Industrial & Labor Relations Review

Volume 59, *Issue* 2 2006 *Article* 4

Swimming Upstream, Floating Downstream: Comparing Women's Relative Wage Progress in the United States and Denmark

Nabanita Datta Gupta* Ronald L. Oaxaca†

Nina Smith‡

*Danish National Institute of Social Research,

†University of Arizona,

‡Aarhus School of Business,

Swimming Upstream, Floating Downstream: Comparing Women's Relative Wage Progress in the United States and Denmark

Nabanita Datta Gupta, Ronald L. Oaxaca, and Nina Smith

Abstract

Applying a new decomposition method to U.S. PSID and Danish Longitudinal Sample data, the authors compare how U.S. and Danish gender wage gaps developed between 1983 and 1995. In Denmark, they find, the wage gap widened, because the worsening in women's relative returns to observable human capital attributes, as well as in their ranking relative to men in unobservable productive attributes, more than offset their wage gains from improved observable qualifications relative to men's. In the United States, in contrast, the gender convergence in qualifications offset adverse influences, including increasing wage dispersion throughout the labor market, to result in a narrowing of the gap. The largest increase in the gap in Denmark was experienced by women in the top earnings decile, and the largest decline in the gap in the United States affected those at the top and in the middle of the distribution.

KEYWORDS: women's relative wages

SWIMMING UPSTREAM, FLOATING DOWNSTREAM: COMPARING WOMEN'S RELATIVE WAGE PROGRESS IN THE UNITED STATES AND DENMARK

NABANITA DATTA GUPTA, RONALD L. OAXACA, and NINA SMITH*

Applying a new decomposition method to U.S. PSID and Danish Longitudinal Sample data, the authors compare how U.S. and Danish gender wage gaps developed between 1983 and 1995. In Denmark, they find, the wage gap widened, because the worsening in women's relative returns to observable human capital attributes, as well as in their ranking relative to men in unobservable productive attributes, more than offset their wage gains from improved observable qualifications relative to men's. In the United States, in contrast, the gender convergence in qualifications offset adverse influences, including increasing wage dispersion throughout the labor market, to result in a narrowing of the gap. The largest increase in the gap in Denmark was experienced by women in the top earnings decile, and the largest decline in the gap in the United States affected those at the top and in the middle of the distribution.

This paper compares women's wage progress in Denmark with that in the United States. Women's relative wages have historically been higher in Denmark and the other Scandinavian countries than in the United States. At the same time, wages are less dispersed in the Danish labor market than in the United States. It is instructive to examine the prospects for change in the relative labor market position of women in two very different economic and institutional settings.

We first confirm the surprising finding of other recent research that in Denmark, despite public policies that might be expected to benefit women more than do the relatively free-market, laissez faire public policies in the United States, the gender wage gap in the 1990s (after a long period of stagnation since the late 1970s and 1980s) was rising, while in the United States it was

*Nabanita Datta Gupta is Research Professor at the Danish National Institute of Social Research, Ronald L. Oaxaca is McClelland Professor of Economics at the University of Arizona, and Nina Smith is Professor of Economics at the Aarhus School of Business. All three authors are research fellows at IZA, Bonn. This research was supported by funds from the Danish Social Science Research Foundation's FREJA grant. The authors thank Kristina Venø Rostbo, Anne-Sofie Reng Rasmussen, and Morten Hansen for excellent research assistance on this paper. Helpful comments by participants of the Southern Economic Association Meetings, EALE Annual Meetings, and the IZA Workshop on Gender and the Labour Market are gratefully acknowledged.

Copies of the computer programs used to generate the results in this paper are available from Nabanita Datta Gupta, The Danish National Institute of Social Research, Herluf Trolles Gade 11, DK–1052 Copenhagen K, Denmark. Phone: (+45) 33 48 09 85. Fax: (+45) 33 48 08 33. Email: ndg@sfi.dk.

Industrial and Labor Relations Review, Vol. 59, No. 2 (January 2006).
0019-7939/00/5902 $01.00

falling rapidly. Our subsequent analysis explores the reasons for this pattern. Why is it that Danish women seem to have stalled in their quest for gender equality in wages while American women were steadily "swimming upstream" by narrowing the gender wage gap despite adverse changes in the wage structure (Blau and Kahn 1997)? In a recent paper, Blau and Kahn (2000) showed evidence from Current Population Survey data that the U.S. gender wage gap may also have been showing signs of leveling off in the mid-1990s, further underscoring the need to understand the processes behind the long period of relative-wage stagnation for women, and the recent worsening of women's relative wages, in countries such as Denmark. A closer examination of the factors determining changes in wages in the United States and Denmark in the 1980s and the 1990s may be necessary in order to evaluate the effectiveness of labor market policies designed to promote gender equality in Scandinavia in light of the American experience.

We consider several hypotheses within the framework of a decomposition of the changes of the gender wage gap in the United States and Denmark between 1983 and 1995. We choose to focus on 1983 and 1995 because those years corresponded to approximately similar stages of the business cycle in each country (upswing years), allowing us to abstract from the effect of cyclical fluctuations.

Juhn, Murphy, and Pierce (1991) developed a decomposition methodology that quantifies the impact of unobservables on the pay gap. Our methodology is similar in spirit to theirs, but with the important difference that it uses the overall wage distribution (for men and women combined), not the male distribution, as the distribution of reference. Using the male wage distribution as the reference assumes that male wages are unchanged by improvements in the relative position of women, whereas anchoring the analysis in the overall wage distribution allows women's relative wage gains or losses to affect the overall wage structure that applies to both women and men. Thus, this paper makes a contribution to the recently developed methods for decomposing wage inequality over time in the discrimination literature. A central concern is also to document that the effects on the wage gap of explanatory factors may be quite different at different points in the wage distribution, requiring a full distributional analysis of the wage decomposition.

Background

While the female-male (unadjusted) earnings ratio in Denmark, as in the other Scandinavian countries, remains among the highest in the world (between 80% and 88% in 1996),[1] there has been almost no movement in this ratio since the late 1970s (see Rosholm and Smith 1996), and there has even been a slight decrease in recent years. The same process of stagnation can also be seen in the gender wage gaps in Sweden (see, for instance, Edin and Richardson 2002) and Finland since the start of the 1980s. Only Norway experienced a steady decline in its gender wage gap in the 1980s and 1990s (see Asplund et al. 1997). Over the same period, the U.S. average female-male raw earnings ratio showed considerable progress, rising from a virtually unchanged 60% throughout the 1960s and 1970s to a high of 76.3% in 1999 for full-time workers.[2] What is further remarkable is that this decrease in the U.S. gender wage gap took place mainly in the 1980s, when work experience (which is typically less extensive for women than for men) and other skill-related human capital attributes were rising in price (see, for example, O'Neill and Polachek 1993).

Several hypotheses can be considered as explanations for this divergence in out-

[1]The actual gap depends on whether the wage measure is straight time wages or includes leave pay. See Pedersen and Deding (2000).

[2]The wage gap is 82.3% among blacks, 85% among Hispanics, and 75.5% among whites. Among part-time workers, women's usual weekly earnings now exceed men's. These statistics are taken from the BLS's Usual Weekly Earnings Survey summary data based on the CPS, and which are available at http://www.bls.gov/bls/newsrels.htm.

comes. First, could the differential development of the gender wage gaps in the two countries be due to Danish women's failure to improve their labor market qualifications, such as experience, and their representation in high-paying occupations and the private sector to the same extent as their American counterparts? Or could it be due to unfavorable wage structure changes—changing returns to observed and unobserved skills that favor men that have overwhelmed any progress made in women's human capital acquisition and other qualifications?

Scandinavian countries such as Denmark and Sweden have led the way in the pursuit of gender equality by designing public policies such as childcare and paid parental leave legislation to accommodate women's employment. In comparison, American women have only recently acquired the right to unpaid parental leave. Yet, the gender wage gap has stagnated, even risen, in Scandinavian countries, while closing rapidly in America. Could it be that the special features of the Danish welfare state, particularly the various "family-friendly schemes" that were greatly expanded from 1984 onward, have had a "boomerang" effect on the position of women because women tend to participate in these schemes to a much larger extent than men?[3] For instance, Ruhm (1998) found that extensions of parental leave schemes in OECD countries tend to increase the gender wage gap. Explanations related to institutional changes are also possible, but in Denmark, 1983–95 was a period characterized by institutional stability, the wage indexation policy having been abandoned prior to the start of these years and no significant changes having taken place in the collective wage agreements concerning minimum wages.

Wage inequality has been shown to be strongly positively correlated with the gender wage gap. In a comparison of earnings of full-time men and women in eight countries, Blau and Kahn (1992) found that the large difference in the gender earnings ratio between the northern European countries and the United States could be explained by a far more compressed wage distribution in the former. Starting in the 1980s and continuing through the 1990s, both the United States and Denmark experienced increased wage dispersion, so one question is to what extent these changes in wage dispersion are responsible for the differential development of the gender wage gaps in the two countries.

One of the sources of increased dispersion in the 1980s and 1990s in the United States was skill-biased technological change. Earlier studies have found that the shifts in the composition of demand that have led to the decline of unionized manufacturing jobs and the rise of service-sector jobs have benefited women relative to men at the low end of the skill distribution, and men relative to women at the high end—a "gender twist" phenomenon (Katz and Murphy 1992; Blau and Kahn 1997). However, Fortin and Lemiuex (1998) showed that the finding of a gender twist pattern is sensitive to the choice of reference distribution—male only, or male and female together—in the wage decomposition analysis. Thus, the evidence remains mixed in the case of the United States, and our analysis adds new input to this debate.

