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THE IMPACT OF WAGE STRUCTURE ON TRENDS IN U.S. GENDER WAGE DIFFERENTIALS: 1975-87

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ABSTRACT

The U.S labor market experienced two dramatic developments over the past twenty years: a falling male-female pay gap and a rising level of wage inequality. This paper uses Michigan Panel Study on Income Dynamics (PSID) data for 1975 and 1987 and Current Population Survey (CPS) data for 1971 and 1988 to analyze how this dramatic decline in the gender gap was achieved in the face of shifts in overall wage structure that were increasingly unfavorable to low wage workers. The decrease is traced to a rise in women's relative experience levels and occupational status, and a larger negative impact of de-unionization on male than female workers. In addition, there was a substantial decline in the "unexplained" portion of the pay gap. These "gender-specific" factors were more than sufficient to counterbalance changes in both measured and unmeasured prices which worked against women.

Using a simply supply and demand framework, we find that the net effect of supply and demand shifts was unfavorable for women as a group: shifts in the composition of demand during this period favoring female workers were more than offset by the rising relative supply of women. However, supply and demand changes match up fairly well with observed relative changes in the gender gap among skill groups, specifically a faster closing of the gap at the bottom of the skill distribution than at the top. Moreover, our analysis of the sources of the greater progress at the bottom than at the top is consistent with the operation of demand and supply forces.

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I. Introduction

The U.S. labor market experienced two dramatic developments over the past twenty years: a falling male-female pay gap and a rising level of labor market inequality. After decades of near-constancy at about 60 percent, the ratio of women's to men's pay began to rise in the late 1970s. For example, the female-male ratio of median weekly earnings of full-time wage and salary workers which was 62.4 percent in 1967 and 61.0 percent in 1978, rose to 74.0 percent in 1991 (US BLS 1980 and 1992). Over the 1970s and 1980s, there were also substantial increases in overall wage inequality for both men and women. Wage inequality rose both within and between education and experience groups, and has been interpreted as reflecting primarily higher returns to both measured and unmeasured labor market skills (Katz and Murphy, 1992; Juhn, Murphy and Pierce, 1993; Bound and Johnson, 1992). Recent evidence also links rising male inequality to the de-unionization of male workers (Card, 1992; Freeman, 1991).

In this paper, we examine the connection between these two important developments. When analyzing gender differentials in pay, economists commonly focus on male-female differences in skills and on the relative treatment of women by employers (i.e., discrimination). Both of these may be considered *gender-specific* factors influencing the pay gap. However, the overall *wage structure* can also have an important effect on the magnitude of the gender differential. Wage structure describes the array of prices set for various labor market skills (measured and unmeasured) and the rents received for employment in particular sectors of the economy. So, for example, since women on average have less experience than men, an increase in the return to experience (as in fact occurred during the 1970s and 1980s) would cause the gender pay gap to rise, even if women's *relative* level of experience and their gender-specific treatment by employers remained the same.

In earlier work (Blau and Kahn, 1992b and forthcoming), we found overall wage inequality to be very important in explaining international differences in the gender pay gap.

In particular, our results indicate that the higher level of wage inequality in the U.S. fully accounts for the larger gender pay gap here in comparison to countries such as Sweden or Australia with relatively small gender differentials. Wage structure has also been found to play a role in U.S. trends in black-white and immigrant-native wage differentials (Juhn, Murphy and Pierce, 1991; LaLonde and Topel 1992).

In this paper, we use data from the Michigan Panel Study on Income Dynamics (PSID), supplemented by the Current Population Survey (CPS), to analyze how the dramatic decline in the gender gap was achieved in the face of shifts in overall wage structure that were increasingly unfavorable to low wage workers. We use a technique developed by Juhn, Murphy and Pierce (1991) in their analysis of black-white wage differentials to assess the effects of wage inequality on the male-female pay gap. Using this approach, we find that rising inequality slowed women's progress over the 1975-87 period, "reclaiming" about one-third of women's potential relative wages gains.

Nonetheless, the male-female pay gap declined dramatically. We trace this decrease in the gender gap to an increase in the relative experience levels and occupational status of women, as well as a larger negative impact of de-unionization on male than female workers. In addition, there was a substantial decline in the "unexplained" portion of the pay gap. These favorable ***gender-specific*** factors were more than sufficient to counterbalance unfavorable shifts in both measured and unmeasured prices which worked against women.

A decline in the "unexplained" portion of the gender gap is generally viewed as reflecting either an upgrading of women's unmeasured labor market skills or a decline in labor market discrimination against them. However, it may also be due to demand and supply shifts which favor female as compared to male workers. Recent findings by Katz and Murphy (1992), confirmed by additional evidence which we present below, suggest that shifts in the composition of demand favored women, on average, and, moreover, that changes in labor demand benefited women relative to men at lower levels of labor market skills, but men

relative to women at higher levels. On the other hand, the rising relative supply of women over this period would be expected to restrain women's relative wage gains, all else equal.

Whether these supply changes outweighed the demand changes is an empirical question. We analyze this issue in a simple supply and demand framework, and find that the net effect of supply and demand was unfavorable for women as a group. Thus, women's overall relative wage gains must be explained by other factors such as improvements in their relative skill levels or reductions in wage discrimination and occupational segregation, all working against the increase in net supply and rising skill prices. However, just as there is evidence that demand especially benefited low skill women relative to men, we find that relative supplies of high skill women grew much faster than relative supplies of low skill women. This combination of relative supply and demand changes by skill level implies that we should observe a faster closing of the gender gap at the bottom of the skill distribution than at the top. We do in fact document such a pattern; further, our analysis of the sources of the greater progress at the bottom than at the top is consistent with the operation of demand and supply forces.

Our disaggregated analysis of the extremes of the male and female skill distributions is also of interest in that it allows us to examine the notion of a "glass ceiling" for highly-skilled women as well as the impact on the gender gap of industrial restructuring and de-unionization among low-skilled workers. It also sheds light on the reasons why, while wage inequality increased for both men and women over the 1975-87 period, it increased less for women than for men.

II. Analyzing Changes in the Gender Gap in the 1970s and 1980s

Factors affecting the gender gap in pay over time can be divided conceptually into those that are gender-specific and those that are related to the wage structure in general. We believe that both of these aspects of the labor market have influenced recent trends in women's relative pay.

Gender-specific factors include women's relative levels of labor market qualifications and discrimination. Over the past two decades, there has been considerable improvement in women's relative skills. Perhaps most importantly, women's levels of actual labor market experience grew relative to men's in the 1980s (Polachek, 1990; O'Neill and Polachek, 1993). Further, the quality of women's education and experience improved, as illustrated by rising percentages of MD, MBA and law degrees received by women since the 1960s (O'Neill, 1990; Blau and Ferber, 1992) and continued declines in occupational segregation (Blau, 1988). On the other hand, government efforts to reduce discrimination, an additional gender specific factor affecting the pay gap, appear to have stalled in the 1980s (Leonard, 1989).[1]

Despite gains in women's relative labor market qualifications, it appears that changes in the overall wage structure have made it more difficult for them to narrow the gender pay gap. Increasing wage inequality has been interpreted as reflecting a rise in the prices of labor market skills, both measured and unmeasured, due to increases in the demand for skills (Juhn, Murphy and Pierce, 1993; Katz and Murphy, 1992). These demand increases appear to be due to the impact of technological change which has reduced the relative demand for unskilled labor within industries (Bound and Johnson, 1992; Berman, Bound and Griliches, 1992; and Krueger, 1993), as well as changes in the industrial composition of demand due, for example, to international trade which has lowered the overall relative demand for unskilled workers (Murphy and Welch, 1991; Borjas and Ramey, 1992).[2]

While women in the U.S. have improved their relative levels of skills, these changes in the overall wage structure imply that they have been swimming upstream against the changing wage distribution. As the prices of measured skills have increased, women, who continue to

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[1] It is of course possible that women's relative wage gains in the 1980s reflect in part the indirect impact of government anti-discrimination activity in the 1960s and 1970s which encouraged women to train for and enter traditionally male fields.

[2] The growth of "high tech" industries has also contributed to the rising skill premium (Bartel and Lichtenberg, 1987).

have less experience and to be located in lower-paying sectors of the labor market, are increasingly penalized. In addition, labor market discrimination and/or actual female deficits in unmeasured skills result in employers treating women as if they have lower unmeasured as well as measured skills. Thus, as the prices of unmeasured skills have increased, further downward pressure is exerted on female relative wages. In this scenario, the recent declines in the gender gap could occur only if women's skills were substantially upgraded or gender-specific treatment of women improved. Some indirect evidence for the assumption that similar factors determine the relative rewards of women and of their male comparables is that, as noted above, wage inequality in the U.S. has been increasing among ***both*** men and women (see Katz and Murphy, 1992 and our findings below). In addition, in our international comparison, we found that male and female wage inequality in a country were extremely highly correlated with each other: labor markets with high levels of male inequality also tended to have high levels of female inequality (Blau and Kahn, 1992b and forthcoming). Again, similar forces appear to be affecting men and women.

However, men and women appear to be viewed as imperfect substitutes in the labor market. This is suggested by the considerable differences in the occupations and industries in which they work, as well as the substantial pay differences that exist for men and women with the same measured characteristics (e.g., Blau and Ferber, 1992). Thus, while rising skill prices are expected to widen the gender pay gap, such changes need not affect men and women equally. Two kinds of evidence suggest that rising skill prices did not have the same impact on men and women. First, as noted above, Katz and Murphy (1992) find that between 1979 and 1987, shifts in demand for output across industry-occupation cells favored women over men for educational levels below a college degree, but men over women among those with a college degree. Second, shifts in industrial representation (notably the decline in durable goods manufacturing) have also favored women's relative pay, as has the decline in union coverage which was greater for men than for women (Sorenson, 1991; O'Neill and Polachek, 1993; Blau and Kahn, 1992a).

Katz and Murphy's (1992) results imply that, on average, demand shifts across industry-occupation cells favored women over men.[3] Thus, these gender-related changes in the wage structure--what we term a "gender twist" in the demand for skill--provide an additional gender-specific factor which may have enabled women to reduce the overall gender pay gap. Working against these demand shifts favoring women overall, however, is the rising supply of women. Thus, the net effect of supply and demand forces on the gender gap will depend on the relative magnitude of the supply and demand shifts--an empirical question which we examine below. We find that, overall, and within each skill level, the net supply of women rose relative to men (i.e., the supply shifts were larger than the demand shifts). This suggests that other factors (such as improved unmeasured qualifications and reduced discrimination) must be present to account for women's overall "unexplained" wage gains.

We also consider the relative magnitude of the supply shifts at various points in the skill distribution. Our results indicate that the relative supply of high-skill women grew faster than the relative supply of low-skill women, reinforcing the impact of the gender twist in demand which also favored low-skilled women. Thus, while supply and demand forces do not appear to explain the overall improvement in women's wages, they may help to account for the particular pattern of the closing of the gender gap which we observe for this period: the gender pay gap declined more at the bottom of the wage distribution--among less-skilled workers--than at the top.

