bubble in the preceding boom likely inflated the size of the construction industry, suggesting that a pre-recession year may not be ideal either and thus that 2009 may be an acceptable endpoint. This conclusion is reinforced by the results in Table 2: for each of the other years for which ACS data are available (2005–2008), the table shows a similar small decrease in the segregation index on a decadal basis.

As an additional check on our results, we also present annual indexes estimated using March CPS data for the entire 1971–2009 period in Fig. 1. The findings are quite similar in indicating a decrease in segregation for the whole period but a considerable slowing of the rate of decline in segregation for the 1990s and 2000s. Unlike the census-based results, however, the CPS data do not show a slower decrease in segregation in the 1980s than in the 1970s.

We now turn to a more detailed analysis of the trends in segregation, focusing for simplicity on the 2000 occupational categories. Although the extent of segregation by

[14] In contrast to the results obtained using the gender-specific crosswalk, application of the census's aggregate crosswalk to the 1990 census data yields implausible results for the change in the index over the 1990s: the index is found to have *increased* by 1.51 percentage points (from 50.52 in 1990 to 52.03 in 2000) using the 2000 occupation codes; see Blau et al. (2012). This conflicts not only with the results in Table 2, but also with our findings using CPS data presented in Fig. 1.

[15] National Bureau of Economic Research Business Cycle Dating Committee (http://www.nber.org/cycles/main.html).

Table 2 Occupational segregation indexes by gender from 1970–2009 using the gender-specific, CPS-based crosswalk (census data)

Year	2000 Codes		1990 Codes	
	Index	Change[a]	Index	Change[a]
1970	64.48		68.69	
1980	58.36	–6.12	60.00	–8.69
1990	54.08	–4.29	53.79	–6.20
2000	52.03	–2.05	51.51	–2.29
2005	51.83	–0.40	51.33	–0.36
2006	51.95	–0.14	51.47	–0.06
2007	51.67	–0.51	51.20	–0.43
2008	51.69	–0.42	51.26	–0.31
2009	51.04	–1.10	50.67	–0.92

Notes: Both the census data and the gender-specific crosswalk are for employed individuals aged 18–64 for whom occupation was not imputed. As explained in the text, total employment was used for crosswalk cells with five or fewer men or women.

[a]Average annual change ×10. For years 2005–2009, change is calculated with reference to the year 2000.

sex remains substantial, the cumulative decrease in segregation over the whole 1970–2009 period has nonetheless been notable. Based on the 2000 codes, the index fell 13.44 percentage points, from 64.48 % in 1970 to 51.04 % in 2009.[16] As noted earlier, it is possible to decompose the overall change in segregation into sex composition and occupation mix components. The sex composition effect measures how much of the overall change is due to changes in sex composition within occupations, and the occupation mix effect measures how much is due to changes in the relative size of occupations. Table 3 presents decomposition results for four time periods: 1970–1980, 1980–1990, 1990–2000, and 2000–2009. The results indicate that both the sex composition and occupation mix effects contributed to the decrease in segregation in each decade; however, the sex composition effect accounted for the bulk of the trend toward desegregation (except in the 2000s when the overall decline in the index was quite small). Table 3 indicates that the magnitude of the negative sex composition effect diminished noticeably over time. Thus, the slowing decline in the segregation index does indeed represent a reduction in gender integration within occupations rather than, say, a constant rate of decrease attributable to changes in sex composition disguised by an unfavorable trend in the mix of occupations.

Before turning to a fuller consideration of the changes in the employment distribution of women and men that contributed to changes in sex composition within occupations, we note the broad trends in occupation mix over the four decades. Based on a disaggregation of the occupation mix effect by major occupation category in

[16] Declines were even larger using the 1990 codes. In contrast to the findings for later years, for 1970 and 1980, a higher level of segregation is obtained using the 1990 codes than using the 2000 codes.