A reason for increased dispersion in Denmark could be that even though Denmark has had a very compressed wage distribution by global comparison, since the early 1980s it has experienced rising decentralization in the wage bargaining process. In a recent micro-study of 22 countries, Blau and Kahn (2003) demonstrated that highly centralized wage bargaining settings increase female wages relative to male wages by setting wage floors at the bottom of the distribution, where women tend to be over-

[3]In 1984 family leave policies were greatly expanded, with 10 additional weeks of parental leave granted over and above the 14 weeks following the birth of a child, but as only 3% of men made use of this scheme, maternity leave taken by mothers increased to an average of 50 weeks per child. Datta Gupta and Smith (2002) analyzed the effect of children and career interruptions on the family gap in the period following this policy change.

represented; decentralization therefore should adversely affect the gender wage gap. We test for this effect as well.

The public sector is the largest employer of women in Denmark, accounting for more than half of the female labor force compared to 20% of the male labor force. While the expansion of the public sector in the 1960s and 1970s accommodated the large-scale entry of women into the Danish labor force, wage growth in the public sector has lagged behind that in the private sector, and several studies have shown that this lag has contributed to the stagnation of the gender wage gap in Denmark. For example, beginning in the mid-1970s, the Danish government embarked on a "wage-twist" policy, restricting public-sector wage growth in order to reduce public-sector wages relative to private-sector wages. This policy was applied uniformly at all wage levels in the public sector.

Rosholm and Smith (1996), using a panel data model, showed that the wage-twist policy not only succeeded in its stated objective, but also widened the gender wage gap, largely because women were much more likely than men to be employed in the public sector. Datta Gupta et al. (2000) used a decomposition methodology and showed that if prices in the private sector had been applied in the public sector, the overall gender wage gap would have been about 3 percentage points lower in 1994. Pedersen and Deding (2000) offered cross-sectional evidence that the gender wage gap in Denmark is largely due to women's over-representation in the public sector. Public sector jobs are attractive for women because of their generous benefit coverage, which includes paid maternity leave as well as paid leave for taking care of sick children, own sickness, holidays, and so on. Yet, career wage growth and progression for women is limited in the public sector.

More recently, Nielsen, Simonsen, and Verner (2004) examined detailed information on career patterns for Danish women in the 1981–97 period and found, after controlling for the endogeneity of sectoral choice and fertility, that women in Denmark self-select into the public sector according to the choice of having children, and that women who take child-related career interruptions face lower wage penalties for absences in Denmark's public sector than in its private sector. Accordingly, the present paper also explores whether changing employment or remuneration (or both) in the public sector could have been a contributing factor in the evolution of the Danish gender wage gap over this period.

Finally, what has been the role of changes in unobserved factors, including discrimination, in the development of the gender gap in each country? Has the role of residual factors increased or decreased in each country, and to what extent are these factors responsible for the differential development of the gender wage gaps?

Decomposition Analysis

Our methodology is related to the decomposition technique developed by Juhn et al. (1991) (hereafter JMP), which Blau and Kahn (1997) applied to PSID data in a study of changes in the U.S. gender wage gap from 1979 to 1988. JMP developed a new methodology for decomposing changes in the wage gap between two groups of workers that allows for changes in the overall wage distribution to affect the wage gap. Thus, they were able to differentiate the effects of a change in the dispersion of the unobservable components of the overall wage distribution from the effects of a change in the two groups' relative positions in the skill distribution. JMP applied their decomposition to black-white wage differentials, in which white wages are taken as the reference wage distribution. Blau and Kahn (1997) applied JMP's method to study the changes in women's wage gains in the context of rising wage inequality in the male wage distribution. Our method, on the other hand, anchors the analysis using the pooled wage regression rather than the male wage regression. Earlier work by Oaxaca-Ransom (1994) and Neumark (1988) on the generalized decomposition clearly demonstrated the advantages of the pooled method. Other studies have also explored alternative decomposition tech-

niques. For example, an alternative method that produces results qualitatively similar to those produced by the JMP estimator was suggested by Richardson (1997). Fortin and Lemieux (1998) used a rank-based procedure to decompose changes in the wage gap. Their results showed that the decomposition results are sensitive to the choice of the distribution of reference (male distribution versus overall distribution).

There are at least two important benefits to using the pooled wage regression as the foundation for the decomposition. First, all the available data are used. Second, the index number problem—the problem that calculated decomposition components differ depending on whether male or female prices are assumed to be the norm—does not arise in this case, and the philosophic notion of a non-discriminatory wage structure is more closely approximated by the pooled method than by assuming that either male prices or female prices would prevail in the absence of discrimination. A brief outline of our method is given below.

The gender wage gap at time t is denoted by $G_t = (\tilde{W}^t_m - \tilde{W}^t_f)/\tilde{W}^t_f$, where $\tilde{W}$ is the geometric mean of the hourly wage rate, and the subscripts m, f denote male and female, respectively. Thus, the log wage ratio is defined by $\ln(G_t + 1) = \ln(\tilde{W}^t_m / \tilde{W}^t_f)$. In line with the Oaxaca-Blinder decomposition, the log wage ratio may be decomposed as

$$\ln(G_t + 1) = \ln(Q_t + 1) + \ln(R_t + 1), \tag{1}$$

where $\ln(Q_t + 1)$ is the qualification component (the explained part of the wage gap) evaluated at the sample means, $\bar{X}_m$ and $\bar{X}_f$, and $\ln(R_t + 1)$ is the residual or unexplained part of the wage gap, the proportion of the wage gap not explained by differences in measured skills. The residual gap can reflect both labor market discrimination against women and gender differences in unmeasured skills. However, it does not take into account feedback effects of labor market discrimination on women's (under)investments in human capital.

Equation (1) may be further disaggregated to evaluate the effects on the observed development in the gender wage gap of both the increased wage dispersion and the changing ranking of women in the common wage distribution. Evaluated at the sample mean, the wage equation may be written as

$$\ln(\tilde{W}^t_i) = \bar{X}^t_i \hat{\beta}^t + \hat{\sigma}^t \hat{\theta}^t_i, \tag{2}$$

where $\tilde{W}^t_i$ is the geometric mean wage in year t in group i ($i = m, f$), $\bar{X}^t_i$ is the vector of mean characteristics in group i, $\hat{\beta}^t$ is the estimated parameter vector from the pooled wage regression, $\hat{\sigma}^t$ is the standard error estimate, and $\hat{\theta}^t_i$ is the mean standardized residual in group i. Thus, $\hat{\beta}^t$ is an estimate of the vector of observed prices, and $\hat{\sigma}^t$ is an estimate of wage dispersion, which is often interpreted as an estimate of unobserved prices (see Blau and Kahn 1997). Finally, $\hat{\theta}^t$ represents the ranking of group i in the common wage distribution, after controlling for differences in observed characteristics. If $\hat{\theta}^t < 0$ (> 0), group i is situated in the lower (upper) part of the distribution.

By combining the Juhn-Murphy-Pierce (1991) and Oaxaca-Ransom (1994) decomposition techniques, we can show that changes between two periods (denoted by Δ) in the two components on the RHS of (1) may be expressed as

$$\Delta\ln(R_t + 1) = \hat{\sigma}^1(\Delta\hat{\theta}_m - \Delta\hat{\theta}_f) + \Delta\hat{\sigma}(\hat{\theta}^0_m - \hat{\theta}^0_f) \tag{3}$$

$$\Delta\ln(Q_t + 1) = (\Delta\bar{X}_m - \Delta\bar{X}_f)\hat{\beta}^1 + (\bar{X}^0_m - \bar{X}^0_f)\Delta\hat{\beta}, \tag{4}$$

where $\Delta\hat{\beta} = \hat{\beta}^1 - \hat{\beta}^0$, $\Delta\hat{\sigma} = \hat{\sigma}^1 - \hat{\sigma}^0$, $\Delta\hat{\theta}_j = \hat{\theta}^1_j - \hat{\theta}^0_j$, $\Delta\bar{X}_j = \bar{X}^1_j - \bar{X}^0_j$, and $j = m, f$.

The first RHS term of (3), which we term the "ranking effect," can be split between $\hat{\sigma}^1\Delta\hat{\theta}_m$, which measures the effect of movements of men in the wage distribution after adjusting for changes in human capital characteristics, and the term $-\hat{\sigma}^1\Delta\hat{\theta}_f$, which is the effect of movements of women in the wage distribution at time 1 after controlling for changes in human capital characteristics. The second RHS term of (3) may be interpreted as the "dispersion" or unobserved prices effect (see, for instance, Blau and Kahn 1997). Note that Suen (1997) criticized as not quite accurate JMP's inter-

pretation of the first and second RHS terms in (3) above as changes in the level of unmeasured skill and changes in the returns to unmeasured skill. Wage dispersion and the percentile ranking, Suen noted, are not independent, since more dispersed distributions have thicker tails. This is indeed the case if each woman, for example, faces a constant discrimination coefficient. If a more general approach is adopted in which the ranking and dispersion effects described above are identified with unmeasured skills plus time-varying discrimination that takes a more complicated form than a constant discount of female wages, for example as shown in Edin and Richardson (2002), or if no discrimination is present and the residual reflects only unmeasured productivity, then the same identification problem need not arise.[4]

The first RHS term of (4) measures the effect of the gender difference in changes in human capital characteristics valued at the period 1 estimated coefficients. The individual terms $\Delta\bar{X}_m\hat{\beta}^1$ and $\Delta\bar{X}_f\hat{\beta}^1$ estimate the effects of changes in the human capital of men and women, respectively. The second RHS term of (4) measures the effect of changes in human capital valuations on the human capital gender gap in period 0 (the effect of changes in observed prices). Changes in the value of the human capital of men and women in period 0 are measured respectively by $\bar{X}_m^0\Delta\hat{\beta}$ and $\bar{X}_f^0\Delta\hat{\beta}$.[5]

Data

The data set for Denmark is created from a 0.5% representative sample of the Danish population extracted from the register-based Danish Longitudinal Sample data. For the United States, we use the PSID Family data for the years 1983–95, with additional information merged in from the Individual and Supplemental Files.