Support for the supply and demand shift explanation for the relative wage gains by skill depends not just on our observing such a pattern of greater closing at the bottom, but also on what caused it. First since shifts in final demand produce changes in the overall demand for gender-skill groups, they may be expected to alter relative wages in all sectors, even the ones

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[3] We infer this to be the case since: i) the female advantage in demand shifts in each of the educational categories below a college degree was greater than the male advantage for those with a college degree; and ii) the vast majority of the labor force has less than a college degree.

not initially affected by the change in output demand. Thus a more favorable *ceteris paribus* gender-specific effect (after adjusting for shifts in unmeasured prices) for low-skilled than for high-skilled women would be consistent with a more favorable net supply effect for low skill than high skill women. Second, changes in final demand can alter the industrial composition of employment. Such changes will directly affect relative pay to the extent that some sectors pay higher wages (rents) than others for similarly qualified workers. Thus larger industrial representation effects favoring women at the bottom compared to women at the top would also be consistent with a net supply effect benefiting low skill women. However, if the observed changes were solely due to a larger improvement in women's relative skills (i.e., human capital) at the bottom than at the top, or to a larger increase in the price of skills at the top than at the bottom, the supply and demand explanation would not be supported. Thus, in evaluating the supply-demand framework, we will look for different contributions of changes in "unexplained" gender differentials and industrial representation at different parts of the skill distribution. Further, we will measure convergence in relative pay net of changes in personal characteristics and changes in overall inequality (i.e., price changes) at different parts of the distribution.

III. Overview of the Trends

Our basic data source for examining the relationship between the wage structure and the gender pay gap is the Michigan Panel Study of Income Dynamics (PSID) for 1976 and 1988 which provides data on 1975 and 1987 earnings. We use the PSID because it is the only nationally-representative sample of the labor force with information on actual labor market experience of individuals.[4] Actual labor market experience has been identified as an important source of the male-female pay gap (Mincer and Polachek, 1974), while rising relative levels of

[4] The PSID also includes a special poverty sample. All of our analyses exclude this group and use only the portion of the PSID that is from a random sample of the U.S. population.

actual experience have been credited for causing a major portion of the closing of the male-female pay gap in the 1980s (O'Neill and Polachek, 1993). The 1988 wave was the latest one available for public use when we undertook this study, and 1976 was the first year for which complete data on actual experience and our other explanatory variables were collected for heads and wives.[5] While it does not contain information on actual experience, we also examine data from the 1972 and 1989 CPS (providing data on 1971 and 1988 earnings) to confirm some of the trends over the 1970s and 1980s evident in the PSID data.

In each case, we restrict the sample to full-time, nonagricultural workers aged 18-65. Self employed individuals were excluded. The earnings measure used for the PSID is average real hourly earnings for the previous year; for the CPS, we use average real weekly earnings in the previous year. Wages are expressed in real terms using the 1983 CPI. We excluded anyone earning less than $1/hr or more than $250/hr in 1983 dollars. When the CPS is used full-time weekly wages are converted into hourly wages for this test by dividing by 40. These restrictions were made for reasons of sample homogeneity, although the results are not sensitive to the exclusions.[6]

Table 1 summarizes the overall trends for all full-time workers from these two data sources, as well as for a subsample of married workers from the PSID. Based on the PSID, the implied gender ratio for all workers rose from 60.4 percent in 1975 to 69.8 percent in 1987 (panel A). In a descriptive sense, the closing of the gender differential reflected a trend toward declining male real wages which fell by 5.8 percent, while women's real wages rose 8.8 percent over this period. The same trends are evident for all workers using CPS data for

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[5] The PSID did collect some information on experience in the 1974 interview, however, data on wives' union status and advanced degrees were not collected. In addition, wives were not asked *directly* about their work histories until 1976.

[6] For one of our samples, the 1972 CPS, a small number of cases were at the maximum top coded value for annual earnings. As in Katz and Murphy (1992), we multiplied the minimum of this top code by 1.45. The results were virtually identical to those found when the top-coded category is not adjusted.

the 1971-88 period (panel B), and for the subset of married workers from the PSID for the 1975-87 period (panel C): the gender differential fell substantially while real wages declined for men but increased for women. Along the earnings dimension, then, we have some confidence in representativeness of the PSID data for all workers.

An additional indicator of women's labor market progress shown in Table 1 is that the mean of women's wage percentiles in the male distribution rose from 21.7 percent to 30.9 percent for all workers in the PSID, with similar gains reported for the other two samples. This rise indicates that the male comparable of the typical woman ranked considerably higher in the male wage distribution in 1987 than in 1975. This is a gender-specific indicator of women's progress that is not contaminated by the increasing spread of the male wage distribution. This rise in the average female percentile may reflect relative improvements in women's measured labor skills and/or declines in the "unexplained" gender gap. Our detailed analysis of these trends below will shed light on the sources of this shift.

Panels a) and b) of Figure 1 show real wage levels by distribution percentile for the 1975 and 1987 PSID samples and the 1971 and 1988 CPS samples. Both panels tell a similar story, although for slightly different time periods: over the period, men's real wages fell sharply at the bottom of the distribution and slightly at the median; while at the top of the distribution their real wages rose slightly. In contrast, real wages rose for women throughout the wage distribution for the CPS data and above the 5th percentile for the PSID data. However, women's real wages at the bottom rose only slightly, and women's real wage gains increase as we move up the distribution. Thus, for both men and women, the wage distribution widened over the period. This is also indicated by the increase in the standard deviation of the log of real wages for men and for women for all three samples (see Table 1). However, overall inequality appears to have risen less for women than for men, increasing by 0.0277 log points for women (i.e., 0.5157 - 0.4880) compared to 0.0738 log points for men in the PSID and 0.0383 log points for women versus 0.0766 log points for men in the CPS.

Figure 2 shows the changes in the gender pay gap by selected percentiles, using the PSID (panel a) and CPS data (panel b). The percentile rankings refer to each gender's own wage distribution. The pay gap declined dramatically at all points in the distribution. However, it fell considerably more at the bottom of the distribution than that at the top. For example, in the PSID, the gender differential fell by 0.18 - 0.20 log points at or below the 20th percentile compared to only 0.07 - 0.09 log points at or above the 90th percentile. The declines in the 30th - 80th percentiles of 0.13 - 0.17 log points comprise an intermediate range. A similar pattern of greater convergence at the bottom than at the top is evident in the CPS. In an accounting sense, these results are due to the collapse of men's real wages at the bottom of the distribution (shown in Figure 1), while women's wages actually increased a bit for this group. On their face, these trends are consistent with the supply and demand shift story, however, a great deal hinges on the reasons for the differing trends at the bottom than at the top. We examine the sources of these changes in greater depth below.

IV. Analytical Framework

Juhn, Murphy and Pierce (1991) have devised a method that allows us to decompose the 1975-87 difference in the gender pay gap into a portion due to gender-specific factors and a portion due to changes in the overall level of wage inequality. Following their notation, suppose that we have for male worker i and year t a male wage equation:

$$(1) \qquad Y_{it} = X_{it}B_t + \sigma_t\theta_{it},$$

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 (i.e. with mean zero and variance 1 for each year); and σ_t is the residual standard deviation of male wages for that year (i.e. its level of male residual wage inequality).

Then the male-female log wage gap for year t is:

$$(2) \qquad D_t \equiv Y_{mt} - Y_{ft} = \Delta X_t B_t + \sigma_t \Delta\theta_t,$$

where the m and f subscripts refer to male and female averages, respectively; and a Δ prefix signifies the average male-female difference for the variable immediately following. Equation (2) states that the pay gap can be decomposed into a portion due to gender differences in measured qualifications (ΔX_t) weighted by the male returns (B_t), and a portion due to gender differences in the standardized residual from the male equation ($\Delta\theta_t$) multiplied by the money value per unit difference in the standardized residual (σ_t).[7] Note that the final term of (2) corresponds to the "unexplained" differential in a standard decomposition of the gender differential when the contribution of the means is evaluated using the male function.

The difference in the gender pay gap between two years 0 and 1 can then be decomposed using (2):

$$(3) \qquad D_1 - D_0 = (\Delta X_1 - \Delta X_0)B_1 + \Delta X_0(B_1 - B_0) + (\Delta\theta_1 - \Delta\theta_0)\sigma_1 + \Delta\theta_0(\sigma_1 - \sigma_0).$$

The first term in (3), the "observed X's effect," reflects the contribution of changing male-female differences in observed labor market qualifications (X) to the gender gap. For example, as mentioned earlier, the declining gender gap in experience contributed to the recent reduction. The second term, the "observed prices effect," reflects the impact of changing prices of observed labor market qualifications for males. For example, given that women have lower actual experience levels, a rising male return to experience, as in fact has occurred in recent years, would weight the female experience deficit more heavily and hence raise the pay gap, *ceteris paribus*.

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[7] Note that this formulation is based on a single wage equation for males. One could alternatively repeat the analysis starting with a female wage equation. Male-female differences in regression coefficients can reflect either discrimination or sex-correlated measurement errors in variables measuring productivity. In using the male wage equation for this decomposition analysis, we in effect simulate what the wage equation in a nondiscriminatory labor market would look like (although the elimination of discrimination might change the male as well as the female reward structure). We present both male and female wage equations for each year in the Appendix.

The third term, the "gap effect," measures the effect of changing differences in the relative wage positions of men and women after controlling for observed characteristics (i.e., whether women rank higher or lower within the male residual wage distribution). That is, it gives the contribution to the change in the gender gap between the two years that would result if the level of residual male wage inequality had remained the same and only the percentile rankings of the female wage residuals had changed.

Finally, the fourth term of (3), the "unobserved prices effect," reflects the impact of differences in residual inequality between the two years. It measures 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. Suppose, as is likely, that unmeasured deficits in relative skills or discrimination lower women's position in the male distribution of wage residuals. The larger the penalty to being below average in the distribution, the larger the pay gap will be. The basic premise here is that men and women at the same percentile ranking in the distribution of male wage residuals are viewed as comparable in the eyes of employers. Thus, women will face the same shifts in relative rewards over the period as these comparable males.

Following Juhn, Murphy and Pierce (1991), we estimate the third and fourth terms of (3) empirically using the entire distributions of wage residuals for 1975 and 1987. For example, to compute $(\Delta\theta_1-\Delta\theta_0)\sigma_1$, we first give each woman in year 0 a percentile number based on the ranking of her wage residual (from the year 0 male wage regression) in year 0's distribution of male wage residuals. We then impute the wage residual of each woman in year 0, given her percentile ranking in year 0 and the distribution of male wage residuals in year 1. The difference between the actual mean female wage residual for year 1 and the mean of these imputed wage residuals for year 0 is used to find $(\Delta\theta_1-\Delta\theta_0)\sigma_1$. (Note that the mean male residual is always zero.) The fourth term of (3), $\Delta\theta_0(\sigma_1-\sigma_0)$, is obtained analogously.

According to (3), the full impact of gender-specific factors is reflected in the sum of the first and third terms, the effect of gender differences in qualifications and of gender differences in wage rankings at a given level of observed characteristics. Wage structure is reflected in the sum of the second and fourth terms, the impact of changing returns to observed and unobserved characteristics. Within the framework of a traditional decomposition, the sum of the third and fourth terms represents the change in the "unexplained" differential which is commonly taken as an estimate of discrimination.

