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Abstract
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THE U.S. GENDER PAY GAP IN THE 1990s: SLOWING CONVERGENCE

FRANCINE D. BLAU and LAWRENCE M. KAHN*

Using Michigan Panel Study of Income Dynamics (PSID) data, the authors study the slowdown in the convergence of female and male wages in the 1990s compared to the 1980s. They find that changes in human capital did not contribute to the slowdown, since women's relative human capital improved comparably in the two decades. Occupational upgrading and deunionization had a larger positive effect on women's relative wages in the 1980s than in the 1990s, explaining part of the slower 1990s convergence. However, the largest factor was a much faster reduction of the "unexplained" gender wage gap in the 1980s than in the 1990s. The evidence suggests that changes in labor force selectivity, changes in gender differences in unmeasured characteristics and in labor market discrimination, and changes in the favorableness of demand shifts each may have contributed to the slowing convergence of the unexplained gender pay gap.

After thirty years of relative constancy, the gender pay gap in the United States narrowed substantially in the 1980s. For example, published tabulations from the Census Bureau on the median annual earnings of year-round, full-time workers indicate that the female-to-male ratio rose from 59.7% to 68.7% between 1979 and 1989—9.0 percentage points. However, the rate of convergence slowed markedly in the following decade, with the ratio rising only to 72.2% by 1999—3.5 percentage points. In this paper, we shed light on several possible sources of slowing convergence in the 1990s using data from the Michigan Panel Study of Income Dynamics (PSID), the only nationally representative data base that contains information on workers' actual labor market experience. Labor market experience has been shown to be an extremely important factor in explaining the gender pay gap (Mincer and Polachek 1974) and its trends (for example, Blau and Kahn 1997; O'Neill and Polachek 1993). We focus on a number of hypotheses that might help to explain the slower progress of women in the 1990s.

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First, relative improvements in women's measured characteristics or increases in their labor market commitment may have proceeded at a slower pace in the 1990s than in the 1980s. A slackening of relative gains in experience seems plausible, for example, given the reduction in the rate of increase of female labor force participation rates between the 1980s and 1990s (Blau, Ferber, and Winkler 2002, Chap. 4), although we note that it is not possible to directly infer trends in women's average experience levels from trends in their participation rates (for example, Goldin 1990). Another possibility is that discrimination narrowed at a slower pace in the 1990s. Views on this are mixed. On the one hand, the General Accounting Office (GAO) and members of Congress have raised concerns about glass ceilings in the late 1990s (GAO 2001; Offices of John D. Dingell and Carolyn B. Maloney 2002). On the other hand, O'Neill (2003) has argued that, at least within occupations, we have largely achieved pay parity between men and women, implying that the slowing in convergence was inevitable.[1] We will provide some suggestive evidence on glass ceilings.

Other explanations center around the possibility that demand- and supply-side shifts played out differently in the 1980s and 1990s, resulting in a larger decrease in the gender pay gap as well as a larger increase in wage inequality among men in the 1980s than in the 1990s. On the one hand, increases in the prices of labor market skills such as experience, for which women have a deficit, are expected to raise the gender pay gap or reduce the rate at which it falls (Blau and Kahn 1997). These skill price increases could in principle have proceeded more rapidly in the 1990s than the 1980s, helping to retard the rate of wage convergence. However, wage inequality in fact grew more rapidly in the 1980s than the 1990s (Autor, Katz, and Kearney 2005), making such an explanation unlikely. On the other hand, Welch (2000), for example, pointed to a technology-based rise in the demand for intellectual skills relative to physical strength, which benefited women as a group relative to men and high-skilled compared to low-skilled men. In this view, the slowing increase in male inequality that occurred in the 1990s is consistent with a tapering off of these demand shifts and thus with slower relative progress of women. Finally, labor force selection may cause changes in observed wage differentials between men and women. Data on wages are available only for a self-selected group of labor force participants. The possibility of selection bias (Heckman 1979) is of particular concern since women's labor force participation grew more rapidly in one period (the 1980s) than in the other (the 1990s).

After examining the overall patterns in the trends in the gender pay gap over the 1980s and 1990s, we use an accounting technique developed by Juhn, Murphy, and Pierce (1991) to decompose the reduction in the gender wage differential in each period into a portion due to changes in the measured characteristics of women compared to men; changes in the prices of measured characteristics; and changes in the unexplained gender pay gap. We then consider a number of possible explanations for the slowing convergence in the unexplained gap identified in the decomposition analysis as the major factor accounting for the difference in trends in the two periods.

Trends in the Gender Pay Gap: Overall Patterns

Table 1 contains information on male and female wage inequality, as well as the gender pay gap, for 1979, 1989, and 1998, based on the PSID. Since our two time periods are of unequal length (ten and nine years), for comparability, here and elsewhere in the paper, we express changes over each period as the average annual change (uncompounded) multiplied by ten. Consistent with published data, we find that the pay gap fell substantially faster in the 1980s than in the 1990s: the gender differential in log wages fell 0.164 log points from 1979 to 1989 compared to a ten-year rate of decline of .075 log points from 1989 to 1998. The implied female-to-male pay

[1]Of course, if occupational representation reflects employer hiring decisions, then controlling for occupation may lead to us to underestimate the full extent of discrimination against women.

Table 1. Overview of Wage Inequality Trends, 1979, 1989, and 1998.

Inequality Indicators	*1979*	*1989*	*1998*	*Changes (Average Annual Change × 10)* *1979–89*	*1989–98*
Men					
Std. Dev. of Log Wage	0.506	0.569	0.601	0.063	0.036
90–50 Differential	0.516	0.630	0.761	0.114	0.145
50–10 Differential	0.654	0.787	0.700	0.133	–0.096
Sample Size	2816	2894	2336	—	—
Women					
Std. Dev. of Log Wage	0.484	0.543	0.566	0.060	0.026
90–50 Differential	0.603	0.646	0.675	0.043	0.031
50–10 Differential	0.534	0.719	0.696	0.186	–0.025
Sample Size	1922	2290	1804	—	—
Gender Log Wage Differential	0.459	0.295	0.227	–0.164	–0.075
Implied Female/Male Pay Ratio	0.632	0.745	0.797	0.113	0.058
Mean Female Percentile in the Male Wage Distribution[a]	24.31	35.16	38.93	10.85	4.19

Notes: Table contains full-time, nonfarm wage and salary workers aged 18–65 years from the Michigan Panel Study of Income Dynamics. Wages are computed as annual earnings divided by annual work hours. Years refer to the period during which income was earned. The Implied Female/Male Pay Ratio is $(\exp(\ln w_f)/\exp(\ln w_m))$, where $\ln w_f$ and $\ln w_m$ are, respectively, the average log female and log male wage.

[a]Computed by assigning each woman a percentile ranking in the indicated year's male wage distribution and calculating the female mean of these percentiles.

ratio rose from 63% in 1979 to 74% in 1989 and 80% in 1998. Wage inequality as measured by the standard deviation of log wages or the 90–50 and 50–10 gaps in log wages rose considerably in the 1980s both among men and among women; in the 1990s, 90–50 gaps continued to rise, while the 50–10 gap fell. The net effect on the standard deviation was a slowing increase in the 1990s compared to the 1980s. These inequality patterns among men and among women are consistent with Current Population Survey (CPS) data, as analyzed in an earlier version of this paper (Blau and Kahn 2004) and in Autor, Katz, and Kearney (2005).

Figure 1, which displays the gender wage gap at the indicated percentiles of the male and female wage distributions, shows that the gender wage gap fell substantially throughout the wage distribution in the 1980s, with much smaller declines in the 1990s. The figure also indicates little wage convergence at the top of the distribution in the 1990s, a finding consistent with the concerns raised by the GAO report cited above. We will examine this issue below controlling for gender differences in measured characteristics by using quantile regression techniques.

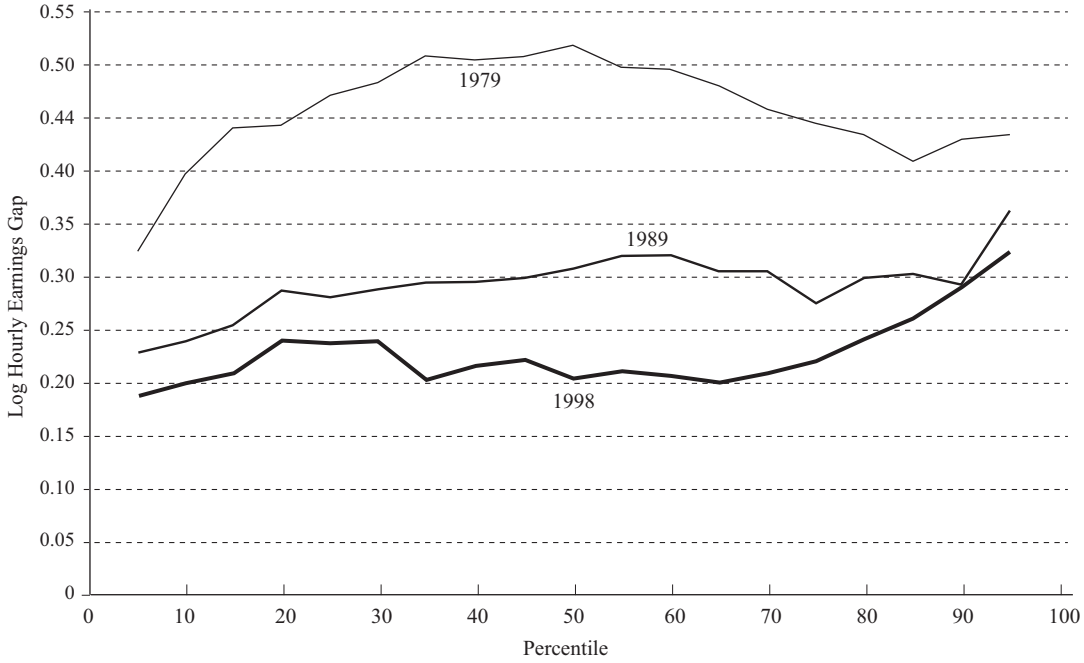
Rising skill prices may induce changes in the gender pay gap that are unrelated to women's relative qualifications or to the extent of discrimination against women. A simple measure that controls for such changes in wage structure is the mean female percentile in the male wage distribution. The female percentiles presented in Table 1 indicate that the behavior of this indicator was similar to the gender pay ratio: women moved up in the male pay distribution in both periods, but the pace of this upward progression was slower in the 1990s than in the 1980s. On average, women out-earned 24% of men in 1979, 35% in 1989, and 39% in 1998.