The Danish sample consists of salaried and manual workers who work more than 1,000 hours annually and excludes the self-employed and their assisting spouses. The hours restriction is needed because hours information is unreliable under 1,000 annual hours. This is because the hourly wage in the Danish Longitudinal Sample is calculated from information on employers' contributions to the ATP scheme (a stepwise function of the degree of employment) and these contributions are only required for each employee who works more than 9 hours a week. It can be shown that the hourly wage imputation is upwardly biased for part-time workers and overtime workers, and therefore that the applied sample selection criterion at least minimizes problems in the wage measure as a result of too few hours.[6] Hourly wage rates are deflated into 1983 prices, converted into U.S. dollars, and restricted to be at least $1.30 per hour in each year. Controls include actual labor market experience and its square,[7] years of education and its square, residence in provinces (that is, outside of the greater Copenhagen area), 1-digit industry dummies, occupational indicators, and sector. Occupational indicators include high manager, middle manager, non-managerial salaried worker (the reference category), manual skilled worker, and manual unskilled worker. Differences in salaried positions primarily reflect differences in supervisory responsibilities, with high managers defined as salaried employees super-

[4]An alternative decomposition of the change in the residual gap is obtained by using period 0 as the base period for changes in the relative movements of men and women in the pooled distribution of wages after controlling for measured skills and period 1 as the base period for changes in wage dispersion. The results from the calculation of these alternative decompositions do not deviate much from the results shown here.

[5]The derivation of analytical standard errors of the decomposition terms above is available as a separate appendix from the authors.

[6]We cannot identify overtime work hours in our data. However, as wage changes occur between two upswing years, overtime work as a proportion of all work, which typically varies with business cycle fluctuations, should remain fairly stable.

[7]A quartic in experience was tried, but higher order terms turned out to be statistically insignificant.

vising more than 20 employees, middle managers as salaried employees supervising up to 20 employees, and non-managerial salaried workers as salaried employees having no supervisory power.[8]

The PSID sample is similarly restricted to non-self-employed white workers between the ages of 18 and 65 who work more than 1,000 hours annually. The hourly wage is measured as the ratio of annual labor income to annual hours and is restricted to be at least $1.00 (1983–84 prices). Special algorithms are needed in order to construct the variables measuring education and experience. For example, in 1983, education was recorded as the years of education obtained when respondents (heads of household and spouses) first entered the sample. Subsequent education was not recorded and the original value was simply brought forward in 1983. We find respondents' educational status in each year since the year they entered the sample (for wives, we can only go back to 1979), and, based on respondents' full-time student status in each year up to 1983, accordingly update years of education. Similarly, for experience in 1983, the variable "years worked since age 18" contains the years worked since age 18 at the time the respondent entered the sample. To account for experience gained since entering the sample, we update this variable with the years equivalent of respondents' working hours in each year. In 1995, the problem is further compounded because in the early release PSID data file for 1995, years worked since age 18 was only asked of new respondents, that is, those entering the sample in 1995. Therefore, for all other respondents we need to combine information from both individual- and family-level data and create a variable containing the value of "years worked since age 18" equivalent to the variable from 1983, with updating for each subsequent year in the sample based on annual work hours.[9]

Both wage earners and salaried workers are included. Controls include actual labor market experience and its square, years of education and its square, dummies for whether the current job is covered by a union contract, 1-digit industry and occupation dummies, region dummies, and sector.

In Appendices A3–A6, we present wage regressions in which we try both a simple quadratic specification in experience and education (column 1) and a specification that adds the effect of sector, industry, occupation, unionization, and region to the basic human capital specification (column 2). The coefficients on experience and its square remain stable, while the returns to education drop as the other labor market variables are entered, suggesting that some of the wage effect of schooling works through its impact on sectoral representation, but for the most part, the human capital variables are not sensitive to inclusion of industry, occupation, and so on.

Descriptive Evidence

According to the evidence presented in Table 1, in the 1983–95 period the unadjusted female-male wage ratio in Denmark declined from about 84% to 81%. Both male and female real hourly wages show a strong increase in this period, but men's wage growth exceeds women's (9.4% compared to 6.2%). At the same time, in the U.S. PSID data, the raw wage ratio rose nearly 7 percentage points, from 66% in 1983 to 73% in 1995. This rise reflects a considerable gain (19.7%) in real female wages in this period and a lesser increase in

[8]A full description of the Danish sample is available at http://www.cls.dk.

[9]How do these corrected measures of experience and education compare to those based on other data sources? Mean education and potential experience values from a sample drawn from the CPS in the middle of this period (1989) lie between the mean values of education and (for comparison purposes) potential experience generated in our sample in the two sample years, for each gender group. At least for men, the fact that mean potential experience in a comparable CPS sample in 1989 is spanned by the mean 1983 and 1995 values of the similarly defined experience measure in this PSID sample validates the measure of actual experience above.

Table 1. Mean Log Wages and Wage Inequality, 1983–1995, Denmark and the United States.

	Denmark				*United States*			
	1983		*1995*		*1983*		*1995*	
Variable	*M*	*F*	*M*	*F*	*M*	*F*	*M*	*F*
Log Hourly Wage–Mean	4.22	4.04	4.31	4.10	2.29	1.87	2.37	2.05
Standard Deviation	0.32	0.30	0.35	0.28	0.53	0.50	0.57	0.57
Log Hourly Wage, 10th Pctl.	3.9	3.7	3.94	3.79	1.6	1.26	1.67	1.33
Standard Deviation	0.05	0.05	0.05	0.05	0.11	0.08	0.1	0.1
Log Hourly Wage, 50th Pctl.	4.19	4.02	4.28	4.08	2.35	1.88	2.37	2.06
Standard Deviation	0.02	0.02	0.02	0.02	0.04	0.05	0.04	0.05
Log Hourly Wage, 90th Pctl.	4.64	4.43	4.8	4.46	2.93	2.52	3.09	2.79
Standard Deviation	0.1	0.09	0.1	0.07	0.1	0.08	0.11	0.10
50-10 Gap	0.29	0.32	0.34	0.29	0.75	0.62	0.7	0.73
90-50 Gap	0.45	0.41	0.52	0.38	0.58	0.64	0.72	0.73
50-25 Gap	0.17	0.18	0.2	0.16	0.39	0.33	0.35	0.39
75-50 Gap	0.19	0.16	0.22	0.18	0.29	0.36	0.38	0.40
Mean Wage Rank	58.0	39.5	58.6	39.5	58.6	36.2	56.4	41.0
Female-Male Wage Ratio	83.5		81.1		65.7		72.6	
N	3,945	3,355	3,999	3,635	1,877	1,274	2,235	1,818

Notes: Wages in Denmark are real (1980) kroner / hour; in the United States, real (1983–84) dollars / hour. Mean wage rank is the average rank in the pooled wage distribution. Female-male wage ratio is $[\exp\{\ln(W_f^t / W_m^t)\}] \times 100$.

real male wages (8.3% gain). Wage inequality rose in the United States (that is, the standard deviations of log wages in Table 1 increased), more so among women (0.07 log points) than among men (0.04 log points). In Denmark, the wage distribution widened for men (0.03 log points) but not for women (–0.02 log points).

Growth in log hourly wages at the median in each country departs little from the mean, except for U.S. men in 1983, for whom the distribution is left-skewed so that median wage growth over the period is lower than mean wage growth. At the 10th percentile, women's wage growth (9.4%) was more than double men's (4%) in Denmark, while being about the same as men's in the United States (7.3%). At the 90th percentile, men in both countries experienced a strong wage increase (17%), while U.S. women forged ahead with a 31% wage increase in this period, compared to only a 3% gain for similar Danish women. Thus, mean tendencies do not capture the wide differences present at the tails. Further, the raw data give additional evidence that women's relative wage progress was strongest at the bottom of the distribution and weakest at the top in Denmark, whereas the reverse was true in the United States, where, in particular, women's wage growth at the top of the distribution was striking.

Wage gaps between percentile groups for each gender for each country for each year confirm that the Danish wage distribution was much more compressed, with lower wage inequality than in the United States at all intervals of the wage distribution. Over time, male wages became more dispersed in Denmark in all the ranges considered, and female wages less, except in the 75–50 range. In the United States, both men and women experienced rising wage inequality, but for men this occurred only in the top half of the distribution.

In terms of the mean of women's percentiles in the overall wage distribution, in the Danish data the average woman ranked at the 40th percentile of the overall wage distribution in 1983 and the average man at the 58th percentile. In 1995, the average woman maintained a percentile rank of 40

in the overall wage distribution, while the average man moved up to the 59th percentile. Thus, men, but not women, improved their wage rank by the end of the period. In the U.S. PSID data, in 1983 the average woman ranked at the 36th percentile. However, in 1995 the average woman had moved up to a percentile rank of 41. Thus, the typical U.S. woman ranked higher in the overall wage distribution at the end of the period than at the beginning. Explanations for the improvement in women's ranking in the U.S. wage distribution and its stagnation in Denmark are further expanded on in the decomposition analysis, where we compare women's relative gains in human capital accumulation and changes in the unexplained component of the wage gap in each country.

Means of the key variables are shown in Appendices A1–A2. In 1983, Danish women had less experience and a little less education than men, and they were much less likely to be in high-salaried or skilled occupations and much more likely to be in low-skilled and low-salaried occupations. They were also much more likely to work in the public sector. By 1995, women's educational attainment exceeded men's and they had improved their level of experience, but gender representation in the high-manager occupations remained skewed, although more women than men entered the medium-manager occupations. For example, about 18.7% of women worked in high- and medium-manager occupations in 1983, compared to about 27% by 1995. The corresponding figures for men are 31.5% in 1983 and 33.5% in 1995. Women's over-representation in the public sector did not change much over time, and in both years, more than 50% of the women in this sample worked in the public sector, as compared to about a quarter of the men. Industrial location was also widely divergent by gender, but remained rather stable over time, with men more likely to be located in primary manufacturing and construction industries and women in "other" industries, which include many jobs in the public sector.