The possibility of discrimination complicates the interpretation of the unobserved price effect. With labor market discrimination, this term in part reflects the interaction between year 0's level of discrimination (which pushes women down the distribution of male wage residuals) and the change in the overall level of inequality which determines how large the penalty is for that lower position in the distribution (Juhn, Murphy and Pierce, 1991). Similarly, the observed prices effect may also reflect discrimination if, for example, women are "crowded" by exclusion into certain sectors, lowering relative earnings there even for men (Bergmann, 1974).

We implement this decomposition using the Juhn, Murphy and Pierce (1991) accounting method in three stages. First, we work only with the dependent variable, in effect attributing all male-female wage differences to the residual. Second, in the "human capital" specification, we use as explanatory variables, X_{hk}, a vector including a race dummy variable WHITE (equal to one for whites) and the following human capital variables:

EDYRS = years of schooling completed;

COLLDEG = dummy variable for completion of a college degree with no graduate degree;

ADVDEG = dummy variable for completion of a graduate degree;[8]

EXPF = years of full-time work experience since age 18;

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[8] We investigated the possibility of different slopes for years of school depending on college degree status; however, in no case were such effects important.

EXPFSQ = EXPF*EXPF;

EXPP = years of part-time work experience since age 18;

EXPPSQ = EXPP*EXPP.

Third, in the "full" specification, we use explanatory variables in vector X_{full} in which the race and human capital information is augmented with collective bargaining coverage (CB), and dummy variables for one-digit industry and occupation. By comparing the results across specifications, we can make inferences about the degree to which industry-occupation shifts explain the findings based on the human capital specification.

We have not controlled for marital status in this analysis, although it may be an important factor influencing the pay gap. An alternative would have been to include marital status as a productivity characteristic. However, such an approach is problematic since this variable appears to proxy higher skills for men (Korenman and Neumark, 1991), but possibly lower skills for women, even controlling for the quantity of actual labor market experience. The approach we have followed allows us to place a sharper interpretation in the decomposition on the impact of differences in labor market skills. Recognizing the potential importance of marital status, however, we also perform some analyses for married workers. The results suggest that the findings for this subset are quite similar to those for the overall sample and thus we concentrate upon the latter in the bulk of the empirical work.

V. Evidence on the Impact of Rising Wage Inequality on the Gender Pay Gap: The Overall Effect of Rising Inequality

The decomposition of the 1975-1987 trends is shown in Table 2. As noted above, the decomposition proceeds with three specifications: i) no explanatory variables; ii) human capital variables and race; iii) human capital variables, race, industry, occupation and union status. (See Appendix Tables A1 and A2 for variable means and regression results.) Before focusing on the decomposition in panel B, we note several interesting findings regarding the trends revealed in panel A.

First, as we have seen, overall wage inequality increased for both sexes during this period (Table 1). The results in Table 2 indicate that residual wage inequality (i.e., the residual standard deviation) for each specification also rose for both men and women during this time. These findings are similar to those in earlier work on inequality (Katz and Murphy, 1992). In addition, they indicate that men and women were at least to some extent affected by similar forces in the 1980s, forces that served to increase wage inequality for everyone. However, as was the case for overall inequality, residual inequality increased less for women than for men: (0.0216 versus 0.0622 log points) in the human capital specification and (0.0270 versus 0.0556 log points) in the full specification.

Second, the mean female residual becomes much smaller within each year as we add more variables to the model; and the mean female residual falls dramatically over time within each specification. This residual is the conventional measure of discrimination, although it is generally acknowledged to combine the effects of possible discrimination and omitted productivity differences between women and men not accounted for by the other explanatory variables. The results indicate that controlling for the human capital variables, including actual labor market experience, the adjusted female-male wage ratio increased from 71.8 percent in 1975 to 78.2 percent in 1987. When we add controls for occupation, industry and collective bargaining status, the increase was from 80.8 percent in 1975 to 85.4 percent in 1987.

Since the unadjusted gender gap also fell over the period, the "explained" portion of the differential is similar in each of the two years. In the human capital specification, women's lower levels of human capital (primarily full-time experience) explain roughly one-third of the pay gap.[9] When industry, occupation and union status are added to the model, the explained portion of the pay gap rises to 56-58 percent. This implies that, in each year, women were

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[9] While race is also a variable in these equations, the racial representation effects are never large, as the percent white is very similar for men and for women (Table A1).

likely to be in lower paying industries and occupations, and less likely to be covered by collective bargaining than men, even controlling for education and actual experience. These gender differences in unionism, occupation and industry accounted for about one-quarter of the overall pay gap in each year.

Third, the mean female residual percentiles show a similar pattern to the actual residuals themselves. As we add more variables, the mean female residual percentile rises: within groups (e.g. controlling for race and human capital), women's labor market outcomes are comparable to men ranked higher in the male pay distribution than is the case between groups (e.g. not controlling for race or human capital--see Table 1). Further, the mean female residual percentile is higher in 1987 than in 1975 for each specification. Again, women were progressing even within groups.

We now turn to panel B of the Table which shows the decomposition of the closing of the male-female pay gap into gender-specific and wage structure effects. The pay gap closed by 0.1442 log points over the period. Under the "observed X's" heading, the row for "all X's" indicates that women's improved levels of the explanatory variables accounted for 62.2 percent (.0897/.1442) of the convergence in the human capital specification and 90.6 percent (.1306/.1442) in the full specification.

Disaggregating by type of variable, we find that in the human capital specification, women's rising relative experience levels were sufficient to account for slightly more than the entire all X's effect.[10] Over this period, the gender gap in full-time experience fell from 8.4 to 4.7 years (Table A1). When industry, occupation and unionism are added to the model, we find that women's higher relative experience levels continue to account for a substantial proportion (53.0 percent) of the reduction of the gap. A comparison of the results for experience in the final two columns of the Table indicates that the overwhelming proportion

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[10] Polachek (1990) and O'Neill and Polachek (1993) also find that rising relative experience levels among women were important causes of the reduction of the gender pay gap in the 1980s.

(79 percent) of the impact of the increase in women's relative experience was due to its direct effect on relative earnings, controlling for industry, occupation and unionism, the remainder was due to its indirect effects in causing an upgrading in women's job characteristics.

In terms of the job characteristics themselves, shifts in occupational representation accounted for 27.5 percent of the convergence, as the fraction of women employed as professionals or managers rose by substantially more than for men, while the fraction of men employed as laborers or service workers increased while women's fell. The changing industrial distribution (including union status as an industry variable) accounted for a considerably smaller proportion (12.7 percent) of the closing.[11] This industry effect was in turn entirely due to the greater decline in unionism among men than women during this period (10.5 vs. 3.7 percentage points). These findings for industry and unionism are consistent with a shift in the industrial composition of demand which favored women relative to men, but suggest that the direct impact of changes in relative female representation across industries was relatively modest. However, as we shall see below, the effect of industrial shifts was not uniform across the distribution; among the low-skill group there were substantial representation effects favoring women.

The observed prices effect is modestly positive in each specification, indicating that the prices of skills or rents have changed in such a way as to widen the male-female pay gap. That is, male returns tended to increase for characteristics where men initially had an advantage; the greater weight placed on these female deficit areas in 1987 worked to raise the gender gap, *ceteris paribus*. The total observed prices effect is somewhat larger for the full specification (0.0411) than for the human capital specification (0.031).

In the human capital specification, the rising male return to experience accounts for most of the observed prices effect. In previous work, O'Neill and Polachek (1993) place

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[11] In earlier work (Blau and Kahn, 1992a) we also found that industry representation had small effects leading to some closing of the male-female pay gap in the 1970s and 1980s.

considerable emphasis on increases in women's experience levels and reductions in the gender difference in the return to experience in narrowing the pay gap in the 1980s. Our findings suggest that some of these improvements were needed simply to offset the potentially adverse effect of the increasing male return to experience. So, for example, 28.2 percent (.0272/.0965) of the closing of the gender differential attributable to the increase in the relative experience of women was required simply to compensate for the greater weight placed on experience in determining earnings in 1987 than in 1975.

In the full specification, most of the observed prices effect is due to changes in industry or collective bargaining wage effects which favored men. Thus, if shifts in the industrial composition of demand have indeed benefited women, it has not been through a realignment of industry/collective bargaining wage effects in their favor. Rather these prices changed to the detriment of low paid workers in general and women in particular. As we shall see below, this appears to have been the case even at the lower end of the male wage distribution where the decrease in male representation in higher paid sectors was substantial.

The gap and unobserved prices effects result from the decomposition of changes in the residual into gender-specific and wage structure effects, respectively. For example, controlling for human capital variables, in 1975, women were comparable to men at the 26.5 percentile of the male residual wage distribution, on average. Between 1975 and 1987, the male residual distribution widened and the residuals of men at the bottom fell relative to the male mean. Had each woman fared as well as her 1975 male comparable (i.e., remained at her 1975 percentile in the male distribution), we estimate that the male-female differential would have increased by .0401 log points (i.e., the unobserved prices effect). However, as may be seen in the table, women in fact advanced up the male residual distribution to the 33.5 percentile, on average. This upward movement, evaluated using the 1987 distribution, decreased the gender differential by .1255 log points (i.e., the gap effect) and was more than sufficient to offset the adverse impact of changes in unmeasured prices. On net, the *ceteris*

paribus gender differential controlling for race, education and experience was reduced by .0854 log points.

In the full specification, the unobserved prices effect is again positive, working to raise the *ceteris paribus* gender differential by .026 log points, while the gap effect was negative and considerably larger, working to reduce the *ceteris paribus* gender differential by .0807 log points. On net, this resulted in a decrease of .055 log points in the *ceteris paribus* gender differential within industries and occupations.

When we add the gender specific components (observed X's plus gap effects) and the wage structure components (observed prices plus unobserved prices), we arrive at an overall answer as to the impact of the changing wage structure on the gender pay gap. In each specification, the gender-specific effects imply a reduction of the pay gap of 0.21 - 0.22 log points, while the widening wage distribution implies an increase of the pay gap of 0.06 - 0.07 log points. Thus, under the assumption that price changes affected men and women equally, rising inequality reclaimed about one third of the gains women would have made had these price changes not occurred (i.e., the sum of the wage structure effects divided by the sum of the gender-specific effects).

Table 3 tests the robustness of our basic findings for two additional samples: i) the Current Population Survey for 1971 - 1988; and ii) a subset of married workers from the PSID for 1975 - 1987. The calculations are based on wages, using the same methodology as in the "No Explanatory Variables" column of Table 2. As was the case for the overall trends presented in Table 1, the decomposition results are very similar for these two additional samples. Rising inequality over the 1971-88 period potentially reclaimed 31.7 percent (.0863/.2719) of the relative wage gains women would have received in the absence of these price changes for the CPS sample, and 31.4 percent for married workers in the PSID.