Decomposing the Changes in the Gender Wage Gap

Analytical Framework

Using a decomposition suggested by Juhn, Murphy, and Pierce (1991) (hereafter, JMP)

Figure 1. Gender Gap in Log Hourly Earnings, by Percentile, Full-Time Workers, PSID.



and implemented to analyze trends in the U.S. gender pay gap in the 1980s by Blau and Kahn (1997), we identify, in an accounting sense, the contribution to changes over time in the gender pay gap of (i) changes in the measured characteristics of women compared to men; (ii) changes in the prices of measured characteristics; (iii) changes in the unexplained gap (corrected for the impact of changes in the prices of unmeasured characteristics); and (iv) changes in the prices of unmeasured characteristics.

The basic insight of the JMP framework is that, since prices change over time in ways that may advantage or disadvantage women, it is useful to identify the impact of gender-specific factors like the relative qualifications of women and discrimination against them separately from the impact of wage structure (or price changes that are common to both sexes). Intuitively, if, as the human capital model suggests, women have less experience than men, on average, the higher the return to experience, all else equal, the higher will be the gender gap in pay. Similarly, if, due to discrimination or other factors, women tend to work in different occupations and industries from men, the higher the return to working in the male sector, the larger will be the gender pay gap. This reasoning suggests that rising wage inequality due to increasing returns to skill and sector would adversely affect women's relative pay. On the other hand, a rising relative demand for intellectual skills relative to physical strength (Welch 2000) or for white-collar relative to blue-collar workers (Berman, Bound, and Griliches 1994) due to technological advances may benefit women as a group relative to men but also increase male wage inequality (see also Blau and Kahn 1997).

Taking into account these alternative possibilities, rising wage inequality might be expected to have opposing negative and positive effects on women's relative wages, with the dominant effect being an empirical question. In terms of the JMP decomposition, the negative effects of adverse price changes

are captured in the components that measure the impact of changes in measured and unmeasured prices on changes in the gender pay gap, while the impact of technological change and other factors that potentially positively affect the relative demand for female workers will be one of the possible factors included in the effect of changes in the unexplained portion of the gender pay gap.

Institutional changes are an additional factor that can affect the return to skill but may have gender-specific effects as well. For example, deunionization likely raises wage inequality and the price of skills, since unions compress wages (DiNardo, Fortin, and Lemieux 1996). One might therefore expect that deunionization would raise the gender pay gap by making wage floors less prevalent. But in the 1980s, the unionization rate fell more for men than for women, actually helping to explain the falling gender pay gap (Blau and Kahn 1997). We can directly assess the latter impact of deunionization, since we can observe it directly. However, any more general effects of deunionization through spill-over or threat effects on the nonunion sector will not be measured by our analysis.[2]

Using the JMP framework, we begin with a male wage equation,

$$Y_{it} = X_{it}B_t + \sigma_t\theta_{it}, \tag{1}$$

where Y_{it} is the log of wages; X_{it} is a vector of explanatory variables; B_t is a vector of coefficients; θ_{it} is a standardized residual (that is, with mean zero and variance 1 for each year); and σ_t is the residual standard deviation of male wages (the level of male residual wage inequality) for that year.[3] The difference in the gender pay gap between two years 0 and 1 (1979–89 and 1989–98) can be decomposed into four components (for additional details, see Blau and Kahn 2004 and Juhn, Murphy, and Pierce 1991):

$$\text{Observed } X\text{'s Effect} = (\Delta X_1 - \Delta X_0)\,B_1 \tag{2}$$

$$\text{Observed Prices Effect} = \Delta X_0(B_1 - B_0) \tag{3}$$

$$\text{Gap Effect} = (\Delta\theta_1 - \Delta\theta_0)\sigma_1 \tag{4}$$

$$\text{Unobserved Prices Effect} = \Delta\theta_0(\sigma_1 - \sigma_0), \tag{5}$$

where a Δ prefix signifies the average male-female difference for the variable immediately following.

The Observed X's Effect reflects the contribution of changing male-female differences in observed labor market qualifications (X). The Observed Prices Effect reflects the impact of changes in prices of observed labor market characteristics, as indexed by male prices. The Gap Effect measures the effect of changing differences in the relative positions of men and women in the male residual wage distribution, including the effect of an improvement in women's unmeasured characteristics or a reduction in the extent of discrimination against women. Finally, the Unobserved Prices Effect reflects the contribution to the change in the gender gap that would result if the percentile rankings of the female wage residuals had remained the same and only the extent of male residual wage inequality had changed. It measures changes in the female penalty to being below average in the distribution of male residuals. The sum of the gap and unobserved prices effects is equal to the change in the "unexplained" differential, which is commonly taken as an estimate of discrimination in a conventional decomposition but may also reflect unmeasured productivity differences between men and women. Recently, this decomposition has come under a variety of criticisms, particularly the decomposition of the residual (for discussion, see Blau and Kahn 2004). However, as shown below, our conclusions about the sources of the slowdown in the convergence of the gender pay gap in the

[2]Given the relatively small size of the union sector in the United States, such effects are not likely to be large empirically, and indeed a recent study does not find much evidence of them (Farber 2005).

[3]Datta Gupta, Oaxaca, and Smith (2006) suggested performing Juhn/Murphy/Pierce decompositions on pooled male and female wage samples. We chose not to do this because the coefficients for male equations are more likely to reflect true returns to human capital and rents than unmeasured human capital. However, in supplementary models, we pooled men and women for each year and obtained results that were very similar to those presented below.

1990s are not affected by whether or not one decomposes the residual.

Data and Specifications

Three waves of the PSID are employed to compare the rate of convergence in the 1980s and the 1990s—1980, 1990, and 1999[4]—allowing us to compute average hourly earnings for 1979, 1989, and 1998. The three survey years span the period of interest, and were also years of economic expansion, likely sharing similar overall macroeconomic conditions.[5] We initially restrict our analysis of wages to workers who were, as of the survey date, full-time, nonagricultural employees age 18–65; the self-employed were excluded. We focus on full-time workers in our basic models in order to identify a group of men and women that is as homogeneous as possible with respect to labor market commitment. However, in some analyses below, we do include part-time workers in order to examine selection issues. To maximize sample size, we use both the PSID's random sample and its poverty oversample populations and, in all analyses, employ the sampling weights supplied in the PSID files. Patterns were similar when we restricted ourselves to the random sample. The wage measure is average real hourly earnings during the previous calendar year expressed in 1983 dollars using the Personal Consumption Expenditures deflator from the National Product Accounts. We exclude individuals earning less than $1 or more than $250 per hour in 1983 dollars. Our longer paper (Blau and Kahn 2004) contains details on the construction of the key experience variables.

Two specifications are employed in implementing the decomposition. The "human capital" specification includes controls for race, education, and experience. The race variable is primarily a control. Sample sizes were insufficient to perform separate analyses for nonwhites, although results were very similar when we confined the sample to whites only. Education is measured by three variables: years of schooling, a dummy for college degree only, and a dummy for advanced degree. Experience includes full-time and part-time experience and their squares.[6]

The second "full" specification augments the human capital variables with a collective bargaining coverage indicator and a set of 19 occupation and 25 industry dummy variables that include some two-digit and some one-digit categories, depending on cell size. Controlling for sector in this way is potentially interesting, since existing research finds that much of the gender gap is associated with location of employment (Blau 1977; Groshen 1991; Bayard, Hellerstein, Neumark, and Troske 2003). Further, factors such as deunionization and occupation and industry shifts clearly in part reflect changing demand for labor, and this specification allows us to examine the importance of these factors (in an accounting sense). We thus present some results controlling for these variables and, moreover, specify the categories in as much detail as we can in order to make the results as informative as possible. However, the sector variables are also potentially endogenous, as they themselves are likely to be affected by relative wages through both worker supply and employer demand decisions. Further, access to occupations, industries, and unionized workplaces may be affected by discrimination. We thus present results for both specifications but interpret the "full" specification cautiously.

As noted, to the extent that supply and demand shifts alter the extent of gender differences in occupation and industry, the *direct* effects of such shifts will, in an accounting sense, be captured in the portion of the change in the gender wage gap that is due to changes in gender differences in occupations

[4]After the 1997 survey, the PSID began surveying respondents every other year rather than annually. Thus, there are no PSID data for 2000.

[5]The unemployment rate was 5.8% in 1979, 5.3% in 1989, and 4.5% in 1998 (BLS web site: www.bls.gov, accessed June 9, 2003).