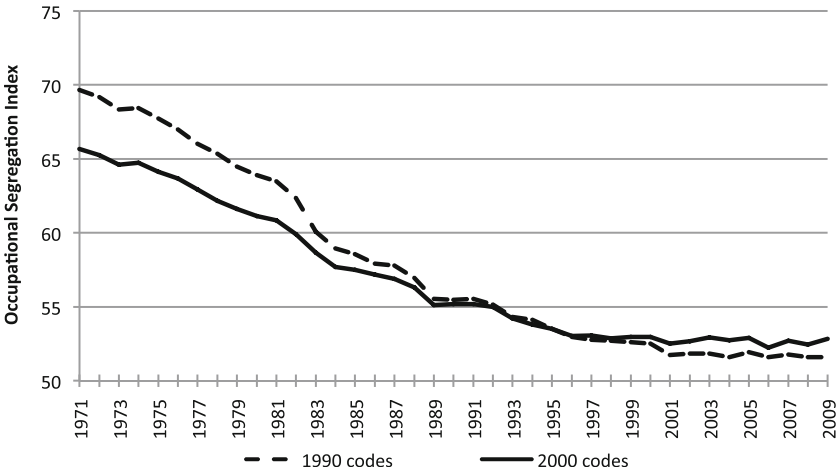

Fig. 1 Trends in occupational segregation using gender-specific CPS crosswalk (March CPS data). Estimates for the years 2000–2002 use actual (noncrosswalked) data from the BLS dual-coded data set

each period (results not shown), similar to Blau et al.'s (1998) results for the 1970s and 1980s, we find that in each decade, the most important shifts in occupation mix that worked to reduce segregation were the decline in the relative importance of (1) particularly male but also female production occupations[17] and (2) female office and administrative support jobs. A decrease in relative employment in other male blue-collar occupations also played a role. During the 2000s, the impact of these trends was offset somewhat by a growth in sex-segregated male and, particularly, sex-segregated female service jobs. The female jobs include a number of occupations in health care, household employment, and personal services.

Turning to the changes in sex composition within occupations, some insight into their dimensions for the period as a whole is provided by Table 4, which gives the distribution of workers (panel 1) and occupations (panel 2) by quintile of percentage female in the occupation for 1970 and 2009. For workers, we first show the distribution for 1970 and 2009, when occupations are defined by their *1970* gender composition, in order to see the reallocations of men and women across fixed categories. The distribution of workers is then shown for 2009 using the *2009* gender composition definitions. This allows occupations to be reclassified as the sex composition (percentage female) within them is changed by the reallocation of workers across the 1970 categories.

As shown in the table, male and female workers were heavily concentrated in the most segregated male and female occupations in 1970. Fully 69.0 % of men worked in heavily male (20 % or less female) occupations, and 45.8 % of women were employed in heavily (more than 80 %) female occupations. Holding the set of occupations fixed, we see a substantial decrease in the share of women in initially heavily female jobs (13.0 percentage points) but a much smaller decrease in the share of men in initially heavily male occupations (only 3.9 percentage points). Similarly,

[17] In the 1970s, the contribution of female production jobs was larger than that of male production jobs.

Table 3 Decomposition of overall changes in occupational segregation, 2000 occupation codes

Time Period	Total Change[a]	Sex Composition		Occupation Mix	
		Absolute[a]	% of Total	Absolute[a]	% of Total
1970–1980	–6.12	–4.91	80.3	–1.20	19.7
1980–1990	–4.29	–2.97	69.4	–1.31	30.6
1990–2000	–2.05	–1.17	57.3	–0.87	42.7
2000–2009	–1.10	–0.51	46.6	–0.59	53.4

Note: The separate parts may not equal the whole because of rounding.