The results of the decomposition in Table 2 (broadly confirmed by the supplemental analyses of two other samples in Table 3) give us some confidence in this method of separating

out the effects of gender-specific factors and wage structure on the gender pay gap.[12] In particular, effects of observed and unobserved prices in each case go in the same direction; and changes in measured X's and the gap effects also go in the same direction. Further, as noted above, inequality rose for both men and women, implying that a framework treating both groups as affected by similar labor market trends may have some validity. However, the increases in wage and residual wage inequality were smaller for women than for men. Moreover, the sizable gap effects raise the possibility that these trends did not affect men and women in exactly the same way. That is, while the negative gap effect may reflect increases in women's unmeasured characteristics relative to men's and/or improvements in their treatment due to declines in discrimination, it may also reflect the impact of supply and demand shifts that affected women differently from men. To shed fuller light on this question we examine the disaggregated trends below.

VI. Evidence on the Impact of Rising Wage Inequality on the Gender Pay Gap: Disaggregating the Effect of Wage Inequality

The preceding section found evidence consistent with the idea that rising prices of labor market skills (both measured and unmeasured) worked to the detriment to women in the 1980s. However, as we have seen, the wage structure did not widen uniformly for all men and for all women. In this section, we examine changes in the gender pay gap at different portions of the wage distribution, in an attempt to find evidence on the sources of such asymmetries.

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[12] It must be remembered that in the presence of discrimination, the unobserved prices effect includes the interaction between the level of discrimination and the change in wage inequality. However, in the absence of a wage inequality effect, this interaction effect will also be zero. Thus a finding that changes in unobserved prices are important is at least qualitative evidence in favor of the framework used here.

To allow for the possibility that the returns to characteristics vary at different points of the wage distribution,[13] we divide the sample into three predicted wage groups as follows. We first estimate a wage equation using the human capital specification for a pooled 1975 and 1987 sample of male workers.[14] We then divide individuals in each gender group into three categories based on the (within gender group) percentile ranking of their predicted wage from the male regression: 0-20; 20-80; 80-100.[15] These predicted wages largely reflect measured labor market skill (i.e., experience and education), although race is also included in the regression. Thus, we refer to these groups as the high (80-100), medium (20-80) and low (0-20) skill groups.

These skill groups are constructed in two alternative ways. First, we construct a set in which the percentiles refer to the current year's distribution of predicted wages for each gender group. For example, the gender pay gap in 1987 for the least skilled 20 percent of each gender group's work force is compared to the gap for the least skilled 20 percent of each group in 1975. We refer to skill groups defined in this way as "relative skill groups," since skill is, in effect, considered to be a relative concept. Within each gender group, the comparative size of the relative skill groups will not vary over time. Second, we construct a set of skill groups in both years based on the 1975 male and female cutoffs for predicted wages. We call the skill groups constructed in this way "absolute skill groups," since skill is considered to be an absolute concept. Using this definition, the relative sizes of the low, middle, and high skill groups among men or among women can change over time.

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[13] For example, Chamberlain (1991) and Card (1992) present evidence that the union wage effect is larger at the bottom of the wage distribution than at the top.

[14] The dependent variable is measured in 1983 dollars and a year dummy variable is included to account for productivity trends.

[15] Each interval is closed at the bottom and open at the top of its range, except for the top group which included the highest predicted wage earner.

Figure 3 shows the trend in the unadjusted gender gaps for both the relative (panel a) and the absolute (panel b) skill groups. Note that for 1975, the two definitions of skill groups coincide by construction. In each case the gender pay gap falls much faster for low skill than for high skill workers, declining by 0.22 log points in both the absolute and relative low skill groups compared to 0.05 - 0.08 log points in the high skill group. The middle skill group constitutes an intermediate category in both cases, although the drop in the gender differential from 1975 to 1987 is considerably smaller for the absolute skill definition, 0.07 log points, than for the relative skill category, 0.14 log points. These patterns mirror the trends in the actual gender differentials shown in Figure 2, particularly in the different rates of progress at the bottom and at the top.

How can one account for the more rapid convergence of male-female pay differentials at the bottom than at the top of the wage distribution? To analyze this question, we begin by applying the Juhn, Murphy and Pierce (1991) decomposition to each of the three skill groups, based on separate male wage regressions estimated within each skill group. (Means of the explanatory variables by skill group are shown in Table A3.) We can then determine whether the reasons for the differences in the closing of the gap across the wage/skill distribution are consistent with a gender twist in the pattern of supply and demand shifts. In the next section we look at these issues directly providing our own estimates of the magnitude of the supply and demand shifts over the period. Having ascertained that the results are broadly similar for the absolute and the relative skill groups, we now focus on the absolute skill groups since the supply-side of the analysis is more interesting for this categorization.[16]

Table 4 contains a full decomposition of the changes in the gender pay gap for each skill group. The first major finding from Table 4 is that the faster gains of women at the bottom of the distribution are *not* accounted for by greater improvement in their relative

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[16] The results of the decomposition presented below are quite similar when relative rather than absolute skill groups are used.

human capital levels. Women's human capital improved relative to men's in each skill group. However, the contribution of women's human capital increases to wage convergence (given by the all X's effect for the human capital specification[17]) in the high skill group was actually slightly larger than in the low skill group. And, while the contribution of human capital was a bit smaller in the middle than in the low skill group, the difference was small and cannot account for more than a very small portion of the slower wage convergence at the middle than at the bottom. Moreover, within the human capital specification, changes in the observed prices of the human capital variables hurt low skill women's relative position compared to high or middle skill women, while the impact of changes in unobserved prices was roughly equally unfavorable for women in the low and high skill groups, and only slightly less unfavorable for middle skill women. So, again, these factors cannot account for the greater wage convergence at the bottom. Table 4 indicates that, controlling only for human capital variables and race, the source of the greater progress of women at the bottom is overwhelmingly their more favorable gap effect which was more than sufficient to account for their faster progress.

Looking at the results for the full specification, we see that the large gap effect for women at the bottom in the human capital specification is associated with their greater narrowing of gender differences in industry and union status. This is indicated by the substantial reduction in the contribution of the gap effect when these variables are included. While all three skill groups upgraded their relative occupational status, the impact of these gains was actually a bit larger for women at the top and middle than for those at the bottom, though the differences across skill groups are not dramatic. In contrast, greater convergence in unionism and industrial distribution worked to narrow the gender gap at the bottom by 0.11 log points more than at the top and by 0.10 log points more than in the middle. (Changes in unionism and industry each accounted for about half of these combined effects.) The

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[17] Recall that the all X's effect also includes the impact of changes in racial composition; however, these effects were minimal.

contribution of changes in the means of these two sets of variables would have been sufficient in themselves to account for the great majority of the faster closing of the gender gap at the bottom than at the top or the middle of the skill distribution.

Appendix Table A4 further decomposes the wage effects of changes in characteristics over the period for each skill group separately by sex. It shows that the reduction in gender differences in industry and union status at the bottom was largely due to a deterioration in men's status rather than to an improvement in women's. The largest impact was for de-unionization which lowered men's wages by 0.066 log points compared to a drop of only 0.002 for women. Men's industrial distribution also changed adversely, lowering their wages by 0.033 log points, while women's improved a bit, increasing their wages by .011. Trends were similar, although considerably more muted in the middle. The impact of industry shifts was negligible; however, de-unionization lowered men's wages by 0.038 log points compared to a decrease of 0.025 for women. In contrast, the effect of changes in unionism was negligible at the top, while men at the top actually upgraded their industrial distribution slightly more than women (contributing 0.015 log points for men and 0.012 for women).

With respect to other sources of the greater narrowing of the gender gap at the bottom of the distribution, the results in Table 4 indicate that more favorable gap effects continued to be an important explanation, even after controlling for industry, union status and occupation. Specifically, these effects were sufficient to account for 77.1 percent of the faster convergence of the low skill relative to the high skill group and virtually all of the faster closing at the bottom than at the middle. Changes in unobserved prices also benefited women at the bottom relative to the top, though these effects were extremely small.

Finally, changes in observed prices again worked against women at the bottom relative to those at the middle and at the top and thus do not account for the greater closing at the bottom. However, it is interesting to note that changes in industry wage effects which benefited men relative to women at the top and the middle, had a much smaller effect at the bottom. Thus, shifts in the returns to industry do help to explain the greater narrowing at the

bottom. This suggests that the decrease in the demand for lower skilled males in high wage industries did have some damping effect on prices. Despite de-unionization, however, the return to unionized employment continued to rise, benefiting men in the lower and middle groups, though the effect was smaller for the former than the latter.

The consequences of these trends for the relative status of women in each of the skill groups are illustrated in panels a) and b) of Figure 4 which plots the average female residuals from the human capital and full specifications in 1975 and 1987. Controlling for human capital variables only, the adjusted log wage gender differential drops sharply (by 0.21) for the low skill group, declines somewhat (by 0.04) for the middle skill group and is constant for the top group. By 1987, as a consequence of these shifts, the implied gender ratio controlling for human capital was over 80 percent for the low and middle skill wage groups, but only 74 percent for the high skill group. The pattern is similar when we add controls for occupation, industry, and unionism with the gender log wage gap falling by 0.11 at the bottom, and increasing by 0.02 at the middle and the top. By 1987, the adjusted gender ratio within industry, occupation and union groups was 82 percent at the top compared to 85-86 percent at the middle and bottom, whereas in 1975 it had been considerably lower in the low skill group than in the others.

The constant or rising *ceteris paribus* gender differences at the top call to mind the notion of the glass ceiling. That is, it may be that as women at the top have accumulated more education and experience they have increasingly bumped against barriers at the very highest reaches of the wage and occupational structure that they had not faced previously. However, our findings do not support a strong version of this view. First, we find that when occupation is measured at the one-digit level (as is done here), improvements in occupational status contributed approximately as much or more towards increasing the relative wages of women at the top as in either of the other two groups. However, this does not entirely rule out the possibility of a glass-ceiling to the extent that women might still face limited access to higher

level jobs within these one-digit occupations.[18] Second, the apparent constancy or widening of the gender gap at the top is due to unfavorable trends in unmeasured prices. As my be seen in Table 4, in both the human capital and full specifications, the gap effects for women at the top are favorable; they are offset by adverse unobserved prices effects. However, it is also the case that when these wage structure effects are netted out we see considerably less closing of the *ceteris paribus* gap for high skill women than for women at the bottom, and less closing for them than for women in the middle when the human capital specification is employed. Thus, some of the lesser progress for women at the top may be due to glass ceiling effects. It is also possible that some portion of the public perception of a "glass ceiling" is in fact due to the unfavorable supply and demand shifts for women relative to men at the top which we document below, rather than to intensified discrimination at the higher echelons.

The faster progress of women at the bottom over the 1975-87 period is particularly impressive in view of the declining real value of the Federal minimum wage during this time. Had the minimum maintained its real value, it is likely that low-skill women's relative wages would have risen even faster, while the relative pay of other women would have been much less affected. To get an indication of the impact of the declining minimum over the 1975-1987 period, we perform a simple simulation similar to the procedure used by Bound and Freeman (1992) in examining the impact of the falling real minimum wage on blacks' relative wages.