In the United States, in 1983 there was a significant gender gap in experience but no longer a gap in years of education.[10] In addition, there were important differences in the occupational distribution by gender. Women were much less likely than men to be in professional, managerial, craft, and labor occupations and more likely to be in service occupations and sales occupations. There were big differences in industrial affiliation. Women were more likely to be in the service sector and men were more likely to be in agriculture, construction, durable manufacturing, and non-durable manufacturing. In 1995, both industrial and occupational segregation persisted, although many more women were drawn into the professional and managerial occupations than before: in 1983, about 32% of women worked in professional and managerial occupations, and by 1995 this rate had increased to 41.4%. Both men and women left manufacturing (durable and non-durable) and joined the service sector. Also, both men and women were less likely to be in unionized jobs in 1995 than in 1983. These figures clearly reflect the decline of the manufacturing and unionized sector in the United States in this period. In 1995, women were more likely than men to be found in public sector jobs, but the female public sector over-representation was much less pronounced in the United States than in Denmark.[11]

[10]Of course, gender differences can still exist in the field of education. However, recent work by Joy (2003) using the NCES Baccalaureate and Beyond data shows that among U.S. college graduates, gender differences in labor market outcomes persist even after the analysis takes into account differences in college major, grades, and type of school attended.

[11]An interesting observation from this table is that the Danish gender experience gap seems to have been larger than the gap in the United States. Although it is true that Scandinavian women participate in the labor market to a much greater extent than American women, actual experience measures for women in Scandinavia tend to be inflated, because women's job rights there include the non-interruption of their "experience clock" during maternity leave, which can be up to a year in many cases. For the purposes of this paper, we have corrected women's experience by the usual length of maternity leave allowed in a woman's sector in the year in which the child is born, bringing Danish women's actual expe-

Estimation Results

Based on estimation of pooled wage functions for Denmark and the United States in 1983 and 1995, we perform the decompositions described in equations (3) and (4). The regression results are shown in Appendices A3–A6. The wage regressions in each country are well-behaved and accord with human capital theory. Wages rise with experience (the experience-earnings profile is concave), education, union status, and occupational rank, and fall with residence in the provinces (Denmark) and employment in the public sector. The return to education shows a decline in the United States over this period, not only in the pooled regression and in gender-separate regressions, but also in regressions correcting for the changing gender composition for the work force in the two analysis years. While this evidence may appear surprising, other studies have also noted that much of the post-1979 increase in wage inequality occurred between 1979 and 1983, the period prior to the one being analyzed here (see, for example, Card and DiNardo 2002).[12]

Based on these estimates, in Tables 2–4 below, wage decompositions are calculated at the mean and at the 10th, 20th, 80th, and 90th percentiles of the wage distribution. Finally, we analyze the separate contribution from different observed factors to the development of the gender wage gap.

These estimation results allow us to test the hypotheses presented in the background section on the reasons for the different development of the gender wage gap in the two countries in this period. Below, we first consider the effect of changing qualifications and changes in residual factors (ranking and dispersion). In the latter part of this section, for each country we explore the role of sector as well as the effect of rising wage inequality, decentralization in wage bargaining, and the low-skill/high-skill gender twist (whereby changing supplies of and demands for skills affect the skill prices of women relative to men differentially within different skill groups).

Decompositions at the Mean

Table 2 presents the wage decomposition results at the mean for both countries, in which column (1) for each country presents estimates of a basic human capital model including only education and experience and column (2) in each case adds occupation, industry, region, sector, and unionization (United States only) to this basic model.[13]

The change in the total gap in Denmark is measured at 0.026 log points, or approximately 2.6 percentage points, which indicates a statistically significant widening of the gender wage gap in this period (standard errors in parentheses). In column (1), this increase of the wage gap results from a 5-percentage-point residual gap, which is statistically significant and positive (that is, increasing the wage gap) and ex-

rience numbers closer to international averages. Another study also found that the actual experience gender gap in the United States, Germany, and Sweden was comparable in 1984 (Blau and Kahn 2003).

[12]We do not attempt to account for the selection bias that may result from estimating the wage model on workers only. Neither do we deal with potential endogeneity of chosen regressors. Selection may not be of great concern in Denmark, where the participation rate among prime age women was nearly the same as that of prime age men. In fact, previous Danish studies have been unable to show that selection matters for female wages in Denmark; see, for example, Rosholm and Smith (1996). In the U.S. context, while it is certainly interesting to speculate on the extent to which changing selectivity in the labor market affects wage outcomes, that is not a question addressed here, as a decomposition over time that takes into account changing selectivity would require many further assumptions that would considerably complicate the basic analysis.

[13]Note that the words "qualifications" and "skills" are used interchangeably to denote the full set of explanatory variables in column (2), although they include industry, occupation, sector, region, and union in addition to basic human capital. Also, given that education and experience closely correspond to skills, as a rule, our discussion, for convenience, sometimes treats skills (or qualifications) and human capital synonymously.

Table 2. Decompositions of the Change in the Gender Wage Gap at the Mean, Denmark and the United States, 1983–1995. (Standard Errors in Parentheses)

	Denmark		*United States*	
Variable	*–1*	*–2*	*–1*	*–2*
Total Gap Change $\Delta\ln(G_t + 1)$	**0.026**** **(0.009)**	**0.026**** **(0.009)**	**–0.102**** **(0.023)**	**–0.102**** **(0.023)**
Qualifications Gap Change $\Delta\ln(Q_t + 1)$	**–0.023**** **(0.003)**	**–0.011**** **(0.005)**	**–0.093**** **(0.005)**	**–0.107**** **(0.012)**
Qualifications Effect $(\Delta\bar{X}_m - \Delta\bar{X}_f)\hat{\beta}^1$	–0.049** (0.001)	–0.045** (0.001)	–0.063** (0.003)	–0.094** (0.003)
Observed Prices Effect $(\bar{X}^0_m - \bar{X}^0_f)\Delta\hat{\beta}$	0.026** (0.003)	0.035** (0.005)	–0.029** (0.006)	–0.012 (0.013)
Residual Gap Change $\Delta\ln(R_t + 1)$	**0.050**** **(0.009)**	**0.037**** **(0.007)**	**–0.009** **(0.023)**	**0.004** **(0.018)**
Ranking Effect $\hat{\sigma}^1(\Delta\hat{\theta}_m - \Delta\hat{\theta}_f)$	0.045** (0.010)	0.041** (0.009)	–0.044 (0.027)	–0.013 (0.023)
Dispersion Effect $\Delta\hat{\sigma}(\hat{\theta}^0_m - \hat{\theta}^0_f)$	0.005** (0.002)	–0.004** (0.001)	0.035** (0.006)	0.018** (0.004)

Notes: The Danish Longitudinal Sample (0.5%) consists of salaried and manual non-self-employed workers observed to work more than 1,000 hours annually. Controls for the specification reported in column (1) are intercept, education, experience, and its square; for the specification reported in column (2), the same controls as for column (1), but with the addition of occupational indicators, 1-digit industry codes, province, and sector. Sample sizes are 7,300 individuals in 1983 (3,945 men, 3,355 women) and 7,634 individuals in 1995 (3,999 men, 3,635 women).

The sample from the U.S. PSID family data for 1983 and 1995 is sample restricted to white, non-self-employed workers, aged 18–65, who worked more than 1,000 hours annually. Controls for column (1) include actual experience, its square, and years of education; for column (2), the same, plus dummies for union contract coverage, 1-digit industry and occupation dummies, region dummies, and sector. Sample sizes are 3,151 individuals in 1983 (1,877 men, 1,274 women) and 4,053 individuals in 1995 (2,235 men, 1,818 women).

**Statistically significant at the .05 level.

ceeds the 2.3-percentage-point qualifications gap (statistically significant and negative—decreasing the wage gap). Looking at the individual components of the qualifications gap, we see that Danish women improved their education and experience in this period—that is, the gender gap in human capital was narrowing—which reduced the gender wage gap by 4.9 percentage points, but that this trend was vitiated by changing returns to observed prices that favored men, which widened the gap by 2.6 percentage points. Note that both components of the qualifications gap are statistically significant.

In terms of the residual gap, the main contributor seems to be a statistically significant and positive ranking effect, which is interpreted as the effect of women's movement relative to men in the pooled wage distribution, after controlling for the effect of observed characteristics. This effect increases the gender wage gap by 4.5 percentage points, which is statistically significant. Increased wage dispersion (resulting, for example, from rising decentralization in the wage bargaining process in recent years) in this period exerted a small widening effect on the gender wage gap of 0.5 percentage points.

Expanding the basic human capital model to include other labor market characteristics reduces the qualifications effect from 2.3 to 1.1 percentage points because of the relatively larger observed prices effect, now 3.5 percentage points instead of

2.6. The residual gap is also smaller—not surprising, since more factors are included in the analysis—but a large ranking effect and a small dispersion effect (now negative, that is, decreasing the gender wage gap) are still characteristic.

The basic finding seems to be robust with respect to the addition of more covariates, and the conclusion is that Danish women improved their qualifications considerably relative to men, but changing observed skill prices that favored men significantly eroded these gains, and the widening of the male-female gap in ranking in the common wage distribution after the analysis controls for observed characteristics contributed to an overall increase in the gender gap of 2.6 percentage points. Therefore it can be said that the average Danish woman was floating downstream in this period: changing observed skill prices that favored men and worsened relative ranking effects more than offset women's wage gains from skill improvement, so that the gender wage gap actually increased by 2.6 percentage points.