[6]In view of the possibility that the returns to education changed differently for different experience groups (Card and Lemieux 2001), we also implemented the JMP decomposition interacting the three education variables with full-time experience and its square; the results were unchanged.

Table 2a. Decomposition of Changes in the Gender Pay Gap, 1979–89 and 1989–98: Descriptive Statistics.

Residual Characteristics	*Human Capital*	*Full*
Male Residual 90–10 Differential[a]		
1979	1.028	0.916
1989	1.124	1.028
1998	1.205	1.047
Female Residual 90–10 Differential[b]		
1979	0.939	0.845
1989	1.064	0.922
1998	1.152	0.979
Mean Female Residual from Male Wage Regression		
1979	–0.346	–0.204
1989	–0.200	–0.094
1998	–0.209	–0.094
Implied Gender Wage Ratio (Adjusted for Measured *X*'s)		
1979	0.708	0.816
1989	0.818	0.910
1998	0.812	0.911
Mean Female Residual Percentile		
1979	27.00	34.57
1989	36.71	43.15
1998	37.68	44.18

Notes: The human capital specification includes controls for race, education, and experience. The full specification includes, in addition, controls for occupation, industry, and collective bargaining coverage. See Blau and Kahn (2004), Table A2 for variable means and Table A3 for regression results.

[a]Residuals from a male wage regression.

[b]Residuals from a female wage regression.

and industries. However, to the extent, for example, that aggregate supply and demand shifts benefit women relative to men (as suggested by the discussion above), they should arguably raise the relative wages of women *wherever* they are employed. Such broader effects of supply and demand shifts will be included in the unexplained gap.

We have not controlled for marital status or number of children, although they may be important factors influencing the pay gap. An alternative would have been to include them as productivity characteristics. Such an approach is problematic, however, because these variables may proxy higher skills for men but lower skills for women, even controlling for actual labor market experience (see, for example, Korenman and Neumark 1991; Waldfogel 1998). The approach we have followed clarifies the interpretation of the estimated impact of differences in labor market skills, and also allows marital and parental status to be endogenous.

Empirical Results

Tables 2a–b show the results of the JMP decomposition of changes in the gender pay gaps across our two periods: 1979–89 and 1989–98. We first consider the descriptive statistics presented in 2a and then the full decomposition results in 2b. Table 2a shows similar patterns of rising residual inequality for both men and women. The residual 90–10 gap increased more rapidly in the 1980s than in the 1990s, as did overall wage inequality (see Table 1). The similar trends in residual inequality for men and women give us some confidence in the validity of the JMP procedure's assumption of a common labor market for men and women. However, as noted above, supply and demand shifts that affect men and women differently will be captured in the unexplained portion of the differential and provide a possible explanation for changes in the unexplained gender pay gap over time.

In both specifications, the average female residual fell dramatically in absolute value in the 1980s but was virtually constant over the 1990s. Our results indicate that, controlling for the human capital variables, including actual labor market experience, the gender wage ratio increased from 70.8% to 81.8% between 1979 and 1989, and was roughly the same in 1998 at 81.2%. In the full specification, which adds controls for industry, occupation, and collective bargaining coverage, the ratio rose from 81.6% in 1979 to 91.0% in 1989 and remained at about 91% in 1998. The mean female percentile in the residual distribution, a measure that, in the context of the JMP framework, is independent of possible adverse shifts in the prices of unobservables, followed a similar pattern, rising sharply in the 1980s and only very slightly in the 1990s.

Table 2b shows the decompositions of the changes in the gender pay gap over the 1980s and the 1990s. Standard errors for the measured *X* and measured *B* effects, as well as approximate standard errors for the residual components, are based on the Appendix to Datta Gupta, Oaxaca, and Smith (2006). The 1980s decomposition results are very similar to those from our earlier work, which covered the 1979–88 period (Blau and Kahn 1997). Specifically, the human capital specification shows that women improved their relative experience levels in the 1980s, accounting for a 0.053 log point fall in the gender pay gap, or about 1/3 of the total decline. In addition, women moved up the male residual distribution, an effect contributing to a highly significant 0.180 log point decrease in the gender pay gap, or more than the actual decline. However, both measured prices and unmeasured prices underwent statistically significant changes to women's detriment, and together they served to increase the gender pay gap by 0.065 log points. The full specification for the 1980s yields a larger observed *X* effect and a gap effect that is smaller in absolute value, suggesting that more of the observed change in the gender pay gap can be explained with the addition of the occupation, industry, and union controls. In addition to the upgrading in female labor market experience, women's occupations improved, and deunionization had a greater negative effect on men's than on women's wages, since men lost union jobs at a faster rate than women did. These changes in the All *X*'s and Gap Effects between specifications for the 1980s were statistically significant. Measured and unmeasured price effects continued to raise the gender pay gap overall in the full specification, and were statistically significant or marginally significant overall, although occupational price effects were negative.[7]

Comparing the JMP decompositions for the 1980s and the 1990s can reveal some of the sources of the slowdown in the convergence of the gender pay gap. Using either the human capital or the full specification, we find that women upgraded their human capital as measured by education and experience to a similar degree in the two decades: for example, in the human capital specification, the difference in the All *X*'s effect was only 0.007 log points, although it was marginally significant. In the 1980s, women's human capital upgrading consisted entirely of rising experience; moreover, consistent with speculations based on aggregate labor force participation rates, decreases in the gender gap in experience contributed considerably less to wage convergence in the 1990s than in the 1980s. The gender gap in years of full-time experience decreased by .7 years between 1989 and 1998, compared to 2.3 years between 1979 and 1989. However, rising relative educational attainment of women played a much larger role in the 1990s, and thus the sum of the effects of education and experience was similar in the 1980s and 1990s. Although men had an edge in the incidence of college degrees in earlier years, by 1998 the incidence of college degrees was slightly (1.2 percentage points) higher among women in our sample of full-time workers.

The full specification shows that, while occupational upgrading and deunioniza-

[7]The negative occupational price effect contrasts with our earlier work and is likely due to our ability to more finely define occupation in the larger samples we now use. Our earlier study employed only the PSID random sample, whereas the current study uses both the PSID's random sample and its poverty oversample populations (employing appropriate sampling weights).

Table 2b. Decomposition of Changes in the Gender Pay Gap, 1979–89 and 1989–98: Decomposition Results. (Average Annual Changes × 10)

	1979–89		*1989–98*		*(1989–98)– (1979–89)*	
Decomposition Components	*Human Capital*	*Full*	*Human Capital*	*Full*	*Human Capital*	*Full*
Change in Differential ($D_1 - D_0$)	–0.164	–0.164	–0.075	–0.075	0.089	0.089
Observed X's						
All X's	–0.049	–0.092	–0.056	–0.068	–0.007	0.025
(Standard Errors)	(0.003)	(0.005)	(0.003)	(0.005)	(0.004)	(0.007)
Education Variables	0.0002	–0.001	–0.035	–0.029	–0.036	–0.028
Experience Variables	–0.053	–0.046	–0.019	–0.017	0.034	0.029
Occupation Variables	—	–0.029	—	–0.019	—	0.010
Collective Bargaining	—	–0.022	—	–0.007	—	0.014
Industry Variables	—	0.003	—	0.005	—	0.002
Observed Prices						
All B's	0.031	0.038	–0.028	–0.006	–0.059	–0.044
(Standard Errors)	(0.009)	(0.023)	(0.032)	(0.024)	(0.034)	(0.033)
Education Variables	0.004	0.004	0.003	0.002	–0.002	–0.002
Experience Variables	0.025	0.022	–0.032	–0.027	–0.057	–0.048
Occupation Variables	—	–0.018	—	0.054	—	0.072
Collective Bargaining	—	0.007	—	0.000	—	–0.008
Industry Variables	—	0.022	—	–0.036	—	–0.058
Unexplained Differential	–0.146	–0.109	0.009	–0.001	0.155	0.108
Gap Effect	–0.180	–0.128	–0.006	–0.007	0.174	0.121
(Approximate Standard Errors)	(0.016)	(0.014)	(0.019)	(0.016)	(0.025)	(0.021)
Unobserved Prices	0.035	0.019	0.016	0.007	–0.019	–0.012
(Approximate Standard Errors)	(0.007)	(0.004)	(0.005)	(0.002)	(0.009)	(0.005)

Notes: The human capital specification includes controls for race, education, and experience. The full specification includes, in addition, controls for occupation, industry, and collective bargaining coverage. See Blau and Kahn (2004), Table A2 for variable means and Table A3 for regression results. Standard errors of the All *X*'s Effect and All *B*'s Effect, and approximate standard errors of the Gap Effect and Unmeasured Price Effect, are computed using results from the Appendix to Datta Gupta, Oaxaca, and Smith (2006).

tion contributed to women's relative wage gains in both periods, these factors had larger effects in the 1980s than the 1990s, explaining roughly 0.024 log points of the 0.089 faster closing of the gender pay gap in the 1980s, or about 27%.[8] Occupational shifts were similar in a number of respects in both periods. Women increased their relative representation in managerial occupations and in professional jobs (both overall and excluding K–12 teaching) and reduced their relative representation in clerical and service jobs at about the same pace in the two decades. However, the gender difference in representation in craft and operator jobs declined more rapidly in the 1980s than the 1990s. This was because men moved out of (or lost) these jobs at a faster rate in the earlier decade. The results for collective bargaining coverage reflect a slowing pace of deunionization for both men and women in the 1990s compared to the 1980s, with a smaller gender difference in the rate of deunionization in the 1990s. The larger loss of relatively high-paying blue-collar and unionized employment for men in the 1980s than in the

[8]The All *X*'s effect in the full specification was significantly more negative in the 1980s than the 1990s.