To implement the simulation for 1975 and 1987, we assume that the minimum wage remained constant in real terms at its 1978 level. This year marked the maximum real value for the minimum wage over the 1975-87 period, although, for analyzing changes in the gender gap, any fixed level of the real minimum will suffice. We assume that anyone earning between the current year minimum and the 1978 minimum in real value earned the 1978

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[18] Sample size prevents us from constructing more detailed categories. However, unlike larger data bases, the PSID data do allow us to control for actual experience. In addition, no generally available data set provides detailed information on an individual's position in the hierarchy within detailed occupations.

minimum; for those earning less than the current minimum, we inflate wages by the ratio of the 1978 minimum to the current minimum.[19] In 1983 dollars, the minimum wage in 1975, 1978 and 1987 was $3.89, $4.05, and $2.94, respectively, indicating a dramatic fall in its real value in the 1980s.[20] Following Bound and Freeman (1992), we assumed no employment effects of such an experiment, which may be appropriate in light of recent evidence showing that such effects are not negative and are usually small (Card, 1992; Katz and Krueger, 1992; Card and Krueger, 1993).

Table 5 shows the impact of this simulation. If the minimum wage had been constant at its 1978 level from 1975 to 1987, the gender pay gap for low skill workers would have fallen by an additional 0.037 log points; not surprisingly, the impact would have been smaller for the middle (0.017) and high (0.008) skill groups. Thus, we estimate that a constant minimum wage would have increased the closing of the gender pay gap for low relative to middle skill workers by 14 percent and for low relative to high skill workers by 18 percent. We have had to make several simplifying assumptions in order to conduct this simulation; however, consideration of the minimum wage suggests that the results in Tables 4 understate the relative gains low skilled women would have made had the minimum wage been indexed to its 1978 value.

VII. The Role of Supply and Demand Shifts

Overall, the findings of our disaggregated analysis indicate that the greater closing of the gender gap at the bottom than at the top was due to: 1) more favorable industry and union representation effects for women at the bottom and 2) a larger across-the-board (gap) effect

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[19] As Bound and Freeman (1992) note, this simulation is conservative in that it assumes that people earning between the current and the 1978 minimum wage would have had their wages raised only to the 1978 minimum wage level.

[20] See Ehrenberg and Smith (1994, p.80) and U.S. BLS, *Monthly Labor Review*, various issues for minimum wage and consumer price information.

favoring women relative to men at the bottom. This result is consistent with a "gender twist" in supply or demand over this period. That is, there may have been shifts in industrial demand favoring low-skill women and high-skill men, as suggested by Katz and Murphy's (1992) work, and/or changes in supply that hurt high skill women more than low skill women. To further probe these possibilities, we compare 1975-87 changes in the supply and demand for the skill groups analyzed above. Our aim here is to determine whether the patterns of changes in supply and demand are consistent with the decompositions in Tables 2 and 4. Our work supplements Katz and Murphy (1992) in that our demand indexes by skill group are constructed for the time period analyzed here, and take into account actual experience, information that is not available in the CPS data they used. In addition, Katz and Murphy (1992) presented only aggregate male and female supply indexes and did not disaggregate supply changes by gender-skill group as we do here.

Turning first to demand, we wish to know whether changes in the composition of output by sector (and the consequent derived demand for labor) favored some gender-skill groups over others during the 1975-87 period. Following Katz and Murphy (1992), we construct industry-occupation cells and view the "output" of particular occupation groups as an intermediate product.[21]

A demand index, $\ln(1+\Delta D_k)$, was computed for each gender-skill group k:

$$(4) \qquad \Delta D_k = \Sigma_o c_{ok}(\Delta E_o/E_k),$$

where o refers to occupation-industry cell, c_{ok} is gender-skill group k's share of employment in occupation-industry cell o in 1975, ΔE_o is the difference between the 1987 and the 1975

[21] The industries are: 1) mining, construction and durable goods manufacturing; 2) nondurable goods manufacturing; 3) transportation, communications and utilities; 4) wholesale trade; 5) retail trade; 6) finance, insurance and real estate; 7) services; 8) government. The occupations are: 1) professional and technical workers; 2) clerical and sales workers; 3) operatives, craftsworkers, laborers and service workers.

share of total labor input employed in cell o, and E_k is the 1975 share of total labor input accounted for by gender-skill group k. The demand index thus measures the degree to which 1975 - 87 shifts in occupation-industry structure favor gender-skill group k, using 1975 weights.

Supply indexes ΔS_k are computed as follows:

$$\Delta S_k = \ln E_{k1} - \ln E_{k0}, \tag{5}$$

where E_{k1} and E_{k0} are respectively, the share of total labor input in 1987 and 1975 consisting of skill group k. Thus, the supply indexes compare the relative representation of each skill group in the 1987 and the 1975 workforce.

We may then compute net supply as:

$$\Delta NS_k = \Delta S_k - \ln(1+\Delta D_k) \tag{6}$$

where ΔD_k and ΔS_k are defined in equations (4) and (5) above. (Recall that all magnitudes are in log points and have been normalized relative to 1975.) As Katz and Murphy (1992) show using a simple equilibrium model, differences across years in relative wages for each gender-skill group will be negatively related to differences in net supply, ΔNS_k. Intuitively, the larger the shifts in supply of skill group k relative to the shifts in demand, the worse skill group k will fare in 1987 compared to 1975.

Table 6 shows the results of the supply and demand analysis.[22] Looking first at the aggregate results (where only two groups k of workers are defined--men and women), we see in Panel A that the relative supply of women grew substantially. While demand changes

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[22] Labor input is defined as work hours. Results were unchanged when earnings replaced hours as the measure of labor input. For the purposes of computing labor input, we included part-time workers and the self-employed.

slightly favored women as well, the net effect of supply and demand in the aggregate was to greatly raise the net supply of women, while the net supply of men fell. Women's overall relative wage gains thus came despite their rising relative net supply. It is important to note, however, that because of these wage gains, we have likely overestimated the increase in women's relative supply and understated the rise in the relative demand for women that would have occurred at constant relative wages. Moreover, there may have been within industry-occupation demand changes favoring women as well. Nonetheless, our findings suggest that women's overall wage gains must be explained by factors other than changes in the supply of and demand for women as conventionally measured. These factors include rising relative productivity due to measured and possibly unmeasured characteristics and improved treatment by employers, as suggested by the results in Table 2.

In contrast to the aggregate results, supply and demand changes match up fairly well with the relative changes in the pay gap among skill groups, particularly as a potential explanation for the faster progress of low relative to middle and high skill women. For the low skill group (Panel B), male relative to female changes in both supply and demand are less favorable than they are for the middle and high skill group.[23] Thus, while shifts in net supply favor women over men among low skill workers, they favor men over women among middle skill and high skill workers, with the favorable male net supply shifts much larger in the high skill group. The pattern of wage changes by skill is therefore broadly consistent with a supply and demand model augmented with an additional source of overall improvement for women's relative wages such as productivity increases, within industry demand shifts, or reductions in discrimination. Further, the large relative wage gains for low skill women imply that the relative net supply figures in Table 6 understate the true net supply advantage of low skill

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[23] The demand patterns are consistent with Katz and Murphy's (1992) findings based on demand indexes defined by gender-education group.

women relative to the other two groups at constant wages.[24] On the other hand, relative net supply does a poorer job in explaining the pattern of relative wage gains for high vs. middle skill women. While the relative net supply advantage of high skill men is considerably larger than for middle skill men, the convergence in the gender gap, both adjusted and as measured by the gap effect, is only slightly larger in the middle skill category. This again suggests that favorable developments for women at the top along other dimensions may have been masked by particularly unfavorable supply and demand shifts for this group.

While the pattern of supply and demand shifts in Table 6 appear to be consistent with the faster closing of the gender gap at the bottom than at the top, it is possible that rising supplies of one group can affect the wages of other groups of workers through substitution effects. For example, Topel (1992) argues that high skill women (those predicted to be above the median in the female wage distribution) compete with low skill men (those predicted to be in the bottom third of the male wage distribution). He finds that nearly all (91 percent) of the decline in the relative wages of low skill men (compared to other men) over the 1972 to 1990 period was associated with rising supplies of high skill women.

This finding suggests an alternative explanation to the basic convergence patterns shown in Figure 2: the increasing supply of women, particularly more skilled women, lowered male wages at the bottom but not at the top of the male distribution. Thus the pay gap between low skill men and low skill women closed by more than the gap among high skill workers. This explanation implicitly assumes that high skill women compete more with low skill men than with low skill women. To test whether this supply argument is consistent with the patterns we observe, we need to examine wage changes across our three skill groups, net

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[24] At constant wages, male relative supply would have been larger and male relative demand smaller than is indicated in Table 6. These biases would be largest for the low skill group, since the gender pay gap fell the most for this group.

of changes in human capital.[25] Table 7 performs such an analysis by using our separate male and female human capital wage equations estimated for each skill group to compare actual and human capital-constant wage levels in 1975 and 1987.

Table 7 shows that the quality adjusted real wages of men at the bottom of the skill distribution fell by 0.248 log points. However, quality adjusted real wages of women at the middle fell by only 0.050 log points, while the decline for women at the top was only 0.005; both were far smaller drops than for men at the bottom. Even if high or middle skill women to some degree substitute for low skill men, we expect such women to be even more substitutable for themselves. If their rising relative supply were the entire cause of the decline in low skill men's relative wages, then the negative changes in quality adjusted real wages for high and middle skill women should have been at least as large in absolute value as for men. Since such changes were much smaller than for low skill men, we infer other causes as also being important.

In addition, quality-adjusted changes in real wages for women at the middle or top of the distribution are much closer to those of men in their own skill group than to men's in the low skill group. Among women, it is women in the low skill group whose quality-adjusted real wage decline (0.090) most closely approximates that of men at the bottom. These latter patterns call into question the notion that high or middle skill women substitute more for low skill than for high or middle skill men. Rather they suggest that the largest degree of substitutability is between men and women within the same skill group.

An alternative interpretation of Topel's (1992) results that is more consistent with the evidence on wage shifts is that they reflect a pattern of biased technical change within industries. For example, as noted above, Berman, Bound and Griliches (1992) find that for manufacturing industries over the 1959-89 period, the within-industry demand for white collar

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[25] That is, the supply argument is not asserting that the convergence pattern is due to changes in the relative quality of low skill men and high skill women; rather, it is the increase in the relative quantity of high skilled women that is the exogenous force.

labor rose relative to that for blue collar labor. It is possible that in manufacturing (and in other industries as well) female (and male) professional, managerial and clerical workers were substituted for lower skilled production workers. This could both increase the relative wages of the higher skill groups and lower the relative wages of low skilled males.

Moreover, it is also important to bear in mind that although the relative quantity of labor supplied by women has risen dramatically since the 1970s, the supply argument depends on an exogenous shift in the supply of skilled labor as the causal factor influencing low skill men's wages. Using a supply and demand model for married women's labor force participation, Goldin (1990) finds that exogenous demand shifts for married women's labor were 32-53% larger than exogenous shifts in their supply over the 1960-80 period. Thus, even if the rising quantity of female labor supply negatively affected low skill men's wages, demand factors (producing higher wages for women) may well have been the most important exogenous force leading to such a change.[26]

VIII. The Time Pattern of Relative Wage Changes

The changes in the gender pay gap by skill group, in conjunction with changes in supply and demand, are broadly consistent with the gender-twist view of the changing labor market in the 1975-87 period (augmented by factors that have reduced the gender gap at all levels). In this section, we examine the pattern of changes in two sub-periods: 1975-79 and 1979-87. This is of interest in that it enables us to test the robustness of the results we have obtained for the whole period and to focus on the key 1979-87 period that spans as much of the 1980s as the PSID will allow.