[a]Average annual change × 10.

the increase in the representation of men in initially moderately and heavily (60 % or more) female jobs (3.9 percentage points) was small relative to the increase in the representation of women in initially moderately and heavily male (40 % or less female) occupations (14.6 percentage points). This means that the decrease in segregation attributable to changing sex composition of occupations was primarily due to the movement of women into predominantly and moderately male occupations rather than a movement of men into predominantly and moderately female occupations (as defined by 1970 sex composition).[18] This is similar to results obtained in earlier studies (see, e.g., Blau et al. 1998; Cotter et al. 1995; and, for the 1970s, Beller 1985; and Bianchi and Rytina 1986) and is a factor underlying recent analyses of the uneven nature of changes in gender roles (England 2010). The impact of this redistribution of women across occupations on the sex composition of initially male occupations was further "leveraged" by the increase in the female share of total employment from 37.3 % in 1970 to 47.6 % in 2009 (calculated from census and ACS data).

As a result, when we compare worker distributions across quintiles in 1970 and 2009 using the *2009* gender composition, the share of men in heavily male occupations is substantially reduced—by 28.2 percentage points—and the number of occupational categories that may be classified as heavily male falls by 73. The decrease in the share of women in heavily female jobs of 12.6 percentage points is smaller and, as we have seen, primarily due to the movement of women out of these jobs. Moreover, the number of occupational categories that may be classified as heavily female increases slightly (by 5). The declines in employment in the most heavily segregated male occupations were accompanied by an increase in the share of men in moderately male (20 % to 40 % female) occupations and of both men and women in relatively integrated (40 % to 60 % female) occupations. However, there was also a substantial increase of 6.3 percentage points in the share of women in moderately (60 % to 80 %) female occupations, and the number of occupations so classified increased by 32. This suggests that, as women enter initially male or integrated occupations, some

[18] Not surprisingly, given the overall trends in occupational segregation, data disaggregated by decade indicate that this inflow of women into male jobs was larger in the 1970s and 1980s than in the 1990s, and virtually died out in the 2000s.

Table 4 Distribution of workers and occupations by quintile of percentage female in the occupation, 2000 occupation codes

	Women as % of Total in Occupation					
	0–20	20–40	40–60	60–80	80–100	Total[a]
I. Distribution of Workers						
Defined by 1970 gender composition						
A. 1970						
Men	69.0	14.6	9.5	4.3	2.6	100.0
Women	9.7	9.5	14.8	20.2	45.8	100.0
Total	46.9	12.7	11.5	10.2	18.7	100.0
B. 2009						
Men	65.1	15.0	9.1	7.2	3.6	100.0
Women	18.1	15.7	14.5	18.9	32.8	100.0
Total	42.7	15.3	11.6	12.8	17.5	100.0
Defined by 2009 gender composition						
A. 2009						
Men	40.8	26.2	18.7	11.0	3.2	100.0
Women	4.1	12.9	20.8	29.1	33.2	100.0
Total	23.3	19.9	19.7	19.6	17.5	100.0
II. Distribution of Occupations						
Defined by 1970 gender composition						
A. 1970						
Percentage	53.3	19.4	10.1	9.9	7.3	100.0
Number	269	98	51	50	37	505
Defined by 2009 gender composition						
B. 2009						
Percentage	38.8	18.6	18.0	16.2	8.3	100.0
Number	196	94	91	82	42	505

Note: Intervals are defined as follows: 0–20: $0 \leq p_{fi} \leq 20$; 20–40: $20 < p_{fi} \leq 40$; … 80–100: $80 < p_{fi} \leq 100$, where p_{fi} is percentage female in occupation i.

[a]Rows may not sum to column totals because of rounding.

occupations may "tip" (Pan 2010) or "resegregate" (Reskin and Roos 1990) and become predominantly female.