1990s may be indicative of larger demand shifts favoring women in the 1980s. To the extent that such demand shifts occurred, they would plausibly have affected women's relative pay wherever men and women were employed. We explicitly examine evidence of such demand shifts below.

While more favorable shifts in occupations and collective bargaining coverage for women in the 1980s help to explain some of the faster convergence in that decade, trends in measured and unmeasured prices worked to widen the gender pay gap more in the 1980s than the 1990s. Specifically, trends in measured prices were estimated to slow convergence in the 1980s compared to the 1990s by .059 (human capital specification) to .044 (full specification) log points, although these differences were either only marginally significant or not significant; and trends in unmeasured prices worked to slow convergence in 1980s relative to the 1990s by 0.012 to 0.019 log points, statistically significant differences.

The results in Table 2b indicate that the primary factor accounting for the more rapid convergence in women's wages in the 1980s was the gap effect: unexplained gender differences in wages, corrected for unmeasured price changes using the JMP decomposition, narrowed more dramatically in both the human capital and full specifications in the 1980s than in the 1990s; and this highly statistically significant difference is more than sufficient to fully account for the slowdown in convergence in the 1990s. Women's more rapid movements up the male distribution in the 1980s produced gap effects narrowing the gender gap by 0.128 to 0.180 log points, in contrast to the much smaller reductions of 0.006 to 0.007 log points for the 1990s. This contrast means that, controlling for measured human capital and sector, women's relative labor market position improved much more in the 1980s than the 1990s. While it is reassuring to have a measure of changes in the unexplained gap that is corrected for the negative effects on women's wages (in some models) of widening residual male inequality, in fact our conclusions are similar if we restrict ourselves to changes in the conventionally defined unexplained differential also shown in Table 2b.[9]

Factors Contributing to a Slowing Convergence in the Unexplained Gender Pay Gap in the 1990s

The slower convergence in the unexplained gap in the 1990s than in the 1980s has at least three possible, non–mutually exclusive, substantive sources: first, gender differences in unmeasured characteristics may have narrowed at a faster pace in the 1980s than in the 1990s; second, reductions in labor market discrimination against women may have proceeded at a faster pace in the 1980s than in the 1990s; and finally, demand and supply conditions for women may have changed more favorably in the 1980s than the 1990s. An additional factor to be considered is the change in labor force selectivity among men and women in each period, which may have contributed to an apparent slowdown in wage convergence overall or in the unexplained gender pay gap (or both). Evidence on the impact of selectivity is considered before the assessment of the impact of the other factors since it is important to know whether the differential trends in the unexplained gap persist after adjusting for selection bias.

Changes in Labor Force Selectivity

Our approach to analyzing the impact of labor force selectivity on trends in the raw and unexplained gender wage gap is to get more information on the wages of those not included in our sample of full-time employed

[9]Using re-weighting techniques introduced by DiNardo, Fortin, and Lemieux (1996), we reestimated our models holding constant first the age composition and second the human capital composition of the male and female samples over time. These analyses, which correct for cohort size (partial equilibrium) effects as well as sample composition effects with respect to the residual as suggested by Lemieux's (2006) work, yielded results very similar to those reported here. In addition, in our longer paper (Blau and Kahn 2004), we performed JMP decompositions on March CPS data for the same years used in Table 2 and obtained similar results.

workers. An alternative would be to build sample selection models and then predict the wage offers of those without observed wages (Heckman 1979). However, since the identification conditions required for the successful implementation of such techniques are potentially severe, we take the more modest approach of looking harder for evidence on offers. We proceed in several stages, each of which allows us to include a successively larger portion of the adult population in our calculations.

First, we add all of those with observed hourly earnings in the current year to our base sample of full-time workers; that is, we include part-time workers. Second, for those with no earnings in a given year for which we measure wages, we use the longitudinal nature of the PSID to recover a real hourly earnings observation (using the Personal Consumption Expenditures deflator for the relevant year) from the most recent year for which one is available, with a maximum window of four years. Third, for those for whom we still have no observation on wages under these procedures, in the spirit of Neal and Johnson's (1996) and Neal's (2004) analyses of black-white wage differentials, we include some additional individuals by making assumptions about whether they place above or below the median of real wage offers. Specifically, we assume that individuals with at least a college degree and at least eight years of actual full-time labor market experience had above the median wage offer for their gender, and that those with less than a high school degree and less than eight years of actual full-time labor market experience had below-median wage offers for their gender. Note that this procedure takes into account that, particularly for women, it would not be appropriate to assume that all those outside the wage sample have below-median wage offers, since some women are outside the wage sample due to a high value of home time rather than a low wage offer. Further, our imputations take into account, in addition to education, actual labor market experience, a crucial variable influencing women's wages.[10] If these wage assumptions are valid, we can use median regression to estimate raw (that is, unadjusted) and human-capital-corrected gender differences in wage offers for the expanded group.[11] Koenker and Bassett (1978) showed that under some non-normal distributions, the sample median has a smaller asymptotic variance than the sample mean, suggesting that median regression may well estimate effects of explanatory variables with smaller errors than linear regression.

The fraction of the population included in our base sample of full-time workers is indeed very selective with respect to women, with only 41% of women in the population included in 1979, rising to 50% in 1989 and 53% in 1998.[12] Moreover, since this group grew very quickly in the 1980s and more slowly in the 1990s, selection may have differentially affected the wage trends during these two periods. In contrast, the inclusion of men in the full-time sample is much greater and fluctuates less over time—including 80–83% of the population over the period. Thus, concerns about selection are centered primarily

[10]Applying these assumptions to individuals who had observed wage offers misclassifies 9–15% of men and 14–21% of women in the low-education, low-experience group and 17–22% of men and 11–20% of women in the high-education, high-experience group. Thus, while the imputation clearly makes some errors, they appear to have a low incidence. Results were not sensitive to some alternative education and experience cutoffs for inclusion in these imputed wage samples.

[11]For the regression-based approach to evaluating raw and human-capital gender wage gaps that we employ, which is based on separate human-capital wage regressions for men and women, we need some additional assumptions about unobserved wage offers. Specifically, for individuals without observed wage offers, we need to assume that those with less than a high school degree and less than eight years' full-time experience had below-median wage offers conditional on their human capital levels; by the same token, we must assume that those with college degrees and at least eight years' full-time experience had above-median wage offers conditional on their human capital. A similar point is made by Neal (2004). These assumptions are discussed further below.

[12]Those who were self-employed or agricultural workers as of the time wages were observed (1979, 1989, or 1998) are excluded from both the numerator and the denominator in these percentages. For further details on the process of obtaining past wages, see Blau and Kahn (2004).

on women, and results for this group will drive our selection-correction adjustments.

When we include all those with earnings in the prior year (that is, part-time workers), the share of all women with wage observations now ranges across years from 68% to 77%, while for men, the sample includes 92–94% of the population. Recovering past observed wages for those without current observations using a four-year window adds 10 to 13 percentage points to female coverage and 4 to 5 percentage points to male coverage. Finally, making our above- and below-median imputations for selected individuals without present or recovered past wage observations leads to very high rates of coverage of the population: fully 86–91% of women and 96–98% of men are now covered. Not only is the coverage within a given year much closer for men and women than under less inclusive definitions of the sample, but the increase in female coverage over time for the expanded sample—4.3 percentage points (1979–89) and 0.4 percentage points (1989–98)—is much less than for the full-time employed sample—8.7 percentage points (1979–89) and 2.8 percentage points (1989–98).

Table 3 shows median log wage gaps (Panel A) and the changes in these gaps (Panel B) for the four samples described above. Two estimates for each year are presented: the raw (unadjusted) gap, and the gap controlling for human capital. Panels A.I and B.I give our findings based on OLS regressions for full-time workers (repeated here for comparison). Panels A.II and B.II report our findings based on median (quantile .50) regressions estimated on the indicated samples. The raw gap is the difference between predicted median male and female log wages based on the estimated median regression coefficients from separate male and female regressions under the human capital specification and the actual male and female means of the explanatory variables.[13] The median gender log wage gap controlling for human capital is the difference in predicted median male and female log wages when both the male and female median regressions are evaluated at the female means.

As may be seen in Panel A, median raw and human capital-corrected pay gaps for the sample of full-time employed workers are similar to those obtained using OLS regressions. Within each year, the size of the raw pay gap grows as we add individuals with less attachment to the labor force. Inspection of the predicted raw medians indicates that, on average, those included in the full-time employed sample are a positively selected group compared to those added to form our most inclusive sample (*d*). Since we add considerably more women than men and the added women had lower relative wages than the added men, the raw pay gap widens. [14]

Table 3 provides some indirect evidence on the potential impact of selection on the slowdown in convergence in the gender pay gap in the 1990s. Focusing on a comparison of the trends for the medians for the full-time employed sample and the most inclusive of the three expanded samples, we see that the raw gap closed more slowly in the 1980s for the expanded sample (0.153 log points) than for the full-time employed sample (0.174 log points). Similarly, convergence in the unexplained gap was also slower for the expanded sample (0.132 log points) than for full-time employed workers (0.158 log points).

The results imply that, due to sample selection, the 1980s gains in women's relative wage offers were overstated. At first glance it might be expected that using the observed

[13]Note that, unlike OLS regressions, quantile regressions do not necessarily pass through the median of the dependent variable and the means of the independent variables. Thus, the predicted value of the male and female medians and the resulting gender gap is not necessarily equal to the actual male and female medians or the gender gap calculated from them. For the imputed wages, we assigned a log wage of 1 for those below median and 4 for those above median. Our analyses of the gender pay gap here focus on medians rather than means, since we do not know the actual earnings levels of these presumed below- and above-median wage individuals.