Looking next at the estimates for the United States in Table 2, we see that quite a different picture emerges for the average American woman. In marked contrast to Denmark, the overall gender wage gap in the United States fell –0.102 log points (10.2 percentage points) between 1983 and 1995 due to a large reduction in the qualifications gap. As the results from the expanded model depart from the basic human capital model mainly to the extent that the effect of changing qualifications on the gender wage gap becomes even stronger and the effect of observed prices weaker but with the signs and statistical significance of all estimated effects remaining the same, we concentrate mainly on reporting the results shown in column (2). Thus, based on the fuller specification, we estimate that women in the United States would have reduced the wage gap by a full 10.7 percentage points simply through relative improvement in observed labor market skills and (to a lesser degree) changes in skill prices that also favorably affected the gender wage gap. The residual gap worked to increase the wage gap slightly (by 0.4 percentage points), mainly due to a small statistically significant effect on the wage gap of increased dispersion in this time period, a result also noted in Blau and Kahn (1997). Women fell further behind men in the common wage distribution in terms of their unobservables, but this effect is minimal and statistically insignificant. Overall, the residual gap is not statistically significant. We therefore find that women in the United States were strongly swimming upstream, opposed by only a weak current![14]

Decompositions at Various Percentiles

We compare U.S. and Danish wage decompositions not only at the mean, but also at the 10th, 20th, 80th, and 90th percentiles, because the pace of skill accumulation, both observed and unobserved, may differ at different points in the wage distribution. While the standard Oaxaca decomposition is carried out at the mean, more recently researchers have explored methods that allow decompositions at various deciles of the wage distribution. For example, Fortin and Lemieux (1998) used a rank-based procedure to perform decompositions at each percentile of the wage distribution, and Blackaby et al. (1999) investigated sectoral wage premiums using JMP's method performed at different

[14]Blau and Kahn (1997) reported similar findings in their analysis of the trend in the U.S. gender wage gap in the 1980s. To what extent are the above findings a result of using a pooled wage regression instead of anchoring the decomposition with the male wage distribution, as in Blau and Kahn (1997)? We explore this question by applying JMP's decomposition method to our U.S. PSID sample and find that at the mean, the qualifications effect is estimated to be –0.087, the observed prices effect –0.019, the ranking effect –0.016, and the dispersion effect 0.019, nearly identical to the estimated components reported in Table 2, column (2) (United States).

Re-running the regression models in each country in 1995 on a randomly selected sample (without replacement) that has the same gender composition as in 1983 yields the same regression estimates as before; that is, the results are unaffected by the changing gender composition of the work force over this period.

Table 3. Decompositions of the Change in the Gender Wage Gap, Denmark and the United States, 1983–1995: 10th, 20th, 80th, and 90th Percentiles. (Standard Errors in Parentheses)

	Denmark				*United States*			
Variable	*10th*	*20th*	*80th*	*90th*	*10th*	*20th*	*80th*	*90th*
Total Gap Change $\Delta\ln(G_t + 1)$	**–0.042**** **(0.011)**	**0.008** **(0.010)**	**0.064**** **(0.010)**	**0.138**** **(0.012)**	**–0.013** **(0.026)**	**–0.039** **(0.025)**	**–0.096**** **(0.026)**	**–0.099**** **(0.029)**
Qualification Gap Change $\Delta\ln(Q_t + 1)$	**0.017**** **(0.004)**	**–0.021**** **(0.005)**	**–0.027**** **(0.006)**	**–0.017**** **(0.006)**	**–0.057**** **(0.016)**	**–0.070**** **(0.014)**	**–0.154**** **(0.012)**	**–0.153**** **(0.012)**
Qualifications Effect	0.008** (0.002)	–0.048** (0.002)	–0.080** (0.002)	–0.085** (0.003)	–0.058** (0.004)	–0.081** (0.005)	–0.145** (0.007)	–0.116** (0.007)
Observed Prices Effect	0.008 (0.004)	0.026** (0.005)	0.055** (0.006)	0.070** (0.007)	0.001 (0.016)	0.010 (0.015)	–0.009 (0.013)	–0.037** (0.015)
Residual Gap Change $\Delta\ln(R_t + 1)$	**–0.058**** **(0.010)**	**–0.005** **(0.008)**	**0.090**** **(0.008)**	**0.153**** **(0.010)**	**0.044** **(0.024)**	**0.032** **(0.021)**	**0.058** **(0.023)**	**0.054** **(0.026)**
Ranking Effect	–0.049** (0.009)	0.001 (0.008)	0.092** (0.008)	0.154** (0.009)	0.030 (0.024)	0.018 (0.023)	0.041 (0.023)	0.036 (0.024)
Dispersion Effect	–0.009** (0.002)	–0.006** (0.001)	–0.003** (0.001)	–0.0003 (0.0003)	0.014** (0.003)	0.014** (0.003)	0.016** (0.004)	0.018** (0.004)

**Statistically significant at the .05 level.

deciles of the wage distribution. The pooled wage decomposition is performed at various percentiles by identifying the "average" observation at the chosen percentile in each sex's wage distribution. This means percentile ranks are assigned to men and women within their own wage distributions, following which averages of the wage, conditioning variables, and residuals are taken in a small neighborhood (plus or minus 5% of the observations) around the respective decile. This is done in order to minimize the effect of outliers. Next, the decomposition is performed holding constant the estimated skill prices but allowing wages, characteristics, and residuals to vary by decile.[15]

Table 3 presents results of this decomposition for both Denmark and the United States at the 10th, 20th, 80th, and 90th percentiles. Clearly, large differences exist between the decomposition at the mean (reported in Table 2) and at the various percentiles. In Denmark, between 1983 and 1995 the wage gap narrowed significantly by 4.2 percentage points at the 10th percentile, showed no change at the 20th percentile, showed a small, statistically significant increase of 2.6 percentage points at the mean, widened by 6.4 percentage points at the 80th percentile, and increased by almost 14 percentage points at the 90th percentile. Women in the highest decile improved their qualifications the most (reducing the wage gap by a full 8.5 percentage points), followed by women at the 80th percentile (8 percentage points), women at the mean and 20th percentile (reductions of 4.5–4.8 percentage points), and women in the lowest decile (increase by 0.8 percentage points). At the same time, changes in observed prices hurt women in the highest deciles and at the mean much more than women in the lowest deciles,

[15]Imposing the same regression parameters across deciles assumes that returns to labor market characteristics are the same at all points in the distribution. The alternative would be to run separate quantile regressions and thereby estimate the marginal effect of a covariate on log wage at different quintiles of the distribution. The disadvantage to implementing the quantile approach here is that our focus is on the unconditional (as opposed to the conditional) distribution.

due to a larger gender gap in such attributes. While women in the lowest decile benefited from the reduced effect of residual factors (mostly due to women's catching up with men in the unobservables distribution), those in the highest decile experienced a 15.3-percentage-point increase in the wage gap due to residual factors, again almost entirely because a ranking effect that was large, positive (that is, widening the wage gap), and statistically significant completely countered the effect of improved qualifications.

In the United States, the story is again entirely different, with the gender wage gap for high-wage (90th- and 80th-percentile) and mean-wage women declining by 9.9, 9.6, and 10.2 percentage points, respectively, whereas low-wage women experienced almost no change in the wage gap in this period (a statistically insignificant decrease of between 1 and 4 percentage points). As in Denmark, the middle and upper groups improved their skills the most relative to men, with the qualifications effect estimated to be 11.6, 14.5, 9.4, 8.1, and 5.8 percentage points at the 90th, 80th, mean, 20th, and 10th deciles, respectively. In particular, the highest wage group experienced a statistically significant decline in the wage gap of 4 percentage points due to changing skill prices, as the gender gap in skills was small for this group.

These results do not accord with findings by Katz and Murphy (1992) and Blau and Kahn (1997) that a gender twist in the supply of and demand for skills worked to the disadvantage of high-skilled women in the United States. Our findings are more in line with those of Fortin and Lemiuex (1998), who also anchored their analysis using the overall wage distribution. Using CPS data for 1979–91, they found that any gender twist effects were overpowered by other factors that benefited women, with the net result being a large decline in the gender wage gap at the top of the U.S. female wage distribution. Of course, it should be pointed out that Blau and Kahn (1997) measured skill groups using predicted wages based largely on education and experience, which may yield patterns different from those obtained when the skill group definition is based on wage percentiles.[16]

Adding together the effect of unobserved prices (dispersion) and observed prices, we obtain the effect of changing returns to skill on the U.S. gender gap resulting from changing supply and demand conditions. These numbers only reinforce the story that high-wage American women experienced the smallest increase in the gender gap from these factors, and low-wage American women the largest, as the gender wage gap increased by –2.0, 0.07, 2.4, and 1.5 percentage points at the 90th, 80th, 20th, and 10th percentiles, respectively. In Denmark, the effect of the growing decentralization in the wage-bargaining process in later years plus changes in observed skill prices had the opposite effect, with the increase in the gender wage gap being 7.0 percentage points, 5.2 percentage points, 2.0 percentage points, and –0.01 percentage points at the 90th, 80th, 20th, and 10th percentiles, respectively, due to the sum of these effects.

In the United States, Table 3 also shows that changes in the residual gap increased the gender wage gap for all three groups, but was never statistically significant. Across all wage groups, increases in wage dispersion were the dominant source of the residual gap, raising the wage gap by about 1.4 percentage points at the bottom of the distribution and by 1.8 percentage points at the top. Women in all deciles in the U.S. data experienced a widening of the wage gap due to a widening of the gender gap in ranking in the distribution of unobservables, to the tune of 1.8–4.0 percentage

[16]The divergence in these studies' findings may be also be partly attributable to the time period under analysis. Both Fortin and Lemieux (1998) and this paper study a slightly later period than Blau and Kahn (1997), who looked at the U.S. labor market in the 1980s, a period during which there was a disproportionate increase in inequality. Recent work on U.S. inequality has found that much of the post-1979 increase in wage inequality occurred between 1979 and 1983; see, for example, Card and DiNardo (2002).

points, but this effect was never statistically significant. This is in sharp contrast to Denmark, where women in the highest decile fell behind men in the common wage distribution of unobservables, and where this effect (15.4 percentage points) was statistically significant and accounted for the entire change in the residual gap.