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[26] Goldin's (1990) results refer to the overall supply of married women, while the substitution argument refers to the supply of high skill women. The latter can increase due to increases in supply among such women as well as increases in human capital accumulation. Demand is likely to have a strong effect on human capital acquisition by increasing the returns to such investment (Ehrenberg and Smith, 1994). Thus, demand is likely a major cause of the rising supply of high skill women as well as women in general.

Table 8 contains summary results from the analysis of the two subperiods. Several findings are evident. First, panel A shows that the gender gap fell sharply for the low skill group from 1975 to 1979, while the pay gaps for middle and high skill workers each rose by about two percentage points. From 1979 to 1987, the pay gaps fell noticeably in each skill group, with no particular pattern to the relative size of the declines across skill groups. Second, when we correct for changes in the minimum wage as in Table 5 above, the relative wage gain for low skill women falls for the 1975-79 period and rises for the 1979-87 period (panel B). This is the case because the minimum wage rose in real terms from 1975 to 1979 (from $3.89 to $3.98 in 1983 dollars) and then fell steadily through 1987. Thus, after correcting for changes in the real value of the minimum wage, the change in the gender pay gap was ranked in inverse order of skill group for 1979-87, as it was for the whole 1975-87 period.

Third, as discussed above, the overall changes in the gender pay gap do not provide direct information on the gender twist view of the labor market. Instead, we must examine the gap effect and the impact of changes in the relative female representation by industry and union status. This is done in panel C of Table 8. From 1975 to 1979, the sum of these two effects greatly favors low skill workers, hurts middle skill workers, and has a moderate negative effect for high skill workers. These findings primarily reflect the gap effects, and the large effects in such a short time period are a bit surprising. However, from 1979 to 1987, the sum of the gap and the industry and union relative representation effects are more in line with the results for 1975-87. Specifically, these effects are all strongly negative and are ranked in absolute value in inverse order of skill. Additionally controlling for minimum wage changes would strengthen this inverse pattern.

Fourth, the pattern of net supply changes for by skill groups (panel D) for each subperiod has the same relative rankings as the sum of the gap, industry and union representation effects (panel C). For example, for 1979-87, relative favorableness to men of net supply is ranked in direct order of skill level, while the sum of the Gap, industry and union

representation effects is ranked in opposite order of skill level. Thus, qualitatively within each subperiod, net supply changes are consistent with the gender twist hypothesis, as they were for the overall 1975-87 period. However, we must qualify this conclusion in at least two ways. First, the net supply of men fell overall in both subperiods, yet the overall wage gap closed in each subperiod (by 0.026 log points from 1975 to 1979 and 0.118 log points from 1979 to 1987). Thus, as discussed earlier, there were additional sources of aggregate increases in female relative wages besides supply and demand shifts. Second, the gender pay gap fell much faster for low skill workers relative to the other groups in the 1975-79 period than in the 1979-87 period; yet net supply differences across skill groups were far greater during the latter period. This suggests that while supply and demand factors contributed to the faster closing of the pay gap for women at the bottom over the whole 1975-87 period, they are not entirely responsible for the greater progress of this group. Again, other factors, such as decreases in discrimination or improvements in unmeasured characteristics, are likely to have been at work here.

IX. Conclusions

In this paper, we use Michigan Panel Study on Income Dynamics (PSID) data for 1975 and 1987 and Current Population Survey (CPS) data for 1971 and 1988 to analyze the relationship between the gender pay gap and growing wage inequality in the 1970s and 1980s. We find that rising inequality "reclaimed" about one-third of women's potential gains in relative wages. Nonetheless, the male-female pay gap declined dramatically during this period. We trace this decrease to a rise in the relative experience levels and occupational status of women, and a larger impact of de-unionization on male than on female workers. In addition, there was a substantial decline in the "unexplained" portion of the pay gap, particularly when adjustment is made only for human capital variables. These factors were more than sufficient to counterbalance unfavorable shifts in both measured and unmeasured prices which worked against women.

The gender-specific treatment effects favoring women which we identify are generally viewed as reflecting either an upgrading of women's unmeasured labor market skills or a decline in labor market discrimination against them. However, an additional hypothesis we investigated was whether shifts in demand or supply could explain the rising relative wages of women. Our own indexes of supply and demand suggest that while demand shifts favored women, the growth of female relative supply was even greater. Thus, at the aggregate level, the net effect of supply and demand shifts was unfavorable to women and cannot, at least as conventionally measured, explain the narrowing of the gender gap during this period. Indeed, the impact of adverse net supply shifts comprise an additional factor which women were able to overcome. Rather, the reduction of the *ceteris paribus* gender differential appears to reflect the traditional gender-specific factors: an upgrading of women's unmeasured labor market skills or a decline in labor market discrimination. Both interpretations are credible for this period. Since women improved their relative level of measured characteristics, it is plausible that they also enhanced their relative level of unmeasured characteristics. Further, as women increased their commitment to the labor force and their other job skills, it is possible that the rationale for statistical discrimination against them diminished.

Supply and demand shifts appear to be a more plausible explanation for the differences in the relative progress of women across skill groups. As reported by Katz and Murphy (1992) and confirmed in our own analysis, demand shifts favored women over men at low skill levels but men over women at high skill levels. Further, our analysis of supply showed that the gender gap in growth rates of supply was smallest for low skill workers and greatest for high skill workers. This "gender twist" in supply and demand patterns implies that the gender pay gap should have fallen faster for low skill workers. Indeed, we find that the pay gap did close faster at the bottom of the skill distribution than at the top. Moreover, the reasons for the greater narrowing at the bottom--1) more favorable industry and union representation effects for women at the bottom and 2) a larger "unexplained" effect favoring women relative to men at the bottom--are consistent with the gender twist view.

Our disaggregated analysis of the extremes of the male and female skill distributions yielded some additional findings of interest. First, our finding of little improvement in the human capital-adjusted gender gap in the high skill group (after controlling for changes in wage structure), in contrast with sizable declines for low and medium skilled women, is consistent with a modified version of a "glass ceiling" for highly-skilled women. Alternatively, it is possible that some portion of the public perception of a "glass ceiling" is actually due to unfavorable supply and demand shifts for women relative to men at the top rather than to intensified discrimination at the higher echelons. We also found considerable support for the view that industrial restructuring and de-unionization have contributed to the narrowing of the gender gap, although the primary impact of these factors appears to have been on low-skilled men. Finally, it appears that wage inequality increased less for women than for men over this period because of the gender twist pattern of shifts in supply and demand which meant that rising skill prices had less of an adverse effect on low skill women than low skill men.

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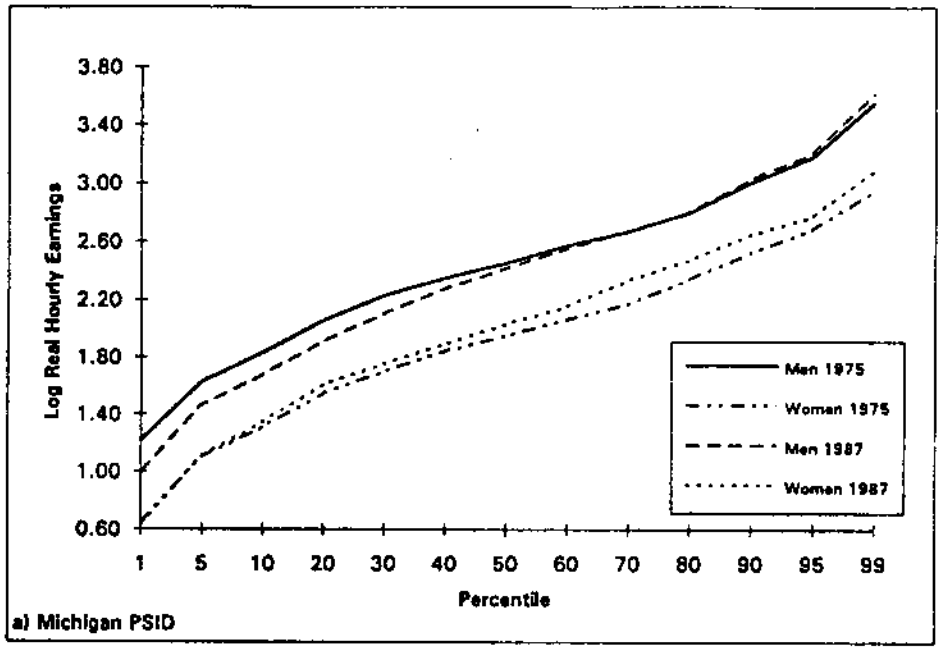
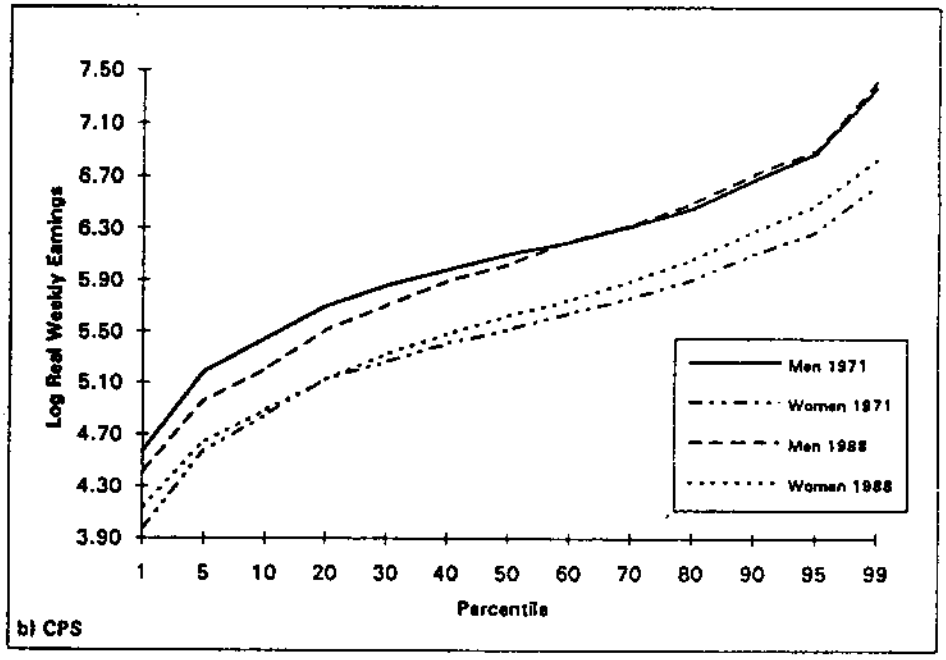
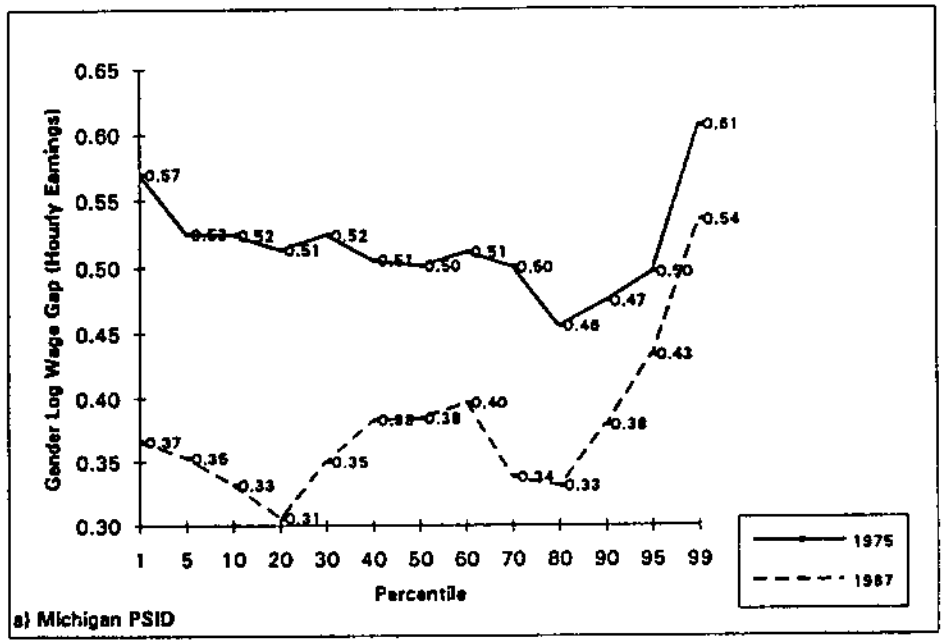
Figure 1. Log Real Wages by Distribution Percentile (1983 Dollars)