[14]For men, predicted median log wages of full-time, employed workers (group *a*) were .10 to .14 log points higher than those added to the full-time employed to form our most inclusive group (*d*); for women, they were .22 to .29 log points higher.

Table 3. Changes in Gender Pay Gaps at the Mean for Full-time Workers and at the Median Under Different Sample Inclusion Rules.

Gender Pay Gap Definition	*Raw Gap*	*Gap Controlling for Human Capital*	*Raw Gap*	*Gap Controlling for Human Capital*	*Raw Gap*	*Gap Controlling for Human Capital*
A. Gender Pay Gaps	***1979***		***1989***		***1998***	
I. Mean (Full-Time Employed Workers)	0.459	0.346	0.295	0.200	0.227	0.209
II. Median, Sample Inclusion Rule:						
a) Full-Time Employed Workers	0.479	0.366	0.305	0.208	0.227	0.201
b) All with Hourly Earnings Observations	0.521	0.346	0.389	0.222	0.318	0.226
c) All with Hourly Earnings Observations in the Last Four Years	0.546	0.351	0.424	0.235	0.343	0.229
d) c) + those with (16+ Yrs. Educ. and 8+ Yrs. Exp.) or (<12 Yrs. Educ. and < 8 Yrs. Exp.)	0.620	0.385	0.467	0.253	0.377	0.236
			(Average Annual Changes × 10)			
B. Changes in the Gender Pay Gaps	***1979–1989***		***1989–1998***		***(1989–98)—(1979–89)***	
I. Mean (Full-time Employed Workers)	–0.164	–0.146	–0.075	0.009	0.089	0.155
II. Median, Sample Inclusion Rule:						
a) Full Time Employed Workers	–0.174	–0.158	–0.087	–0.008	0.087	0.150
b) All with Hourly Earnings Observations	–0.132	–0.124	–0.080	0.005	0.052	0.128
c) All with Hourly Earnings Observations in the Last Four Years	–0.121	–0.116	–0.090	–0.007	0.031	0.110
d) c) + those with (16+ Yrs. Educ. and 8+ Yrs. Exp.) or (<12 Yrs. Educ. and < 8 Yrs. Exp.)	–0.153	–0.132	–0.100	–0.019	0.054	0.113

Source: PSID.

Notes: Raw Gap is the difference in predicted mean or median log male and log female wage, which is $H_m X_m - H_f X_f$, where H_m and H_f are, respectively, vectors of male and female mean (Row I) or median (Rows IIa–d) human capital log wage regression coefficients and X_m and X_f are, respectively, male and female means for the vector of explanatory variables, which include a dummy for white, years of schooling, dummies for college degree and advanced degree, and part-time and full-time actual experience and their squares. The Gap Controlling For Human Capital is $(H_m - H_f) X_f$.

wages of workers with full-time jobs should have caused us to understate the gains, since the female full-time work force was growing substantially over the 1980s, and median wage offers were lower among those without full-time jobs than among the full-time work force. The key to understanding why the gap in the selectivity-corrected offers closed more slowly than the gap in the observed wage offers in the 1980s lies in the changes in the degree of selectivity of the women included in the full-time sample (group *a*) as the female labor force grew. Our results suggest that female labor force growth over this period

was positively selected,[15] and this is indeed consistent with considerable evidence on female labor force participation trends. For example, Juhn and Murphy (1997) found that employment gains for married women over the 1970s and 1980s were largest for wives of middle- and high-wage men who themselves tended to be more skilled.[16] This pattern is in turn related to the rising returns to skills over this period, which drew high-skilled women into the labor force. Our findings suggest that this positive selection characterized not only the observable characteristics of women in the labor force (as reflected in our results for the raw gap) but also their unobserved characteristics (as reflected in our results for the unexplained gap).

The selection adjustments had less impact for the 1990s, as might be expected based on the slower growth in the female labor force for that period. Convergence in the raw gap was somewhat faster in the expanded sample, where the gender gap fell by 0.100 log points, than in the full-time employed sample, where it decreased by 0.087 log points. This suggests that labor force growth over this period was negatively selected and may reflect the large entry of relatively low-skilled, female single-family heads during this decade, about which there is a sizable literature related to changes in welfare laws (for example, Blank 2000; Meyer and Rosenbaum 2001). Reductions in the gender wage gap controlling for human capital were also slightly faster in the expanded sample (0.019 log points) than in the full-time sample (0.008 points).

Can sample selectivity help explain the slowdown in convergence between male and female wages in the 1990s? Table 3 suggests that it is indeed part of the explanation. Specifically, the last two columns of Panel B compare changes in the raw and human capital–corrected gender pay gap in the 1990s and the 1980s. Looking at trends for the medians for our most restricted sample, the full-time employed, the raw pay gap converged 0.087 log points more slowly in the 1990s than in the 1980s, and the difference between the two decades in the human capital–corrected pay gap was even greater, closing 0.150 log points more slowly in the 1990s than in the 1980s. However, in our most inclusive sample (*d*), the raw gap closed 0.054 log points more slowly in the 1990s, and the human capital–corrected gap closed 0.113 log points more slowly. The comparison across the two samples implies that as much as 0.033 log points (that is, 0.087–0.054) of the 0.087 log point slower closing of the raw pay gap among the full-time employed in the 1990s was due to sample selection. Table 3 also shows a comparable effect of selection on the human capital–corrected gender pay gap: 0.037 log points of the 0.150 log point slower closing of the human capital-corrected gender pay gap in the 1990s was due to sample selection. This implies that sample selection can explain about 25% (0.037/0.150) of the slowdown in the narrowing of the unexplained pay gap (in the human capital specification) that we observe among the full-time employed. For the entire 1979–98 period, Table 3 implies that the human capital–corrected gap fell 0.165 log points when the analysis does not control for selection but 0.149 when it does. Thus, selection bias can explain about 10% of the closing of the *ceteris paribus* gender pay gap over the 1980s and 1990s taken together.[17] While our computations imply that selection appreciably affects the 1980s–1990s comparison, they do not alter our conclusion,

[15]The estimated wage offers for women not included in group (*a*) were 25.2% lower than those in group (*a*) in 1979, but 33.2% lower in 1989—again indicating that the full-time employed had become more positively selected relative to those not included.

[16]See also Blau (1998) and references therein.

[17]After we wrote the first draft of this paper, we became aware of a paper that uses a structural approach to investigate the impact of selectivity bias on the observed gender pay gap over the 1975–2001 period (Mulligan and Rubinstein 2005). The authors found that selection accounts for all of the apparent improvement in women's relative wages since 1975, although they did not study the subperiods separately as we do. In contrast, as noted in the text, we find that selection is only part of the explanation for the 1979–98 period. And using a selection correction similar to ours, Olivetti and Petrongolo (2006) found that selection explains about 60% of the cross-country (negative) correlation between the gender pay gap and the gender employment gap.

based on OLS regressions for the full-time employed sample, that there was considerably less convergence in the unexplained gender pay gap in the 1990s than in the 1980s.[18]

Changes in Gender Differences in Unmeasured Characteristics and Labor Market Discrimination

In this section we consider two possible sources of the slower convergence in the unexplained gender wage gap in the 1990s that persists after our correction for sample selection—slower reductions during the 1990s (i) in the gender difference in unmeasured characteristics and (ii) in labor market discrimination. In the spirit of seeking as much homogeneity as possible between the female and male samples when addressing these issues, we return our focus to the full-time employed sample.

With respect to unmeasured characteristics, it is possible that increases in women's commitment to the labor market and their employers were greater in the 1980s than the 1990s, even controlling for measured human capital and sector. Changes in such unmeasured characteristics are, by definition, difficult to measure. However, Aguiar and Hurst's (2006) findings on changes in housework are consistent with the possibility that such shifts played a role. Specifically, based on time use diaries, the authors' data imply that the gender gap in housework hours among nonretired individuals age 21–65 declined by more in the 1980s than in the 1990s: between 1975 and 1985, this gap fell from a level of 18.3 hours per week to 12.6 hours; however, from 1985 to 1993, the gap only fell to 10.6 hours, with a further reduction to 8.6 hours by 2003 (pp. 45–46). This pattern was also observed in analyses that controlled for the educational, age, and family composition of the sample, as well as the day of the week on which the data were collected. Specifically, in weekly housework regressions that pooled years separately by gender and controlled for these factors, the female year effect fell relative to the male year effect by 4.4 hours per week between 1975 and 1985, 1.7 hours between 1985 and 1993, and 2.6 hours between 1993 and 2003 (p. 56).[19] Additionally, retrospective data from the PSID for all full-time workers as well as married full-time workers show a pattern similar to that shown by the time diary data: declines in the housework gap were faster in the 1980s than in the 1990s (Blau and Kahn 2004). If housework reduces the effort one can put into a job (Becker 1985; Hersch and Stratton 1997), gender differences in potential effort on the job likely closed faster in the 1980s than in the 1990s.