Therefore, even within industry-occupation groups, the wage gains of highly qualified women in Denmark lagged behind those of other groups. The highest decile in Denmark experienced the greatest widening in the gender wage gap over this period, and this effect was almost entirely due to women falling behind men in the common distribution of the unobservable components of wages. We interpret this as the emergence of a sort of glass ceiling that disproportionately affected high-wage women. A comparable change did not occur in the United States, where women in the highest decile experienced the greatest narrowing of the wage gap, and where the role of changing unobservable factors was small and statistically insignificant. A finding similar to that for Denmark was reported by Albrecht et al.(2003) for Sweden in the 1990s, where the gender wage gap at the top of the Swedish wage distribution was larger than the corresponding gap in the United States, despite the average gender gap being much smaller in Sweden than in the United States.

More recently, Arulampalam et al. (2004) analyzed gender pay gaps by sector in ten European countries using harmonized European Union Household Panel data. Applying quantile regression techniques, they also found that, controlling for various individual and job characteristics, gender pay gaps are largest at the top of the distribution for a number of countries, including Denmark, a finding they interpreted as being consistent with glass ceilings.[17]

To some extent, the finding that changes in unobserved factors are an important part of the explanation for changes in the gender wage gap among high-wage workers in Denmark could be due to non-convergence in unmeasured characteristics. Another possibility is that there was growing statistical discrimination against high-wage women. One consequence of growing decentralization in wage-setting could be the rising importance of individual bargaining in wage determination at higher levels, a task at which men may be more skilled than women (see, for example, recent work in this area by Babcock and Laschever [2003] and Säve-Söderbergh [2003]). However, it is difficult to argue that this type of gender differential was only present in Denmark and not in the United States.

Another explanation could be that high-wage women in Denmark are less committed to their jobs than are women of the same rank in the United States. Despite family-friendly schemes in the public sector, high-wage women in Denmark in both public and private sectors, unlike their counterparts in the United States, tend to leave work earlier than men because of early closing of publicly provided daycare, and tend to be responsible for a greater housework load because of the high tax rates and high price of market services in Scandinavia.[18] It is possible that lower career attachment impedes women's wage progress in high-level jobs, particularly in the present-day labor market, where competition is stronger.

On the other hand, Arunampalam et al. (2004) showed that a similar glass-ceiling effect is present in many countries in Europe and not merely in Scandinavia, which may weaken the argument that "work-family reconciliation policies" adopted by the Scandinavian welfare states have had back-

[17]They also found evidence consistent with *sticky floors* in a number of countries—substantial gender wage gaps at the bottom of the distribution—but glass ceilings tend to be more prevalent than sticky floors.

[18]A time-use-based study of the effect of housework on wages of men and women in Denmark (Bonke et al. 2005) showed that housework performed just before or after market work is associated with significantly lower wages, particularly for women at the high end of the distribution.

Table 4. Effect of Explanatory Variables on Qualifications Gap Change: Denmark, 1983–1995.

	Qualifications Effect			*Observed Prices Effect*		
Variable	*10th perc.*	*Mean*	*90th perc.*	*10th perc.*	*Mean*	*90th perc.*
Exp. + Exp.-sq.	–0.017**	–0.021**	–0.029**	0.011**	0.018**	0.023**
Education	0.006**	–0.011**	–0.026**	–0.003**	0.003**	0.015**
Occupation						
High Manager	0.004**	–0.001**	0.016**	0.0001	0.0005	0.001
Middle Manager	0.002**	–0.009**	–0.024**	–0.0001	0.00003	0.00002
Skilled Worker	0.001**	–0.001**	–0.002**	–0.009**	–0.011**	–0.006**
Unskilled Worker	0.0005	–0.001	–0.001	–0.005**	0.005**	0.016**
Industry						
Primary	–0.0001	–0.00004	–0.0001	–0.002	–0.002	–0.002
Manufacturing	0.002	0.0001	–0.001	–0.003	–0.006	–0.006
Energy	–0.001**	–0.0001	0.002**	0.0004	0.0006	0.0001
Construction	–0.0001	0.00005	0.0002	–0.006	–0.007	–0.006
Trade	0.00003	–0.0001	–0.0002	–0.0003	–0.001	–0.001
Transport. & Comm.	–0.0005	–0.0004	–0.001	–0.001	–0.001	–0.0004
Finance	0.0003**	0.0001	–0.001**	–0.001**	0.0001**	–0.001**
Other	–0.002	–0.0001	0.002	0.001	0.002	0.002
Public	0.007**	0.0009**	–0.009**	0.026**	0.032**	0.036**
Province	0.007**	–0.002**	–0.009**	–0.001	–0.00002	0.0003
Total	0.008**	–0.045**	–0.085**	0.008	0.035**	0.070**

**Statistically significant at the .05 level.

lash effects on women's wages by encouraging participation but weakening commitment. They further reported that this phenomenon is not seemingly related to the variance of the wage distribution (computed within their small sample), which would otherwise reflect the greater extent of do-it-yourself work and housework in the high-tax countries. Instead, they concluded that promotion procedures may favor men across European countries, leading to a larger wage gap at the top of distribution.

However, it is interesting to speculate about why, judging from the results in this paper, American women seem not to have encountered a similar promotion hurdle. Perhaps structural / institutional differences across European countries and complex country-specific interactions between different factors make it difficult to identify a single common cause. In Denmark, the lack of commitment to work encouraged by family-friendly policies and the inability to put in long hours due to early closing of daycare and a larger housework load may have become particularly damaging to women at the top of the distribution, where pay and promotions are increasingly becoming tied to performance, but the same factors may not be at play in other countries where a similar glass-ceiling pattern is observed.

Contribution of Explanatory Variables

We further decompose the Danish and U.S. wage gaps to show the separate contributions of the explanatory variables to the qualifications gap, that is, the separate contributions to the qualification effect and the observed prices effect. We do this at the 10th percentile, the mean, and the 90th percentile, as results from Table 3 indicate that the 20th and 80th percentiles are fairly close to the 10th and 90th, respectively. These results are given in Tables 4 and 5 below. As noted by Oaxaca and Ransom (1999), in decomposition analysis, the separate contributions to the discrimination gap of sets of indicator variables are not

Table 5. Effect of Explanatory Variables on Qualifications Gap Change: United States, 1983–1995.

	Qualifications Effect			*Observed Prices Effect*		
Variable	*10th perc.*	*Mean*	*90th perc.*	*10th perc.*	*Mean*	*90th perc.*
Exp. + Exp.-sq.	0.009**	–0.031**	–0.059**	–0.009**	–0.023**	–0.033**
Education	–0.001**	–0.014**	0.008**	0.004**	–0.002**	0.006**
Occupation						
Professional	–0.017**	–0.025**	–0.017**	0.002**	–0.003**	–0.027**
Managerial	–0.019**	–0.017**	–0.051**	0.011**	0.011**	0.025**
Sales	0.005**	0.004**	0.017**	–0.004**	0.002**	0.003**
Crafts	–0.012**	–0.005**	–0.024**	0.026**	0.021**	0.018**
Labor	0.003	0.001	0.001	0.011	0.007**	0.0002
Service	–0.003	–0.002	–0.002	–0.024**	–0.009	–0.002
Industry						
Agriculture	0.001**	0.002**	0.002**	–0.001	–0.001	–0.001
Construction	0.0001	–0.005**	0.001	0.006	0.004	0.004
Nondur. Manuf.	–0.0003	–0.0003	0.001	–0.002**	0.002**	0.010**
Service	–0.006**	–0.001**	–0.024**	–0.017**	–0.015**	–0.026**
Public	0.0008	0.0001	–0.001	0.004	–0.002	–0.009
Union	–0.012**	–0.010**	0.016**	–0.002	–0.003	0.002
Region						
West	0.002**	–0.001**	0.001**	–0.001**	0.002**	0.0005**
North	–0.012**	0.006**	0.004**	0.005**	–0.006**	–0.005**
South	0.003**	–0.001**	0.012**	–0.006**	0.002**	–0.001**
Total	–0.058**	–0.094**	–0.116**	0.001	–0.012	–0.037**

**Statistically significant at the .05 level.

invariant to the choice of omitted category, while the estimated separate contributions of sets of dummy variables to the explained portion of the wage gap are invariant. Here, as the constant term is eliminated, the separate contributions have to be invariant with respect to dummy variable normalizations. Therefore, unlike in the standard case, it is possible to report the separate contributions of the explanatory variables to both qualifications and effects of observed price effects.

For each country, the specification is the most general wage regression model, which forms the basis for the decompositions in Tables 2 (column 2 in each country) and 3. For brevity, we report the total effect of experience, although experience and its square were entered separately in the wage regressions. In the following discussion, we concentrate mainly on the statistically significant effects.

In Denmark, we see that women in all three wage deciles were catching up to men in qualifications, particularly with respect to experience and, to a lesser degree, education (except at the bottom of the wage distribution), and that these factors combined with a narrowing of the occupational attainment gap (in middle-manager–level positions) for the highest group account for most of the qualifications effect. Changes in the gender gap in industrial distribution had only modest effects, and closing the gap in public sector employment hurt only women in the low wage group. In terms of the observed price effect, a low-skill / high-skill wage twist phenomenon is evident in which changing prices of human capital factors such as experience and education worked to the detriment of high-wage women in particular. For this group, changing returns to experience increased the wage gap by 2.3

percentage points and changing returns to education increased the gap by 1.5 percentage points. This is due to a larger gap in accumulated experience and education among the women in this group than among their male counterparts.

Changes in the return to public sector employment increased the gap for all groups by 2.6 to 3.6 percentage points, the penalty being greatest at the top. That the gender wage gap in Denmark is closely tied to women's over-representation in the public sector has also been shown in a number of previous studies mentioned in the background section. Here, we document that the gender pay gap in Denmark has widened as a result of a falling return to public sector employment. That pattern was likely due to the slowdown in wage growth in the public sector relative to the private sector in the 1980s and 1990s as a result of the government's public-private wage twist policy, as well as to the expansion in this period of a number of family-friendly schemes in the public sector, such as paid parental leave, entitlements to care days, and shorter and more flexible working hours, which could have had negative consequences for women's wages. Nonetheless, the public sector over this period continued to attract the majority of the female work force because of the long duration of benefits and their generous coverage.