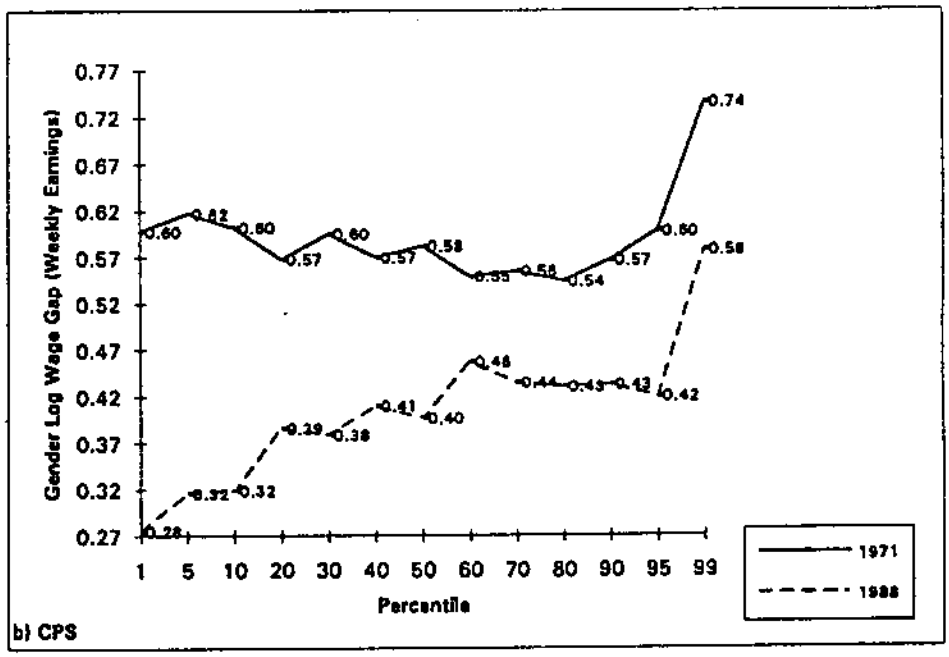




Notes: Includes full-time, nonfarm wage and salary workers.

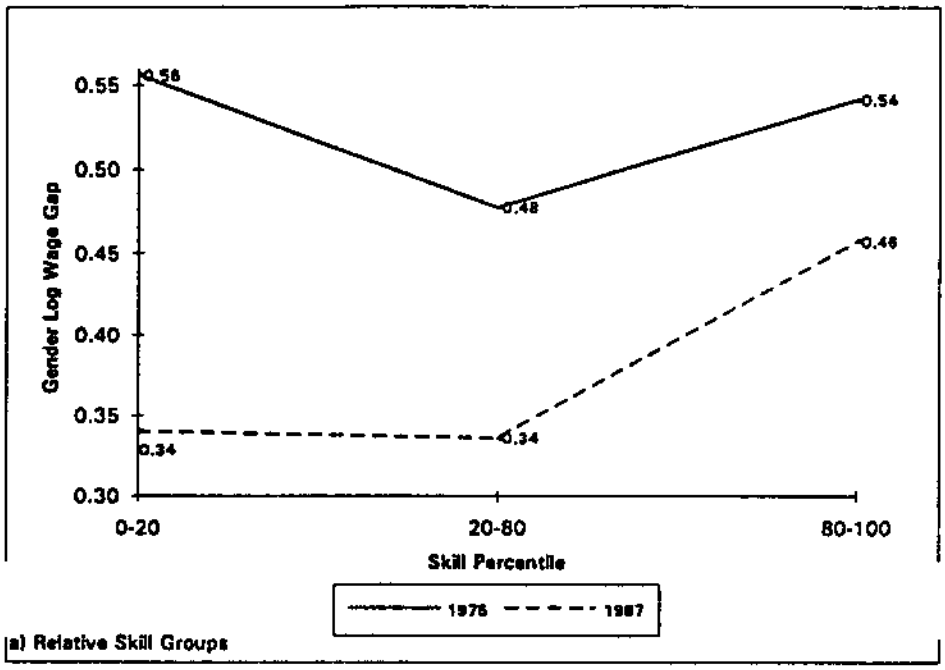
Figure 2. Gender Log Wage Gaps by Distribution Percentile



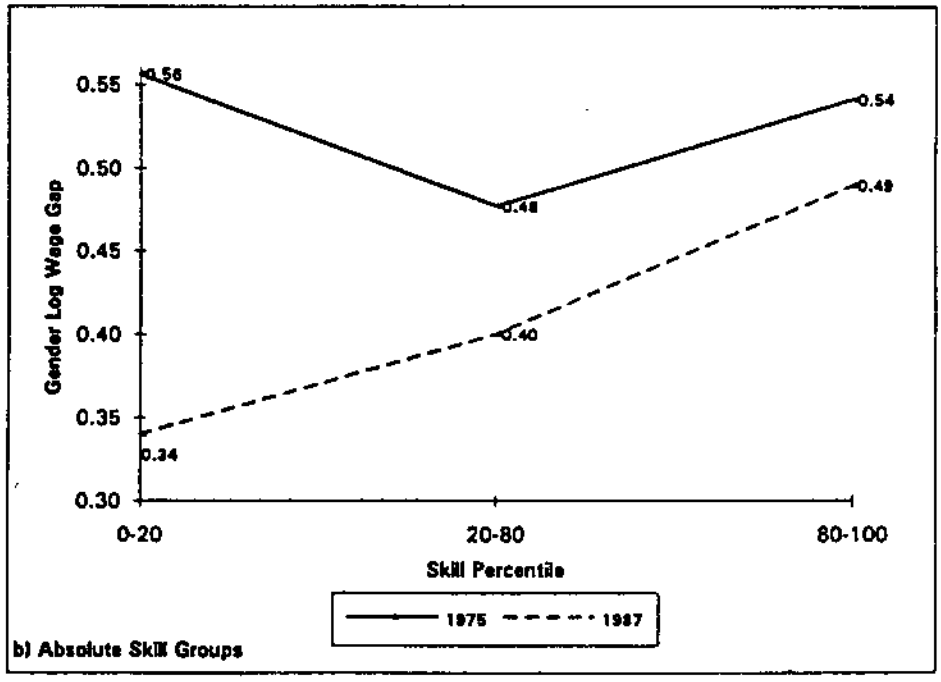


Notes: Includes full-time, nonfarm wage and salary workers.

Figure 3. Unadjusted Gender Log Wage Differentials by Skill Groups

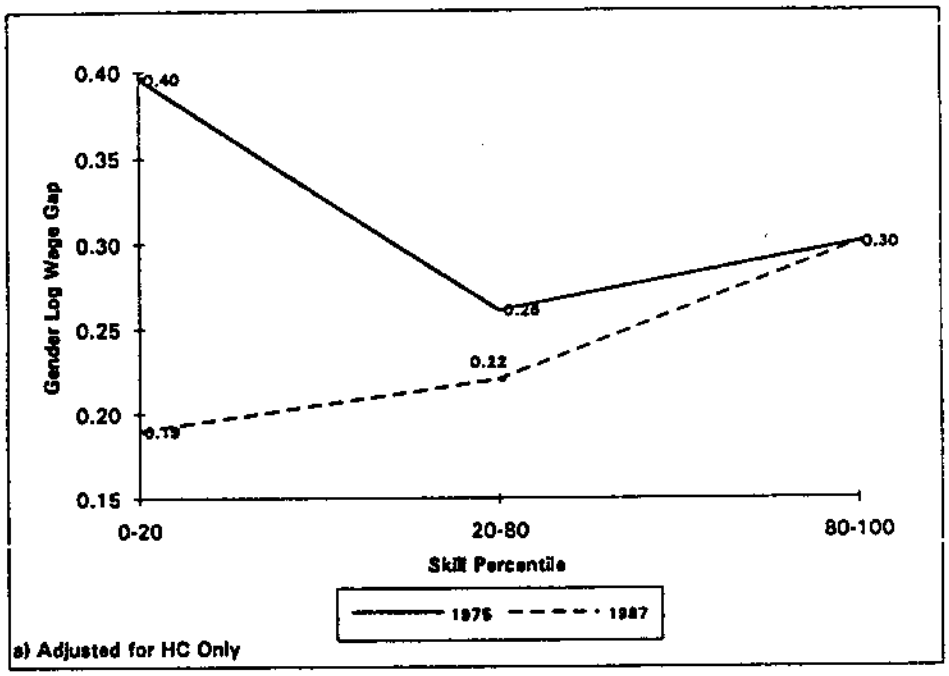


a) Relative Skill Groups



b) Absolute Skill Groups

Figure 4. Adjusted Gender Log Wage Differentials by Absolute Skill Groups



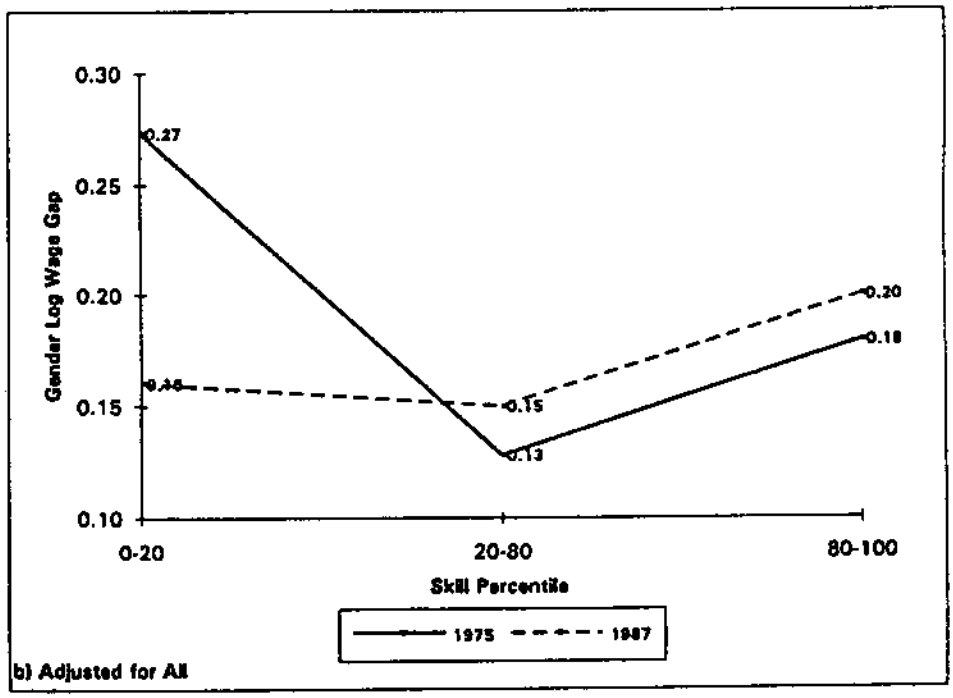


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TABLE 1

OVERVIEW OF WAGE TRENDS (1983 DOLLARS)[a]