Given that the movement of women into traditionally predominantly male occupations played a major role in the reduction in occupational segregation over this period, Table 5 investigates which types of male jobs women were more likely to enter. It reports the results of a descriptive regression estimated for occupations that were heavily male (20 % female or less) in 1970. The dependent variable is the change in the proportion female in an occupation between 1970 and 2009 minus the corresponding change in the proportion female in total employment. The explanatory variables are dummy variables for the major occupation categories, with production jobs as the omitted category. Table 5 shows the predicted changes in female

Table 5 Changes in percentage female in heavily male (≤ 20 % female) occupations between 1970 and 2009 across major occupation categories, 2000 occupation codes

Major Occupation	Change in % Female
Management, Business, and Financial	7.655**
	(1.044)
Professional and Related	6.504**
	(1.153)
Service	3.195*
	(1.286)
Sales and Related	11.145**
	(1.207)
Office and Admin. Support	7.110*
	(2.609)
Farming	–9.159**
	(2.780)
Construction and Extraction	–9.758**
	(1.095)
Installation, Maintenance, and Repair	–8.869**
	(1.308)
Transportation and Material Moving	–5.368**
	(1.072)
Production	–7.117**
	(1.304)
R^2	.592
N	269

Notes: Standard errors are in parentheses. Based on regression results in which the dependent variable is defined as the change in proportion female within the occupation minus the change in proportion female in total employment. The explanatory variables are dummy variables for the major occupation categories, with production occupations as the omitted category. The table entries reported for major occupation groups are b_{OCC} + Constant, where b_{OCC} is the coefficient on the indicated major occupation category. Male occupations are those with percentage female of 20 % or less in the base year. To correct for heteroskedasticity, regressions were weighted by $(n_j \times n_k)/(n_j + n_k)$, where n gives the sample size in the occupation cell in the indicated year, and j and k are the years spanned by the period defining the dependent variable.

*$p < .05$; **$p < .01$

representation in each occupation category (relative to the change in women's representation in total employment) based on this regression and indicates whether the changes are significantly different from 0. That is, for each occupation, the table reports the sum of the constant term and the regression coefficient for that occupation (or just the constant term in the case of the omitted category). This is easier to interpret than the regression coefficient itself, which is with reference to an arbitrarily selected reference category. The calculations are explained in more detail in the notes to the table.

The major pattern that emerges is that women increased their representation in previously male white-collar and service jobs significantly faster than the increase in

their share of total employment—for example, 7.7 percentage points faster for the management category. In contrast, their representation in blue-collar and farming occupations increased significantly more slowly than the increase in their share of total employment—for example, 9.8 percentage points more slowly for the construction and extraction category.

Because of the pattern of entry of women shown in Table 5, many traditionally male professions moved out of the heavily male category, including lawyers, physicians and surgeons, architects, economists, and veterinarians (to name a few). The remaining heavily male professional jobs tend to be in science, technology, engineering, and mathematics (the STEM fields); the clergy also remains heavily male. Even in these areas, however, there have been increases in the representation of women in most cases. The reduction in the number of managerial jobs that are heavily male includes the movement off this list of chief executives, general and operation managers, and financial examiners, among others. At the same time, many blue-collar jobs remain heavily male. As a result of these differences between white- and blue-collar occupations, heavily male jobs have become increasingly blue-collar. Our calculations indicate that, in 1970, about 53 % of men employed in heavily male jobs were in blue-collar occupations; this had increased to 71 % by 2009.

Trends in Segregation by Age Categories

We now turn to an analysis of trends in occupational segregation by age categories designed to shed light on the extent to which the changes in occupational segregation we have observed for all workers are due to (1) new cohorts entering the workforce with different occupational distributions than their predecessors, (2) occupational shifts of cohorts already established in the workforce, or

Table 6 Trends in occupational segregation from 1970–2009 by age and education categories, 2000 occupation codes

	1970	1980	1990	2000	2009
Age Categories					
25–34	62.19	56.82	53.24	51.00	50.76
35–44	62.97	59.30	54.24	53.29	51.40
45–54	62.14	60.18	56.47	54.06	53.64
55–64	62.21	60.27	57.35	56.36	53.57
Education Categories					
Less than high school diploma	60.57	60.53	57.81	57.19	59.19
High school diploma	65.88	63.36	60.64	59.76	58.63
Some college	63.54	59.01	56.57	55.98	54.44
At least a college degree	61.73	51.69	44.81	41.66	40.35
All	62.50	58.36	54.08	52.03	51.04

(3) a combination of both. To do this, we calculate the occupational segregation index for four different age categories (25–34, 35–44, 45–54, and 55–64) for each year. Although our analyses have been focused overall on the 18- to 64-year age range, we present these results for age categories beginning at age 25 in order to focus on individuals who have generally completed their schooling, and also to be able to follow 10-year age cohorts over time. These results are presented in the top panel of Table 6.