Of course, the observed changes in housework hours could have been in part a *response* to changing labor market opportunities. However, this does not invalidate the reasoning by which housework potentially exerts an independent effect on labor market success. More broadly, it seems likely to us that the differences in trends for gender differences in housework over the two decades are indicative of faster convergence over the 1980s in other unmeasured characteristics as well. The faster increase in female labor force participation

[18]As noted, in order to reach conclusions about changes in the gender pay gap when those with imputed wages are included (as in group *d* in Table 3), we must assume that their wage offers are above median or below median, conditional on their human capital levels. This assumption is more likely to be valid for the group with low education and low experience than for the high-education, high-experience group. When we performed analyses like those in Table 3 adding only the former group, the results were virtually identical: selection is estimated to have accounted for 25% of the slowdown in the convergence in the unexplained pay gap. Moreover, as may be seen in Table 3, when we make no imputations and include only those for whom we observe a wage offer at some time in the past four years (group *c* in Table 3), we obtain results very similar to those for group *d:* selection accounts for 27% of the slowdown in the closing of the unexplained gender pay gap. Thus, our conclusions about selection do not appear to be sensitive to adding those with imputed wage offers.

[19]These conclusions were not affected by taking account of childcare, which was not analyzed in the regressions. Specifically, Aguiar and Hurst (2006:47) found that the gap in average childcare hours between working women and all men was 2.0 hours in 1975, 2.1 hours in 1985, 1.7 hours in 1993, and 2.6 hours in 2003 (the authors did not present data that would allow us to infer the pattern of changes in housework hours between working women and men).

in the 1980s, as well as the more rapid narrowing of the gender gap in experience in that decade, are also suggestive of a greater increase in women's commitment to the labor force in the earlier decade.[20]

It is also possible that discrimination decreased by more in the 1980s than in the 1990s. This might at first appear unlikely, given that civil rights legislation passed in 1991 made the legal environment more favorable toward antidiscrimination lawsuits in the 1990s than in the 1980s (Gould 1993). This contributed to a more rapid growth in job bias lawsuits over the 1990s, since representing defendants in such suits became more lucrative for private law firms operating on a contingency fee basis (Blau, Ferber, and Winkler 2002:243). Nonetheless, if women's labor force commitment changed more in the 1980s, it is possible that employers' perceptions of women's labor force commitment also changed more in the 1980s. If so, one of the possible bases for statistical discrimination against women may have eroded faster in the 1980s than in the 1990s.

An additional scenario whereby discrimination could have narrowed more slowly in the 1990s is related to the glass ceiling hypothesis mentioned above. The so-called glass ceiling problem refers to the explicit or, more likely, subtle barriers that inhibit women's progress at the highest echelons. If there is indeed such a problem, it may have had a greater negative impact on women in the 1990s than in the 1980s, as women's 1980s gains placed more of them into the higher-level positions where glass-ceiling barriers might hinder their further upward progression. If women are indeed increasingly constrained by glass ceilings, then one might expect to find less wage convergence with men at the top of the distribution than at other points. We study this issue in Table 4.

As we saw in Figure 1, the gender pay gap closed more slowly in the 1990s at all points in the distribution, but the contrast was particularly large at the top of the distribution. Although this is consistent with greater glass ceiling problems, it could also have been due to different rates of change in women's relative qualifications in the two decades. The estimates in Table 4 are based on quantile regressions for the 50th and 90th percentiles and allow us to present estimates of the unexplained gender pay gap controlling for measured characteristics. (Of course, as in all analyses of this kind, the unexplained gender wage gap could also be due in whole or part to gender differences in unmeasured characteristics.) We focus on the results for the human capital specification because the implicit cell sizes within occupation-industry-unionization cells in the PSID are rather small to support an analysis focusing on various points of the distribution.

Table 4 presents three sets of results. The first two apply the results of the male and female quantile regressions by evaluating them (I) at the actual female means and (II) for white college graduates with 15 years of full-time experience. That is, we take women with the indicated characteristics and compare the predicted wages from the male and female quantile regressions at the 50th and 90th percentiles given those characteristics.[21] The rationale for the simulations in (II) is that the popular understanding of the glass ceiling is that it potentially applies to relatively high-skilled/high-level workers. A different approach is used for the last set of results (III), where we construct counterfactual wage distributions for each year using a technique proposed by Machado and Mata (2005) and compute the gender gap at the 50th and 90th percentiles of these counterfactuals. Specifically, we first estimate 99 quantile regressions each year for men and women

[20]Women's work attitudes and ambition are examples of other unmeasured factors that potentially influence wages and could have changed at a different rate over the two decades. In this regard, it is interesting that Fortin (2005) found evidence that gender differences in these factors were much smaller in 2000 than in 1986, although her data do not allow us to determine whether this convergence happened at a faster pace in the 1980s than in the 1990s.

[21]That is, the unexplained gap is calculated as $(B_M - B_F)\,X_F$, where B_M and B_F are vectors of coefficients from male and female quantile regression equations and X_F is a vector of female characteristics.

Table 4. Unexplained Gender Pay Gaps Based on Quantile Regressions (Human Capital Specification)[a]

A. Unexplained Gender Pay Gap	***1979***	***1989***	***1998***
I. Evaluated at the Female Means			
50th Percentile	0.366	0.208	0.201
90th Percentile	0.377	0.209	0.269
II. Evaluated for White, College Graduates with 15 Years of Full-Time Experience			
50th Percentile	0.243	0.164	0.169
90th Percentile	0.368	0.171	0.287
III. Evaluated Using Counterfactual Wage Distributions			
50th Percentile	0.393	0.198	0.197
90th Percentile	0.334	0.194	0.247

	Average Annual Change × 10		
B. Changes in the Unexplained Gender Pay Gap	***1979–89 (1)***	***1989–98 (2)***	***Difference (2)–(1)***
I. Evaluated at the Female Means			
50th Percentile	–0.158	–0.008	0.150
90th Percentile	–0.168	0.067	0.235
II. Evaluated for White, College Graduates with 15 Years of Full-Time Experience			
50th Percentile	–0.079	0.005	0.084
90th Percentile	–0.197	0.116	0.313
III. Evaluated Using Counterfactual Wage Distributions			
50th Percentile	–0.195	0.0004	0.195
90th Percentile	–0.140	0.053	0.194

[a]The human capital specification includes controls for race, education, and experience.

Notes: In I and II, the unexplained gap is calculated as $(B_M - B_F)\,X_F$, where B_M and B_F are vectors of coefficients from male and female quantile regression equations and X_F is a vector of female characteristics, evaluated at the female means in I and for white college graduates with 15 years of full-time experience in II. In III, counterfactual distributions are constructed from 99 male and 99 female quantile regressions estimated over the full male and female samples, with predicted wages based on a random sample of 100 women; see Machado and Mata (2005).

separately (that is, quantiles 1–99). These quantile regressions use the entire sample of full-time employed wage and salary workers. Next, we take a random sample of 100 women in each year and find 198 predicted wages for each woman applying each of the 99 estimated male and female quantile regressions. This results in two counterfactual "raw" wage distributions for the same sample of 100 women, one based on the male quantile regressions and one based on the female quantile regressions.[22] We then compare, for example, the 90th percentile of wages in the distribution based on the female and the male quantile regressions (that is, the female and male reward structures). A comparison of how individuals near the top (that is, 90th percentile) of these two distributions fare certainly incorporates an element of the glass ceiling idea. However, the characteristics of the individuals at the 90th percentile are not held constant in the comparison, as they are in approaches (1)

[22]The simulated female wage distribution created using the sample of 100 women and the 99 female quantile regressions was very similar to the actual female wage distribution, suggesting that the 100 randomly chosen women were representative of the working female population. Note that Albrecht, Björklund, and Vroman (2003) also employed a similar strategy in their implementation of the Machado and Mata (2005) procedure.

and (II)—and as they traditionally are in studies of discrimination. That is, the male and female reward structures will likely result in different types of individuals ending up at the top, and comparison (III) asks how people at the top fare under the two reward structures (regardless of their characteristics).

Looking at the calculations for the first approach (I), the results for the unexplained gender pay gap from median regressions are quite similar to those based on OLS regressions (see Tables 2a–b and Table 3). The unexplained gap fell substantially in the 1980s, with relatively little further convergence in the 1990s. At the 90th percentile, however, this pattern is even more pronounced, with the unexplained gap actually increasing in the 1990s. When we evaluate the quantile regression results for white college graduates with 15 years of experience, the disparity between the median and the 90th percentile is even more extreme, with women at the 90th found to be losing substantial ground relative to men at the 90th in the 1990s, *ceteris paribus*.

Our findings for the third approach (III) differ in a key respect from (I) and (II). As in the earlier exercise, we find that both 50th and 90th percentile gaps fell much more quickly in the 1980s than the 1990s. But the results show that the magnitude of the slowdown in convergence was comparable at the 50th and 90th percentiles. This is not consistent with a worsening of the glass ceiling problem in the 1990s. Interestingly, though, the results for method (III) (unlike the results for I and II) suggest that women at the top were already showing a slower rate of progress than women at the median in the 1980s. And it is the continuation of this slower rate of progress of women at the 90th percentile into the 1990s that results in a comparable slowdown in convergence for the 50th and the 90th percentiles in the 1990s.

Taking the evidence in Table 4 together, these methods of analyzing convergence at the top versus the middle of the distribution provide mixed evidence in favor of the notion that the glass ceiling problem worsened in the 1990s. We would again like to emphasize that even the results that are consistent with the glass ceiling story (I and II) may reflect, in whole or part, the impact of unmeasured characteristics rather than discrimination. For example, the high tech boom of the late 1990s may have especially benefited high-skill men (Echeverri-Carroll and Ayala 2006).

Shifts in Supply and Demand

In this section we consider the possibility that less favorable changes in supply of and demand for women during the 1990s than during the 1980s contributed to slower convergence in the unexplained gap during the 1990s. On the supply side, our longer paper (Blau and Kahn 2004) found evidence of a larger rightward shift in female relative labor supply in the 1980s than the 1990s. Thus, female labor supply shifts do not explain the wage convergence patterns. On the other hand, there is some evidence that demand shifts both between sectors and within sectors were more favorable to women in the 1980s than in the 1990s.