In the U.S. case (Table 5), we see that the strong reduction in the wage gap due to the qualifications effect at the mean and the 90th decile was mostly due to women catching up with men in occupational attainment and to a narrowing of the gender gap in experience (at the higher deciles) and education (at the mean). In the lowest decile, the decline in the pay gap due to a convergence of qualifications was a little more modest but still due to narrowing of the gender gaps in education and occupational attainment. In that decile, the wage gap actually worsened substantially as the experience gap rose. The typical woman also experienced a statistically significant narrowing of the wage gap due to a narrowing of the gender gap in union affiliation, reflecting the loss of male union jobs in this period. A change in the industrial distribution, particularly the narrowing of the gap in service sector employment, also worked to the advantage of women, especially those with high or mean wages.

In terms of observed skill prices, while all three groups (low-wage, middle-wage, and high-wage women) faced a narrowing of the wage gap due to the changing returns to experience, low-wage and high-wage women were penalized due to a changing return to education that favored men. The pay gap also increased as a result of rising returns to being in managerial, craft, sales, and laborer occupations, although this effect was slightly offset by decreases in the gap arising from higher returns to professional and service occupations. Although women's rising union representation (relative to men), as well as changes in the industrial distribution that were favorable to women, tended to reduce the gap, especially for women in the middle- and lower-wage groups, these effects were, in general, not highly statistically significant. In the highest decile, the estimated changing return to non-durable manufacturing (relative to durable manufacturing) favored men and raised the wage gap.

Even at a disaggregated level, we do not find convincing evidence of a low-skill/high-skill wage twist phenomenon whereby changing prices of skills (reflecting the changing supply of and demand for various human capital attributes) particularly disadvantaged women relative to men in the highest decile. It is true that changing returns to education and employment in some occupations—managerial, sales, craft, and laborer occupations (relative to clerical)—and the changing return to employment in non-durable manufacturing industries tended to dampen the progress of high-wage women. But the overall trend in returns to experience benefited this group, as it did women in the other wage categories, and adverse changes in the returns to education hurt high-wage women no more than women in the lowest wage group. In aggregate, the observed prices effect lowered the gender wage gap *most* in the highest-wage group, because that was the group

for whom the gender gap in human capital acquisition was smallest.

Conclusion

This paper provides clear evidence that over the period 1983–95 the wages of Danish women stalled or even floated downstream, while U.S. women managed to swim upstream in a country with less favorable family-friendly welfare schemes and in a labor market with a much larger and more rapidly increasing wage dispersion. In Denmark, changing returns to experience, education, and public sector employment widened the wage gap significantly in all wage groups. Further, the impact of changing residual factors, or the unexplained gap, increased the wage gap greatly at the top of the wage distribution; in fact, among high-wage women, almost the *entire* increase in the wage gap was attributable to a worsening of women's ranking relative to men's in the common distribution of unobservables. In the United States, in contrast, neither these effects nor the effects of increased overall wage dispersion were strong enough to countervail the impact of a gender convergence in qualifications, with the result that women at all wage levels—but particularly high-wage women—made appreciable wage progress relative to men.

These results point to some basic mechanisms at work in the Danish labor market that have been detrimental to the closing of the gender wage gap. First, changing prices of human capital attributes such as experience and education reclaimed a large portion of wage gains made through the convergence in the levels of these skills. Further, this effect seems to have been most pronounced at the top of the wage distribution; that is, a high-skill/low-skill gender wage twist whereby the net increase of the gender wage gap results from a changing supply of and demand for skills seems to have been largest at the top of the wage distribution.

Second, developments in public sector employment had a negative "boomerang" effect on female wages and careers, partly through the public/private wage twist policy, but possibly also partly through "family-friendly" welfare schemes available in the public sector in Denmark, such as paid maternity leave, family care days, and flexible working hours, all of which were significantly expanded in this period. Although these policies facilitated women's entrance into the labor market, perhaps even raising their total compensation, they had the unintended consequence of facilitating frequent absences from work and thereby reducing women's attractiveness as employees. The falling return to public sector employment may thus indirectly reflect the high take-up of these schemes by women in this period and the human capital atrophy and productivity decline that result. For women in the United States, many of these welfare state options were not available, and U.S. women to a much larger extent had to find alternatives in the form of private child care or housekeepers. In this way, the Scandinavian welfare state model may have had a backlash effect on the wage progress of women that did not occur under the less liberal social welfare system in America.

A third finding is that while low-skilled women in Denmark enjoyed shrinking gender wage gaps over this period similar to their counterparts in the United States, the experience of high-skilled women in the two countries was entirely different, with women in the highest decile in Denmark experiencing the greatest *increase* in the gender wage gap, almost entirely due to their falling behind men in the overall wage distribution in terms of unobservable characteristics, whereas in the United States the greatest pay gap *decline* was in the highest decile. A "glass ceiling" seems to have emerged in Denmark in this period—similar to the phenomenon found by Albrecht et al. (2003) in Sweden—that disproportionately affected high-wage women: even after the analysis controls for observed characteristics, Danish women faced a widening wage gap due to their falling behind men in the residual distribution. This pattern might reflect a relative lag in women's unmeasured skills that are important for wage-setting in high-level jobs these days, or it

might be due to growing statistical discrimination against high-wage women. It is possible that a less than full commitment to work encouraged by family-friendly policies and a relatively large housework load penalized Danish women at the top of the distribution. Such disadvantages are more than ever likely to weigh heavily in present-day high-skilled, high-intensity workplaces, where pay and promotions are tied to performance rather than to qualifications and tenure.

Appendix A1
Variable Means, Denmark, 1983 and 1995
(Standard Deviations in Parentheses)

	1983				1995			
Independent Variable	*Women*		*Men*		*Women*		*Men*	
Log Wage	4.039	(0.293)	4.222	(0.315)	4.104	(0.282)	4.314	(0.347)
Experience	10.597	(6.835)	16.376	(11.912)	13.948	(8.099)	17.161	(10.571)
Experience-Sq./100	1.590	(1.913)	4.100	(5.205)	2.601	(2.622)	4.062	(4.355)
Education	11.293	(2.244)	11.657	(2.512)	12.171	(2.436)	12.137	(2.532)
Occupation								
High Manager	0.039	(0.193)	0.160	(0.367)	0.059	(0.235)	0.177	(0.381)
Middle Manager	0.148	(0.355)	0.155	(0.362)	0.212	(0.408)	0.158	(0.365)
Skilled Worker	0.019	(0.136)	0.232	(0.422)	0.024	(0.153)	0.224	(0.417)
Unskilled Worker	0.328	(0.470)	0.261	(0.439)	0.261	(0.439)	0.270	(0.444)
Industry								
Primary	0.007	(0.081)	0.023	(0.149)	0.009	(0.096)	0.022	(0.147)
Manufacturing	0.130	(0.337)	0.258	(0.437)	0.133	(0.339)	0.266	(0.442)
Energy	0.003	(0.052)	0.012	(0.111)	0.003	(0.057)	0.012	(0.110)
Construction	0.008	(0.091)	0.103	(0.304)	0.010	(0.102)	0.093	(0.291)
Trade	0.131	(0.338)	0.145	(0.352)	0.118	(0.323)	0.154	(0.361)
Transport. & Communic.	0.042	(0.201)	0.102	(0.303)	0.073	(0.260)	0.124	(0.329)
Finance	0.075	(0.264)	0.072	(0.259)	0.049	(0.216)	0.049	(0.216)
Other	0.677	(0.468)	0.353	(0.478)	0.635	(0.481)	0.305	(0.460)
Public	0.562	(0.496)	0.284	(0.451)	0.532	(0.499)	0.247	(0.431)
Province	0.624	(0.484)	0.627	(0.484)	0.631	(0.483)	0.666	(0.472)
N	3,355		3,945		3,635		3,999	

Appendix A2
Variable Means, U.S., 1983 and 1995
(Standard Deviations in Parentheses)

	1983				1995			
Independent Variable	*Women*		*Men*		*Women*		*Men*	
Log Wage	1.870	(0.503)	2.291	(0.535)	2.051	(0.568)	2.369	(0.567)
Experience	11.791	(9.031)	16.647	(11.49)	15.352	(8.311)	17.373	(8.869)
Experience-Sq./100	2.205	(3.332)	4.090	(5.085)	3.047	(3.001)	3.805	(3.714)
Education	13.072	(2.145)	12.954	(3.557)	13.286	(2.779)	13.128	(2.557)
Occupation								
Professional	0.222	(0.416)	0.208	(0.406)	0.278	(0.448)	0.211	(0.408)
Sales	0.049	(0.215)	0.056	(0.23)	0.040	(0.196)	0.056	(0.23)
Crafts	0.021	(0.144)	0.257	(0.437)	0.018	(0.134)	0.237	(0.426)
Labor	0.103	(0.304)	0.207	(0.405)	0.073	(0.26)	0.203	(0.402)
Managerial	0.100	(0.301)	0.17	(0.376)	0.136	(0.343)	0.173	(0.378)
Service	0.801	(0.399)	0.050	(0.218)	0.129	(0.335)	0.064	(0.245)
Industry								
Agriculture	0.009	(0.097)	0.038	(0.192)	0.010	(0.099)	0.028	(0.164)
Construction	0.009	(0.093)	0.082	(0.274)	0.012	(0.107)	0.085	(0.279)
Nondurable Manuf.	0.086	(0.281)	0.102	(0.302)	0.067	(0.249)	0.101	(0.301)
Service	0.801	(0.399)	0.576	(0.494)	0.844	(0.363)	0.625	(0.484)
Public	0.221	(0.415)	0.183	(0.387)	0.231	(0.422)	0.177	(0.381)
Union	0.159	(0.365)	0.261	(0.439)	0.139	(0.346)	0.207	(0.405)
West	0.208	(0.406)	0.189	(0.392)	0.189	(0.391)	0.185	(0.388)
South	0.331	(0.471)	0.32	(0.466)	0.341	(0.474)	0.339	(0.474)
North	0.252	(0.434)	0.291	(0.454)	0.283	(0.45)	0.286	(0.452)
N	1,274		1,877		1,819		2,237	

Appendix A3
Pooled Wage Regressions, Denmark, 1983
(Standard Errors in Parentheses)

Variable	*–1*		*–2*	
Intercept	3.542	(0.019)***	3.712	(0.070)***
Experience	0.016	(0.001)***	0.014	(0.001)***
Experience-Sq./100	–0.020	(0.003)***	–0.022	(0.003)***
Education	0.038	(0.001)***	0.017	(0.002)***
High Manager			0.365	(0.013)***
Middle Manager			0.148	(0.011)***
Skilled			0.098	(0.012)***
Unskilled			0.072	(0.009)***
Public			–0.013	(0.015)
Province			–0.060	(0.007)***
Industry Controls	No		Yes	
Adj. R^2	0.144		0.244	
Root MSE	0.295		0.277	
N	7,290		7,290	

Note: Omitted occupational category is other (non-managerial) salaried workers.
*Statistically significant at the .10 level; **at the .05 level; ***at the .01 level.