In 1970 and 1980, the level of segregation was quite similar across age groups. Looking across the columns, we see that occupational segregation declined for each age group over the 1970–2009 period. The decreases in segregation by age group tend to follow the same pattern as the overall decline in segregation: segregation decreased most rapidly in the 1970s and 1980s, with decreases in the 1990s tending to be smaller and any decreases in the 2000s being smaller still. Over the whole period, decreases were somewhat larger for the younger two than for the older two age groups. These age-specific decreases in segregation represent between-cohort or inter-cohort declines in segregation and suggest that a primary mechanism by which occupational segregation was reduced throughout the period was through the entry of new, less-segregated cohorts presumably with better training, stronger labor market commitment, and perhaps better labor market opportunities than their predecessors.

Further insight into the mechanism by which occupational segregation has been reduced may be obtained by following cohorts over time; we may get an indication of these within-cohort or intracohort changes by looking diagonally down the rows in the table. For example, the workers in age group 25–34 in 1970 were in age group 35–44 in 1980 and had a 2.9-point decline in occupational segregation.[19] This pattern of intracohort declines occurred for all age cohorts during the 1970s and 1980s, indicating that, during this period, women became less segregated by occupation as they aged. Thus, in the 1970s and 1980s, the periods with the largest decreases in segregation, intercohort declines in segregation were augmented by decreases in segregation within cohorts; thereafter, however, segregation levels remained fairly constant with age.

Trends in Segregation by Education Groups

To update and confirm earlier results, this section examines trends in occupational segregation by education to see how each education group fared over this period. (Jacobs (1999) provided estimates of occupational segregation by education level for 1971–1997.) We compute the index separately for four education groups (i.e., less than high school, high school diploma, some college, and at least a college degree) for each year. These results are presented in the bottom panel of Table 6. Except for 1970, each year provides some evidence of a negative relationship between education and occupational segregation, with college-educated women less

[19] The intracohort results are only suggestive in that they may be affected by changes over time in the composition of the group. Further, the last period shown in the table, 2000–2009, is slightly less than a full decade, but we include it as an indication of the trends over the 2000s.

segregated than high school graduates and high school dropouts, and those with a college degree considerably less segregated than those with less education. As Jacobsen (1997) noted, this pattern implies that part of the overall decrease in occupational segregation is due to the increased educational attainment of the working-age population. The dramatic gains in college education for women (Goldin et al. 2006) are likely to have been especially important.

Although rising educational attainment has contributed to the decrease in occupational segregation, there have also been considerable declines over the 1970–2009 period in the extent of segregation within educational categories, with the exception of those with less than a high school diploma. Table 6 further indicates that, as reported by Jacobsen (1997) and Jacobs (1999) for earlier periods, the decreases in segregation have been positively related to education, and the declines have been especially pronounced for college graduates. Between 1970 and 2009, the segregation index declined by fully 21.4 percentage points among those with college degrees, compared with decreases of 9.1 percentage points for those with some college, 7.3 percentage points for those with just a high school education, and only 1.4 percentage points for high school dropouts. As Jacobs (1999) pointed out, the considerable success of women in entering formerly male managerial and professional occupations has likely fueled this dramatic decline in segregation for highly educated women. However, as we have seen, progress in integrating blue-collar jobs has been much slower, likely retarding reductions in occupational segregation for less-educated women.