First, looking at between-sector changes, we examine the degree to which changes in the industrial-occupational structure of employment favored women in the 1980s and the 1990s. To do this, we compute demand indexes similar to those specified by Katz and Murphy (1992). Following their procedure, we construct industry-occupation cells and view the "output" of particular occupation groups as an intermediate product. A relative demand index, $\ln(1+\Delta\mathrm{DEM}_f)$, was computed for women relative to men for the two time periods 1980–90 and 1990–99,

$$\Delta\mathrm{DEM}_f = \Sigma_o c_{of}(\Delta E_o/E_f), \tag{6}$$

where o refers to occupation-industry cell, c_{of} is the female share of the labor input in occupation-industry cell o over the pooled sample (1980, 1990, and 1999), ΔE_o is the difference between the 1990 and 1980 or 1999 and 1990 share of total labor input employed in cell o, and E_f is the 1980 or 1990 share of total labor input accounted for by women. The demand index thus measures the degree to which 1980–90 or 1990–99 shifts in occupation-industry structure favored women, using pooled 1980, 1990, and 1999 weights.

Estimates of such demand indexes are likely to be biased, so caution must be taken

in interpreting the empirical results. When labor input is measured in hours or employment, the index will understate the shift in demand for women that would have occurred at constant relative wages, since women's wages rose more than men's over the sample period. This understatement will be more severe for the 1980s than for the 1990s, since women's relative wages were rising faster in the earlier decade. However, when labor input is measured in efficiency units (earnings), depending on the overall elasticity of demand for labor, the index could overstate or understate the shift in demand for women at constant relative wages. With inelastic labor demand, the index will overstate the shift toward women, while with elastic labor demand, the index will understate this shift; if the labor demand elasticity is –1, the index will accurately show the shift in labor demand at constant wages. In his review of many studies of labor demand, Hamermesh (1993) suggested that the elasticity of labor demand is less than zero but greater than –1, with a likely range of –0.15 to –0.75. This suggests that earnings-based measures of labor demand shift will overstate the shift toward women during this period and will do so by more in the 1980s than in the 1990s, in contrast to hours-based measures. Of course, the shift-share analysis does not measure within-sector changes in demand, and we will return to this issue below.

In computing the demand indexes, we use 1980, 1990, and 1999 March CPS data because the CPS sample sizes allow us to construct more detailed industry-occupation cells than the PSID. We include part-time and full-time nonagricultural workers, and both the self-employed and wage and salary workers. However, because of the difficulty in measuring self-employment income, earnings-based measures of labor income include only wage and salary earnings. As noted, the base shares of female labor input (c_{of}) are computed using pooled 1980, 1990, and 1999 samples. In pooling these CPS files, we adjusted the CPS sampling weights so that each year received the same weight. We obtained similar results using either the 1980, 1990, or 1999 female shares as our base.

We defined sector as industry-occupation cells, with 43 mostly two-digit industries and five occupations: (a) professionals; (b) managers; (c) clerical and sales workers; (d) craft, operative, and laborer jobs; and (e) service occupations. For both hours and efficiency unit definitions of labor input, demand shifts were favorable toward women in the 1980s. The demand index, which is in log units of labor, was estimated to shift .056 units in the 1980s and only 0.015 units in the 1990s using the efficiency unit definition, with shifts of 0.033 in the 1980s and –0.0017 in the 1990s using hours. While these estimated demand shifts are consistent with the slowdown in wage convergence, our longer paper (Blau and Kahn 2004) showed that these demand shifts were too small to account for a major portion of the slowdown. In fact, they were smaller than changes in our estimated supply shifts. However, it is certainly possible that the shift-share analysis understates the true growth in demand, and particularly the extent of faster growth in the 1980s.

One possibility is that a substantial portion of the gender-biased increases in the demand for intellectual skills discussed by Welch (2000) manifested themselves *within* industry-occupation cells and are thus not captured by our shift-share analysis. One indicator of the increased demand for "brains" over "brawn" is the growth in the incidence of computer use at work. The observation that women are more likely than men to use computers at work suggests that women as a group may have benefited from shifts in demand associated with computerization.[23] Diffusion of computers likely also benefited women because computers restructure work in ways that de-emphasize physical strength (Weinberg 2000). Consistent with these arguments, Weinberg (2000) found for the 1984–93 period that, within industry-occupation cells, growth in overall computer usage in the cell increased women's share of hours worked among both computer users and nonusers.

[23]Autor, Katz, and Krueger (1998), for example, noted that the groups having the most rapid increase in computer usage in the 1980s and early 1990s (the highly educated, whites, white-collar workers, and women) also had the largest wage increases.

Computerization rose more rapidly in the 1980s than in the 1990s, and hence this may be a factor in explaining the slowdown in convergence in the 1990s. Friedberg (2003) reported that computer use increased from 24.4% of workers in 1984 to 37.3% in 1989, for an annual rate of increase of 8.9%; in contrast, the annual increase between 1989 and 1997 was only 3.9% (p. 514). Combining Weinberg's estimates of the impact of increased computer use on the female hours share with Friedberg's data on the growth in computer usage, we estimate that rising computer use increased women's share of hours by 0.077 log points over the 1980s compared to 0.030 log points over the 1990s under Weinberg's "high estimates," and 0.047 log points in the 1980s compared to 0.018 log points in the 1990s under his "low estimates."[24] This suggests one plausible source of within-industry-occupation demand shifts favoring women to a greater extent in the 1980s than in the 1990s that is not captured by our shift-share analysis. While even if we added these estimates to those presented in the shift share analysis, we would still fall short of the demand shifts required by the simulation in Blau and Kahn (2004), this finding may be indicative of other factors positively affecting the demand for women within industry-occupation cells. A possible example of such within-sector changes in the demand for women is suggested by the recent work of Borghans, ter Weel, and Weinberg (2005), who found evidence that a growing influence of interpersonal interactions on wages (in part due to increased computer use) can help explain rapidly rising female relative wages in the 1980s as well as a slower rate of increase in the 1990s.

Finally, as noted above, the effects of industry, occupation, and union coverage shown in Table 2b, taken together, are consistent with a slowdown in the growth of demand for women in the 1990s. Specifically, Table 2b shows that women's relative industry, occupation, and union status changes together contributed to a 0.048 log point closing in the gender wage gap in the 1980s, but to only a 0.021 log point closing in the 1990s, with both occupational shifts and deunionization, in particular, contributing less to convergence in the 1990s. Of course, as noted, these effects only measure the direct impacts of shifting employment distributions on the gender gap. Demand shifts favoring women can have broader impacts, raising women's wages wherever they are employed and hence lowering the female residual. Interestingly, technical change has been widely cited as a factor in the shrinking of blue-collar employment (for example, Katz and Murphy 1992) and is likely also to be an important cause of deunionization, as computers make it easier to substitute away from relatively unionized routine manual jobs (Autor, Levy, and Murnane 2003).

Conclusion

We have used PSID data to study the slowdown in the convergence of female and male wages in the 1990s compared to the 1980s. After decades of near constancy, between 1979 and 1989 the female/male hourly pay ratio rose by 17.8%—from 63.2% to 74.5%. However, convergence slowed in the 1990s, with the ratio rising to 79.7% in 1998, an increase of only 7.2% on a ten-year basis. We first decomposed the slowdown in convergence into a portion due to changes in women's relative human capital levels and other measured characteristics; a portion that was due to changes in measured labor market prices; a portion due to changes in women's position in the male wage distribution; and a portion due to changes in unmeasured labor market prices.

Our decompositions showed that women improved their relative human capital to

[24]Friedberg provided data on computer use only for 1984, 1989, 1993, and 1997. The estimates in the text use linear interpolation to obtain computer use in 1998 and assume zero incidence of computer use in the workplace in 1979. The latter is consistent with Autor, Katz, and Krueger's (1998) observation that the IBM PC was introduced in 1981 and the Apple II in 1977. If we instead use linear interpolation to estimate 1979 computer use, we estimate that rising computer use increased women's share of hours by 0.027 log points (Weinberg low estimate) to 0.044 log points (Weinberg high estimate) over the 1980s; and 0.018 log points (Weinberg low estimate) to 0.030 log points (Weinberg high estimate) over the 1990s.

a comparable extent in the 1980s and the 1990s. In contrast, while occupational upgrading and deunionization contributed to women's relative wage gains in both decades, the impact of these factors was greater in the 1980s. Thus, slowing convergence in sectoral location in the 1990s is part of the explanation for the slowdown in wage convergence. The results of our decompositions also indicate that changes in the price of skills and returns to location in favorable sectors of the economy cannot explain why the gender pay gap fell faster in the 1980s than in the 1990s. These prices changed to women's detriment in the 1980s and had very little effect in the 1990s.

Controlling for human capital, sector, and the prices of measured and unmeasured labor market skills, we found that women made much larger gains in relative wages in the 1980s than in the 1990s. This difference, which is "unexplained" by our regression analyses, was sufficient to more than fully account for the slowdown in wage convergence in the 1990s. We then considered the factors that may have contributed to these changes in the convergence of the unexplained gender pay gap, including changes in labor force selectivity, changes in the gender difference in unmeasured characteristics and in labor market discrimination, and changes in the favorableness of supply and demand shifts. We presented some evidence consistent with each of these factors, suggesting that each may have played a role in explaining the observed trends.