Appendix A4
Pooled Wage Regressions, Denmark, 1995
(Standard Errors in Parentheses)

Variable	*–1*		*–2*	
Intercept	3.353	(0.018)***	3.682	(0.036)***
Experience	0.018	(0.001)***	0.018	(0.001)***
Experience-Sq./100	–0.017	(0.003)***	–0.024	(0.003)***
Education	0.052	(0.001)***	0.027	(0.002)***
High Manager			0.369	(0.012)***
Middle Manager			0.153	(0.010)***
Skilled			0.046	(0.011)***
Unskilled			–0.008	(0.008)
Public			–0.128	(0.011)***
Province			–0.065	(0.006)***
Industry Controls	No		Yes	
Adj. R^2	0.264		0.392	
Root MSE	0.287		0.261	
N	7,634		7,634	

Note: Omitted occupational category is other (non-managerial) salaried workers.
*Statistically significant at the .10 level; **at the .05 level; ***at the .01 level.

Appendix A5
Pooled Wage Regressions, United States, 1983
(Standard Errors in Parentheses)

Variable	*–1*		*–2*	
Intercept	0.440	(0.055)***	0.747	(0.066)***
Experience	0.046	(0.003)***	0.040	(0.003)***
Experience-Sq./100	–0.066	(0.007)***	–0.061	(0.006)***
Education	0.092	(0.004)***	0.071	(0.004)***
Professional			0.301	(0.028)***
Managerial			0.346	(0.029)***
Sales			0.167	(0.039)***
Crafts			0.221	(0.028)***
Labor			–0.020	(0.030)
Service			–0.132	(0.032)***
Public			–0.048	(0.022)**
Union			0.313	(0.021)***
Industry Controls	No		Yes	
Region Controls	No		Yes	
Adj. R^2	0.264		0.393	
Root MSE	0.482		0.437	
N	3,151		3,151	

Note: Omitted occupational category is Clerical.
*Statistically significant at the .10 level; **at the .05 level; ***at the .01 level.

Appendix A6
Pooled Wage Regressions, United States, 1995
(Standard Errors in Parentheses)

Variable	*–1*		*–2*	
Intercept	0.975	(0.044)***	1.284	(0.054)***
Experience	0.046	(0.003)***	0.036	(0.003)***
Experience-Sq./100	–0.079	(0.008)***	–0.062	(0.008)***
Education	0.059	(0.003)***	0.035	(0.003)***
Professional			0.477	(0.025)***
Managerial			0.501	(0.026)***
Sales			0.422	(0.039)***
Crafts			0.309	(0.029)***
Labor			0.045	(0.029)
Service			–0.048	(0.031)
Public			–0.008	(0.021)
Union			0.285	(0.022)***
Industry Controls	No		Yes	
Region Controls	No		Yes	
R^2	0.175		0.343	
Root MSE	0.535		0.478	
N	4,053		4,053	

Note: Omitted occupational category is Clerical.
*Statistically significant at the .10 level; **at the .05 level; ***at the .01 level.

REFERENCES

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.

Arulampalam, Wiji, Alison L. Booth, and Mark Bryan. 2004. "Is There a Glass-Ceiling over Europe? Exploring the Gender Pay Gap across the Wages Distribution." IZA DP No. 1373.

Asplund, Rita, Erling Barth, Nina Smith, and Eskild Wadensjö. 1997. "The Male-Female Wage Gap in the Nordic Countries." In Niels Westergård-Nielsen, ed., *Wage Differentials in the Nordic Countries*. Amsterdam: North Holland.

Babcock, Linda, and Sara Laschever. 2003. *Women Don't Ask: Negotiation and the Gender Divide.* Princeton, N.J.: Princeton University Press.

Blackaby, David H., Phillip D. Murphy, and Nigel C. O'Leary. 1999. "The Payment of Public Sector Workers in the U.K.: Reconciliation with North American Findings." *Economics Letters,* Vol. 65, pp. 239–43.

Blau, Francine D., and Lawrence M. Kahn. 1992. "The Gender Earnings Gap: Learning from International Comparisons." *American Economic Review Papers and Proceedings,* Vol. 82 (May), pp. 533-38.

____. 1997. "Swimming Upstream: Trends in the Gender Wage Differential in the 1980s." *Journal of Labor Economics,* Vol. 15, No. 1, Part 1 (January), pp. 1–42.

____. 2000. "Gender Differences in Pay." *Journal of Economic Perspectives,* Vol. 14, No. 4 (Fall), pp. 75–99.

____. 2003. "Understanding International Differences in the Gender Pay Gap." *Journal of Labor Economics,* Vol. 21, No. 1 (January), pp. 106–44.

Bonke, Jens, Nabanita Datta Gupta, and Nina Smith. 2005. "The Timing and Flexibility of Housework and Men's and Women's Wages." In Daniel Hamermesh and Gerard Pfann, eds., *The Economics of Time Use*. Economic Analysis series. Amsterdam: Elsevier, pp. 43–78.

Card, David, and John E. DiNardo. 2002. "Skill-Biased Technological Change and Rising Wage Inequality: Some Problems and Puzzles." *Journal of Labor Economics*, Vol. 20, No. 4, Part 2, pp. 733–83.

Datta Gupta, Nabanita, and Nina Smith. 2002. "Children and Career Interruptions: The Family Gap in Denmark." *Economica*, Vol. 69, No. 276, pp. 609–29.

Datta Gupta, Nabanita, Ronald L. Oaxaca, and Nina Smith. 2000. "The Danish Gender Wage Gap and Wage Determination in the Private and Public Sectors." In Siv S. Gustafsson and Danièle E. Meulders, eds., *Gender and the Labour Market: Econometric Evidence on Obstacles in Achieving Gender Equality*. AEA Macmillan Series. London: Palgrave Macmillan.

Edin, Per-Anders, and Katarina Richardson. 2002. "Swimming with the Tide: Solidarity Wage Policy and the Gender Earnings Gap." *Scandinavian Journal of Economics,* Vol. 104, No. 1, pp. 49–67.

Fortin, Nicole, and Thomas Lemieux. 1998. "Rank Regressions, Wage Distributions, and the Gender Gap." *Journal of Human Resources,* Vol. 33, No. 3 (Summer), pp. 611–43.

Joy, Lois. 2003. "Salaries of Recent Male and Female College Graduates: Educational and Labor Market Effects." *Industrial and Labor Relations Review,* Vol. 56, No. 4 (July), pp. 606–21.

Juhn, Ching-hua, 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.* Washington, D.C.: AEI Press.

Katz, Lawrence F., and Kevin M. Murphy. 1992. "Changes in Relative Wages, 1963–1987: Supply and Demand Factors." *Quarterly Journal of Economics*, Vol. 107, No. 1 (February), pp. 35–78.

Neumark, David. 1988. "Employers' Discriminatory Behavior and the Estimation of Wage Discrimination." *Journal of Human Resources,* Vol. 23, No. 3 (Summer), pp. 279–95.

Nielsen, Helena S., Marianne Simonsen, and Mette E. Verner. 2004. "Does the Gap in Family Friendly Policies Drive the Family Gap?" *Scandinavian Journal of Economics*, Vol. 106, No. 4, pp. 721–44.

Oaxaca, Ronald L., and Michael R. Ransom. 1994. "On Discrimination and the Decomposition of Wage Differentials." *Journal of Econometrics,* Vol. 61, No. 1 (March), pp. 5–21.

____. 1999. "Identification in Detailed Wage Decompositions." *Review of Economics and Statistics,* Vol. 81, No. 1 (February), pp. 154–57.

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, Part 1 (January), pp. 205–28.

Pedersen, Lisbeth, and Mette Deding. 2000. "Wage Differences between Men and Women in Denmark." Social Research Institute (SFI) Working Paper, 00:4.

Richardson, Katarina. 1997. "Essays on Family and Labour Economics." Ph.D. diss., Stockholm University.

Rosholm, Michael, and Nina Smith. 1996. "The Danish Gender Wage Gap in the 80s: A Panel Data Study." *Oxford Economic Papers*, Vol. 48, pp. 254–79.

Ruhm, Christopher. 1998. "The Economic Consequences of Parental Leave Mandates: Lessons from Europe." *Quarterly Journal of Economics*, Vol. 113, No. 1 (February), pp. 285–317.

Säve-Söderbergh, Jenny. 2003. "Are Women Asking for Low Wages? Individual Wage Bargaining and Gender Wage Differentials." Mimeo, SOFI, Stockholm.

Suen, Wing. 1997. "Decomposing Wage Residuals: Unmeasured Skill or Statistical Artifact?" *Journal of Labor Economics*, Vol. 15, No. 3, Part 1 (July), pp. 555–66.