Conclusion

In this article, we used census data to analyze the trends in occupational segregation in the U.S. workforce over a nearly 40-year period. This required us to bridge the major change in the census occupational coding system that occurred in 2000. We present evidence that the crosswalk provided by the census to convert data for previous years into the 2000 occupational categories is of limited usefulness for studying trends in occupational segregation by gender because it is based on aggregate employment data (i.e., data for men and women combined) and thus provides the same conversion factors for men and women. This leads to classification errors that, when aggregated across a large number of occupational categories, can bias the segregation estimate downward substantially. A major contribution of this study is the development of a gender-specific crosswalk, with separate conversion factors for men and women, using dual-coded Current Population Survey data for 2000–2002. We show that this crosswalk more accurately captures the trends in occupational segregation and, in general, should be used in any application that requires separate occupational data for men and women. We also recommend that when any future coding changes occur, the Census Bureau publish a gender-specific crosswalk as it did for the major occupation coding changes that occurred between 1970 and 1980 but did not for the changes to the occupational coding system between 1990 and 2000. We also recommend that the Census Bureau make a dual-coded data file available so that users can generate crosswalks along any number of dimensions.

We then applied our gender-specific crosswalk to study the trends over the 1970–2009 period, providing the first results for trends over the 2000s and for all periods using the new 2000 occupational codes. Consistent with previous research, we find that the decline in occupational segregation by sex has indeed been slowing. Our results indicate that by the 2000s, the decrease in segregation had become extremely modest. Consistent with past research on earlier periods, we find that the considerable reductions in occupational segregation achieved over the period as a whole were primarily due to women entering formerly predominantly male occupations (particularly white-collar and service jobs), rather than to men entering formerly predominantly female occupations. There was no evidence of similar female gains in blue-collar occupations. Consistent with this pattern, we also confirm earlier findings that reductions in occupational segregation were correlated with education, with the largest decreases among college graduates and very little change in the extent of occupational segregation among high school dropouts. In addition, our results suggest that for the 1970s and 1980s, when the decline in segregation was particularly pronounced, occupational segregation was reduced not only through the entry of new cohorts of women who were presumably better prepared and/or encountered less labor market discrimination than their predecessors but also through within-cohort decreases in segregation.

A central finding of this study is the confirmation of the results of previous research for earlier periods and occupational coding schemes that the decline in occupational segregation by sex has been slowing. It is difficult to predict whether or when a more robust decrease in segregation will resume. However, our analysis suggests that for it to do so, women would need to begin to make significant inroads into areas where they have not so far, especially predominantly male blue-collar jobs, and continue to build on their gains in STEM fields; and/or men would need to enter predominantly female occupations in much larger numbers than they have in the past.

A large entry of men into predominantly female occupations is unlikely, in our view; as long as such jobs continue to pay less for workers with similar characteristics, men have little incentive to enter them in large numbers. This might change somewhat, depending on the long-term impact of the recent recession on male blue-collar jobs, as well as structural shifts in the economy increasing demand for workers in traditionally female occupations.[20] Along this line, our data do show an increase, albeit a very small one, in the representation of men in traditionally female occupations since 1970. Encouraging the entry of women into areas where they are underrepresented appears more promising. With respect to the STEM fields, enhancing the performance of girls and young women in mathematics is a reasonable target of policy. How to do so remains an active area of inquiry, but it is encouraging that although a gender gap in math scores on high school math achievement tests and the SATs remains, it has declined as the high school course work of young men and women has grown more similar (Blau et al. 2010: chap. 6; Goldin et al. 2006) and that gender differences in math scores vary considerably across countries, suggesting that they are susceptible to environmental factors (Guiso et al. 2008). In addition, in considering these and other occupations, considerable research suggests that although there are gender differences in preferences and beliefs (which may be socially

[20] For some suggestive evidence on such trends, see Dewan and Gebeloff (2012).

influenced) that may affect occupational choices (e.g., Bertrand 2010; England 2010), there are also obstacles (some subtle or structural) to women's entry and advancement in traditionally male fields (e.g., Blau et al. 2010: chap. 7; Reskin and Bielby 2005; Valian 1998). These have been and remain appropriate targets for government anti-discrimination efforts and voluntary policies adopted by firms. However, there is still much we do not know, and additional research remains important for more fully understanding the causes and consequences of occupational segregation, as well as the efficacy of policies to address it. We believe that the crosswalk we have developed to bridge the changes in the census occupational coding scheme that occurred in 2000 will be useful in this effort.