REFERENCES

Aguiar, Mark, and Erik Hurst. 2006. "Measuring Trends in Leisure: The Allocation of Time over Five Decades." National Bureau of Economic Research Working Paper 12082, Cambridge, Mass. (March).

Albrecht, James, Anders Björklund, and Susan Vroman. 2003. "Is There a Glass Ceiling in Sweden?" *Journal of Labor Economics,* Vol. 21, No. 1 (January), pp. 145–77.

Autor, David H., Lawrence F. Katz, and Melissa S. Kearney. 2005. "Rising Wage Inequality: The Role of Composition and Prices." Unpublished Working Paper, Massachusetts Institute of Technology (May).

Autor, David H., Lawrence F. Katz, and Alan B. Krueger. 1998. "Computing Inequality: Have Computers Changed the Labor Market?" *Quarterly Journal of Economics,* Vol. 113, No. 4 (November), pp. 1169–1213.

Autor, David H., Frank Levy, and Richard J. Murnane. 2003. "The Skill Content of Recent Technological Change: An Empirical Exploration." *Quarterly Journal of Economics,* Vol. 118, No. 4 (November), pp. 1279–1333.

Bayard, Kimberly, Judith Hellerstein, David Neumark, and Kenneth Troske. 2003. "New Evidence on Sex Segregation and Sex Differences in Wages from Matched Employee-Employer Data." *Journal of Labor Economics,* Vol. 21, No. 4 (October), pp. 887–922.

Becker, Gary S. 1985. "Human Capital, Effort, and the Sexual Division of Labor." *Journal of Labor Economics,* Vol. 3, No. 1 (January Supp.), pp. S33–S58.

Berman, Eli, John Bound, and Zvi Griliches. 1994. "Changes in the Demand for Skilled Labor within U.S. Manufacturing Industries: Evidence from the Annual Survey of Manufactures." *Quarterly Journal of Economics,* Vol. 109, No. 2 (May), pp. 367–97.

Blank, Rebecca M. 2000. "Distinguished Lecture on Economics in Government—Fighting Poverty: Lessons from Recent U.S. History." *Journal of Economic Perspectives,* Vol. 14, No. 2 (Spring), pp. 3–19.

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

____. 1998. "Trends in the Well-Being of American Women, 1970–1995." *Journal of Economic Literature,* Vol. 36, No. 1 (March), pp. 112–65.

Blau, Francine D., Marianne Ferber, and Anne Winkler. 2002. *The Economics of Women, Men, and Work,* 4th edition. Englewood Cliffs, N.J.: Prentice Hall.

Blau, Francine D., and Lawrence M. Kahn. 1997. "Swimming Upstream: Trends in the Gender Wage Differential in the 1980s." *Journal of Labor Economics,* Vol. 15, No. 1 (January, part 1), pp. 1–42.

____. 2004. "The U.S. Gender Pay Gap in the 1990s: Slowing Convergence." National Bureau of Economic Research Working Paper 10853, Cambridge, Mass. (October).

Borghans, Lex, Bas ter Weel, and Bruce A. Weinberg. 2005. "People People: Social Capital and the Labor-Market Outcomes of Underrepresented Groups." IZA Discussion Paper No. 1494, Bonn, Germany (February).

Card, David, and Thomas Lemieux. 2001. "Can Relative Supply Explain the Rising Return to College for Younger Men? A Cohort-Based Analysis." *Quarterly Journal of Economics,* Vol. 116, No. 2 (May), pp. 705–46.

Datta Gupta, Nabanita, Ronald L. Oaxaca, and Nina Smith. 2006. "Swimming Upstream, Floating Downstream: Comparing Women's Relative Wage Progress in the United States and Denmark." *Industrial and Labor Relations Review,* Vol. 59, No. 2 (January), pp.

243–66.

DiNardo, John, Nicole M. Fortin, and Thomas Lemieux. 1996. "Labor Market Institutions and the Distribution of Wages, 1973–1992: A Semiparametric Approach." *Econometrica,* Vol. 64, No. 5 (September), pp. 1001–44.

Echeverri-Carroll, Elsie, and Sofia G. Ayala. 2006. "High Technology Agglomeration and Gender Inequalities." Paper presented at the American Economic Association Meetings, Boston, Mass. (January).

Farber, Henry S. 2005. "Nonunion Wage Rates and the Threat of Unionization." *Industrial and Labor Relations Review,* Vol. 58, No. 3 (April), pp. 335–52.

Fortin, Nicole M. 2005. "Greed, Altruism, and the Gender Wage Gap." Unpublished Working Paper, University of British Columbia (May).

Friedberg, Leora. 2003. "The Impact of Technological Change on Older Workers: Evidence from Data on Computer Use." *Industrial and Labor Relations Review,* Vol. 56, No. 3 (April), pp. 511–29.

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

Gould IV, William B. 1993. *Agenda for Reform: The Future of Employment Relationships and the Law.* Cambridge, Mass.: MIT Press.

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,* Vol. 26, No. 3 (Summer), pp. 457–72.

Hamermesh, Daniel S. 1993. *Labor Demand.* Princeton, N.J.: Princeton University Press.

Heckman, James J. 1979. "Sample Selection Bias as a Specification Error." *Econometrica,* Vol. 47, No. 1 (January), pp. 153–62.

Hersch, Joni, and Leslie Stratton. 1997. "Housework, Fixed Effects, and Wages of Married Workers." *Journal of Human Resources,* Vol. 32, No. 2 (Spring), pp. 285–307.

Juhn, Chinhui, and Kevin M. Murphy. 1997. "Wage Inequality and Family Labor Supply." *Journal of Labor Economics,* Vol. 15, No. 1 (January, part 1), pp. 72–97.

Juhn, Chinhui, Kevin M. Murphy, and Brooks Pierce. 1991. "Accounting for the Slowdown in Black-White Wage Convergence." In Marvin H. Kosters, ed., *Workers and Their Wages,* pp. 107–43. Washington, D.C.: AEI Press.

Katz, Lawrence F., and Kevin M. Murphy. 1992. "Changes in Relative Wages, 1963–87: Supply and Demand Factors." *Quarterly Journal of Economics,* Vol. 107, No. 1 (February), pp. 35–78.

Koenker, Roger, and Gilbert Bassett, Jr. 1978. "Regression Quantiles." *Econometrica,* Vol. 46, No. 1 (January), pp. 33–50.

Korenman, Sanders, and David Neumark. 1991. "Does Marriage Really Make Men More Productive?" *Journal of Human Resources,* Vol. 26, No. 2 (Spring), pp. 282–307.

Lemieux, Thomas. 2006. "Increasing Residual Wage Inequality: Composition Effects, Noisy Data, or Rising Demand for Skill?" *American Economic Review,* Vol. 96, No. 3 (June), pp. 461–98.

Machado, José A. F., and José Mata. 2005. "Counterfactual Decomposition of Changes in Wage Distributions Using Quantile Regression." *Journal of Applied Econometrics,* Vol. 20, No. 4 (May/June), pp. 445–65.

Meyer, Bruce D., and Dan T. Rosenbaum. 2001. "Welfare, the Earned Income Tax Credit, and the Labor Supply of Single Mothers." *Quarterly Journal of Economics,* Vol. 116, No. 3 (August), pp. 1063–1114.

Mincer, Jacob, and Solomon Polachek. 1974. "Family Investments in Human Capital: Earnings of Women." *Journal of Political Economy,* Vol. 82, No. 2 (March/April, part 2), pp. S76–S108.

Mulligan, Casey B., and Yona Rubinstein. 2005. "Selection, Investment, and Women's Relative Wages Since 1975." National Bureau of Economic Research Working Paper 11159, Cambridge, Mass. (February).

Neal, Derek. 2004. "The Measured Black-White Wage Gap among Women Is Too Small." *Journal of Political Economy,* Vol. 112, No. 1 (February, part 2), pp. S1–S28.

Neal, Derek A., and William R. Johnson. 1996. "The Role of Pre-Market Factors in Black-White Wage Differences." *Journal of Political Economy,* Vol. 104, No. 5 (October), pp. 869–95.

Offices of Representatives John D. Dingell and Carolyn B. Maloney. 2002. "A New Look through the Glass Ceiling: Where Are the Women?" Report (January).

Olivetti, Claudia, and Barbara Petrongolo. 2006. "Unequal Pay or Unequal Employment? A Cross-Country Analysis of Gender Gaps." IZA Discussion Paper No. 1941, Bonn, Germany (January).

O'Neill, June. 2003. "The Gender Gap in Wages, circa 2000." *American Economic Review,* Vol. 93, No. 2 (May), pp. 309–14.

O'Neill, June, and Solomon Polachek. 1993. "Why the Gender Gap in Wages Narrowed in the 1980s." *Journal of Labor Economics,* Vol. 11, No. 1 (January, part 1), pp. 205–28.

U.S. General Accounting Office (GAO). 2001. "Women in Management: Analysis of Selected Data from the Current Population Survey." Report to Congressional Requesters, Washington, D.C. (October).

Waldfogel, Jane. 1998. "The Family Gap for Young Women in the United States and Britain: Can Maternity Leave Make a Difference?" *Journal of Labor Economics,* Vol. 16, No. 3 (July), pp. 505–45.

Weinberg, Bruce A. 2000. "Computer Use and the Demand for Female Workers." *Industrial and Labor Relations Review,* Vol. 53, No. 2 (January), pp. 290–308.

Welch, Finis. 2000. "Growth in Women's Relative Wages and in Inequality among Men: One Phenomenon or Two?" *American Economic Review,* Vol. 90, No. 2 (May), pp. 444–49.