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Appendix

Table 7 Occupational segregation indexes by gender from 1970–2009 testing various methods for applying the crosswalk, 2000 occupation codes

Year	Small Occupation Cutoffs				Small Transition Cutoff	
	≤1		≤10		<0.05 %	
	Index	Change[a]	Index	Change[a]	Index	Change[a]
1970	64.49		64.46		64.75	
1980	58.41	–6.08	58.34	–6.11	58.56	–6.19
1990	54.08	–4.33	54.07	–4.28	54.18	–4.38
2000	52.03	–2.05	52.03	–2.04	52.03	–2.15
2009	51.04	–1.10	51.04	–1.10	51.04	–1.10

Notes: All calculations are made as in Table 2 except where specifically noted. For the small occupation cutoffs, if a gender-occupation cell did not have the indicated number of observations, the observations for both sexes combined were used to generate the crosswalk information for that occupation. For the small transition cutoff, transitions with less than 0.05 % of occupational employment were dropped. The transition percentages were then recalculated so they equaled 100 %.

[a]Average annual change × 10.

References

Beller, A. H. (1985). Changes in the sex composition of U.S. occupations, 1960–1981. *Journal of Human Resources, 20,* 235–250.

Bertrand, M. (2010). New perspectives on gender. In O. Ashenfelter & D. Card (Eds.), *Handbook of labor economics* (Vol. 4b, pp. 1545–1592). Amsterdam, The Netherlands: Elsevier.

Bianchi, S. M., & Rytina, N. (1986). The decline of occupational sex segregation during the 1970s: Census and CPS comparisons. *Demography, 23,* 79–86.

Blau, F. D., Brummund, P., & Liu, A. Y.-H. (2012). *Trends in occupational segregation by gender 1970–2009: Adjusting for the impact of changes in the occupational coding system,* (NBER Working Paper No. 17993). Cambridge, MA: National Bureau of Economic Research.

Blau, F. D., Ferber, M. A., & Winkler, A. E. (2010). *The economics of women, men, and work* (6th ed.). Upper Saddle River, NJ: Prentice Hall.

Blau, F. D., & Hendricks, W. E. (1979). Occupational segregation by sex: Trends and prospects. *Journal of Human Resources, 14,* 197–210.

Blau, F. D., & Kahn, L. M. (2006). The U.S. gender pay gap in the 1990s: Slowing convergence. *Industrial & Labor Relations Review, 60,* 45–66.

Blau, F. D., & Kahn, L. M. (2007). Changes in the labor supply behavior of married women: 1980–2000. *Journal of Labor Economics, 25,* 393–438.

Blau, F. D., Simpson, P., & Anderson, D. (1998). Continuing progress? Trends in occupational segregation in the United States over the 1970s and 1980s. *Feminist Economics, 4*(3), 29–71.

Bradley, D., & Earle, K. (2001, August 5–9). Developing and explaining the crosswalk between census 1990 and 2000 industry and occupation codes. *Proceedings of the Annual Meeting of the American Statistical Association*.

Cotter, D. A., DeFiore, J. M., Hermsen, J. M., Marsteller Kowalewski, B., & Vanneman, R. (1995). Occupational gender desegregation in the 1980s. *Work and Occupations, 22*(3), 3–21.

Dewan, S., & Gebeloff, R. (2012, May 21). More men enter fields dominated by women. *New York Times.* Retrieved from http://nytimes.com

Duncan, O. D., & Duncan, B. (1955). A methodological analysis of segregation indexes. *American Sociological Review, 20,* 210–217.

England, P. (1981). Assessing trends in occupational segregation, 1900–1976. In I. Berg (Ed.), *Sociological perspectives on labor markets* (pp. 273–295). New York: Academic.

England, P. (2010). The gender revolution: Uneven and stalled. *Gender and Society, 24,* 149–166.

England, P., Allison, P., & Wu, Y. (2007). Does bad pay cause occupations to feminize, does feminization reduce pay, and how can we tell with longitudinal data? *Social Science Research, 36,* 1237–1256.

Fuchs, V. R. (1975). A note on sex segregation in professional occupations. *Explorations in Economic Research, 2,* 105–111.

Gibbs, J. P. (1965). Occupational differentiation of negroes and whites in the United States. *Social Forces, 44,* 159–165.

Goldin, C., Katz, L. F., & Kuziemko, I. (2006). The homecoming of American college women: The reversal of the college gender gap. *Journal of Economic Perspectives, 20,* 133–156.

Gross, E. (1968). Plus ca change…? The sexual structure of occupations over time. *Social Problems, 16,* 198–208.

Guiso, L., Monte, F., Sapienza, P., & Zingales, L. (2008). Education forum: Culture, gender, and math. *Science, 320,* 1164–1165.

Jacobs, J. A. (1989). Long-term trends in occupational segregation by sex. *The American Journal of Sociology, 95,* 160–173.

Jacobs, J. A. (1999). The sex segregation of occupations: Prospects for the 21st century. In G. N. Powell (Ed.), *Handbook of gender and work* (pp. 125–141). Newbury Park, CA: Sage Publications.

Jacobs, J. A. (2003). Detours on the road to equality: Women, work and higher education. *Contexts, 2*(1), 32–41.

Jacobsen, J. P. (1997). Forum: Trends in workforce segregation: 1980 and 1990 census figures. *Social Science Quarterly, 78,* 234–235.

King, M. C. (1992). Occupational segregation by race and sex, 1940–88. *Monthly Labor Review, 115*(4), 30–37.

King, M., Ruggles, S., Alexander, J. T., Flood, S., Genadek, K., Schroeder, M. B., . . . Vick, R. (2010). *Integrated Public Use Microdata Series, Current Population Survey: Version 3.0* [Machine-readable database]. Minneapolis: University of Minnesota.

Levanon, A., England, P., & Allison, P. (2009). Occupational feminization and pay: Assessing causal dynamics using 1950–2000 U.S. census data. *Social Forces, 88,* 865–981.

Nam, C. B., & Boyd, M. (2004). Occupational status in 2000: Over a century of census-based measurement. *Population Research and Policy Review, 23,* 327–358.

Pan, J. Y. (2010). *Gender segregation in occupations: The role of tipping and social interactions*. Unpublished manuscript, Department of Economics, National University of Singapore.

Reskin, B. F., & Bielby, D. D. (2005). A sociological perspective on gender and career outcomes. *Journal of Economic Perspectives, 19,* 71–86.

Reskin, B. F., & Roos, P. A. (1990). *Job queues, gender queues: Explaining women's inroads into male occupations*. Philadelphia, PA: Temple University Press.

Ruggles, S. J., Alexander, T., Genadek, K., Goeken, R., Schroeder, M. B., & Sobek, M. (2010). *Integrated Public Use Microdata Series: Version 5.0* [Machine-readable database]. Minneapolis: University of Minnesota.

Scopp, T. S. (2003). *The relationship between the 1990 census and census 2000 industry and occupation classification systems* (U.S. Census Bureau Technical Paper #65). Washington, DC: U.S. Census Bureau.

U.S. Bureau of Labor Statistics (2011). *Monthly Labor Review, 134*(4).

U.S. Census Bureau. (2009a). *A compass for understanding and using American Community Survey data: What PUMS data users need to know.* Washington, DC: U.S. Government Printing Office.

U.S. Census Bureau. (2009b). *Design and methodology, American Community Survey.* Washington, DC: U.S. Government Printing Office.

Valian, V. (1998). *Why so slow? The advancement of women*. Cambridge, MA: MIT Press.