A. Michigan PSID All Workers (Hourly Earnings)	1975	1987
Log Male Wage	2.4316 (0.4691)	2.3715 (0.5429)
Log Female Wage	1.9278 (0.4880)	2.0117 (0.5157)
Differential (D)	0.5040	0.3598
Mean Female Percentile	21.7	30.9
B. CPS All Workers (Weekly Earnings)	**1971**	**1988**
Log Male Wage	6.0753 (0.5239)	5.9922 (0.6005)
Log Female Wage	5.4964 (0.5220)	5.5989 (0.5603)
Differential (D)	0.5789	0.3933
Mean Female Percentile	19.4	29.9
C. Michigan PSID Married Workers (Hourly Earnings)	**1975**	**1987**
Log Male Wage	2.4396 (0.4593)	2.4014 (0.5300)
Log Female Wage	1.9113 (0.4956)	2.0051 (0.5150)
Differential (D)	0.5283	0.3963
Mean Female Percentile	20.8	29.0

[a] Full-time, nonfarm wage and salary employees.

TABLE 2

ANALYSIS OF CHANGES IN THE GENDER PAY GAP (MICHIGAN PSID ALL WORKERS)

	No Explanatory Variables	Human Capital Only	Human Capital Plus IND OCC CB
A. Descriptive Statistics			
Male Residual Std Dev			
1975	---	0.3821	0.3524
1987	---	0.4443	0.4080
Female Residual Std Dev			
1975	---	0.3995	0.3565
1987	---	0.4211	0.3835
Mean Female Residual			
1975	---	-0.3314	-0.2126
1987	---	-0.2460	-0.1579
Mean Female Residual Percentile			
1975	---	26.5	32.9
1987	---	33.5	38.2
B. Decomposition of Change			
Change in Differential (D87-D75)	-0.1442	-0.1442	-0.1442
Observed X's			
All X's	---	-0.0897	-0.1306
educ vars	---	0.0049	0.0024
exp vars	---	-0.0965	-0.0764
occ vars	---	---	-0.0397
cb	---	---	-0.0181
ind vars	---	---	-0.0002
Observed Prices			
All B's	---	0.0310	0.0411
educ vars	---	0.0034	0.0044
exp vars	---	0.0272	0.0122
occ vars	---	---	-0.0093
cb	---	---	0.0114
ind vars	---	---	0.0216
Gap	-0.2061	-0.1255	-0.0807
Unobserved Prices	0.0619	0.0401	0.0260
Sum Gender-Specific	-0.2061	-0.2152	-0.2113
Sum Wage Structure	0.0619	0.0711	0.0671

TABLE 3

DECOMPOSITIONS OF CHANGES IN THE GENDER PAY GAP FOR SUPPLEMENTAL SAMPLES
(NO EXPLANATORY VARIABLES)

A. CPS All Workers	1971-1988
Change in Differential (D88-D71)	-0.1856
Gap	-0.2719
Unobserved Prices	0.0863
B. Michigan PSID Married Workers	**1975-1987**
Change in Differential (D87-D75)	-0.1320
Gap	-0.1924
Unobserved Prices	0.0604

TABLE 4

ANALYSIS OF CHANGES IN THE GENDER PAY GAP BY ABSOLUTE SKILL GROUPS
(MICHIGAN PSID)

Skill Group	0-20		20-80		80-100	
Specification	Human Capital	Full	Human Capital	Full	Human Capital	Full
A. Descriptive Statistics						
Mean Female Residual						
1975	-0.3958	-0.2733	-0.2605	-0.1280	-0.3041	-0.1794
1987	-0.1872	-0.1556	-0.2188	-0.1509	-0.3044	-0.2001
Mean Female Residual Percentile						
1975	22.6	29.2	30.6	38.8	30.0	37.0
1987	37.8	38.1	34.9	38.4	30.2	36.3
B. Decomposition of Change						
Change in Differential (D87-D75)	-0.2180	-0.2180	-0.0726	-0.0726	-0.0527	-0.0527
Observed X's						
All X's	-0.0466	-0.1704	-0.0271	-0.0714	-0.0574	-0.0771
educ vars	0.0263	0.0272	0.0358	0.0241	-0.0025	-0.00002
exp vars	-0.0790	-0.0682	-0.0692	-0.0512	-0.0530	-0.0452
occ vars	---	-0.0264	---	-0.0373	---	-0.0351
cb	---	-0.0648	---	-0.0129	---	0.0011
ind vars	---	-0.0433	---	0.0015	---	0.0032
Observed Prices						
All B's	0.0373	0.0701	-0.0039	-0.0241	0.0043	0.0038
educ vars	-0.0036	-0.0084	-0.0045	-0.0009	0.0146	0.0093
exp vars	0.0392	0.0168	0.0011	-0.0447	-0.0101	0.0067
occ vars	---	0.0402	---	-0.0239	---	-0.0148
cb	---	0.0090	---	0.0198	---	-0.0119
ind vars	---	0.0089	---	0.0252	---	0.0149
Gap	-0.2525	-0.1499	-0.0743	0.0082	-0.0464	-0.0224
Unobserved Prices	0.0439	0.0322	0.0326	0.0147	0.0467	0.0431
Sum Gender-Specific	-0.2991	-0.3203	-0.1014	-0.0632	-0.1038	-0.0995
Sum Wage Structure	0.0812	0.1023	0.0287	-0.0094	0.0510	0.0469

TABLE 5

ACTUAL AND MINIMUM WAGE-ADJUSTED CHANGES IN GENDER PAY GAPS BY ABSOLUTE SKILL GROUP, 1975-87

Skill Group	Change in Log Wage Gap	
	Actual	Minimum Wage-Adjusted
0-20	-0.2180	-0.2548
20-80	-0.0726	-0.0897
80-100	-0.0527	-0.0602

Note: For explanation of minimum wage adjustment, see text.

TABLE 6

SUPPLY, DEMAND AND NET SUPPLY INDEXES 1975-87
(ABSOLUTE SKILL GROUPS)

	Supply	Demand	Net Supply
A. All Men and Women			
Men	-0.1087	-0.0018	-0.1069
Women	0.1931	0.0038	0.1894
Men-Women	-0.3018	-0.0056	-0.2962
B. Skill Group 0-20			
Men	-0.3451	-0.1079	-0.2372
Women	-0.4159	-0.0269	-0.3890
Men-Women	0.0708	-0.0811	0.1519
C. Skill Group 20-80			
Men	-0.1052	-0.0195	-0.0857
Women	0.1317	-0.0062	0.1379
Men-Women	-0.2369	-0.0133	-0.2236
D. Skill Group 80-100			
Men	0.0315	0.1140	-0.0825
Women	0.6642	0.0594	0.6048
Men-Women	-0.6327	0.0546	-0.6873

Note: labor input is defined as total work hours. For definitions of supply, demand and net supply, see text.

TABLE 7

ACTUAL AND PREDICTED WAGES BY ABSOLUTE SKILL GROUP, 1975 AND 1987 (1983 DOLLARS)

	1975	1987	Change 1975-87
Skill Group 0-20			
Log Male Wage			
Actual	2.0846	1.8644	-0.2202
1975 Means	2.0846	1.8369	-0.2477
Log Female Wage			
Actual	1.5288	1.5266	-0.0022
1975 Means	1.5288	1.4388	-0.0900
Skill Group 20-80			
Log Male Wage			
Actual	2.4152	2.3366	-0.0786
1975 Means	2.4152	2.3469	-0.0683
Log Female Wage			
Actual	1.9381	1.9321	-0.0060
1975 Means	1.9381	1.8885	-0.0496
Skill Group 80-100			
Log Male Wage			
Actual	2.8307	2.7806	-0.0501
1975 Means	2.8307	2.8025	-0.0282
Log Female Wage			
Actual	2.2895	2.2920	0.0025
1975 Means	2.2895	2.2849	-0.0046

Note: Wages are predicted using the human capital specification.

TABLE 8

SUMMARY RESULTS FOR CHANGES IN THE GENDER PAY GAP BY ABSOLUTE SKILL GROUP, 1975-79 AND 1979-87

A. Change in the Male-Female Log Wage Gap		
Skill Group	1975-79	1979-87
0-20	-0.1314	-0.0866
20-80	0.0202	-0.0928
80-100	0.0191	-0.0718
B. Change in the Male-Female Log Wage Gap, Corrected for Changes in the Minimum Wage		
Skill Group	1975-79	1979-87
0-20	-0.1238	-0.1310
20-80	0.0222	-0.1119
80-100	0.0193	-0.0795
C. Gap Plus Industry and Union Measured X Effects, Full Specification		
Skill Group	1975-79	1979-87
0-20	-0.1282	-0.1477
20-80	0.1159	-0.1319
80-100	0.0683	-0.0763
D. Net Supply Effects, Labor Input Measured in Hours (Male - Female)		
Skill Group	1975-79	1979-87
0-20	0.0194	0.1325
20-80	-0.1253	-0.0983
80-100	-0.0909	-0.5964

TABLE A1

MEAN VALUES OF EXPLANATORY VARIABLES

Explanatory Variable	Men 1975	Women 1975	Men 1987	Women 1987
WHITE	0.918	0.906	0.919	0.898
EDYRS	12.564	12.545	13.429	13.334
COLLDEG	0.154	0.143	0.208	0.180
ADVDEG	0.076	0.041	0.077	0.065
EXPF	19.616	11.261	17.433	12.758
EXPFSQ	513.140	206.740	414.020	233.940
EXPP	1.058	1.762	1.517	2.350
EXPPSQ	8.455	14.411	8.686	21.685
CB	0.331	0.206	0.226	0.169
PROF	0.177	0.179	0.206	0.254
MGR	0.160	0.061	0.183	0.130
CLER	0.067	0.367	0.046	0.333
SALES	0.058	0.040	0.061	0.035
CRAFT	0.272	0.010	0.228	0.018
OPER	0.189	0.176	0.172	0.113
LABSERV	0.077	0.168	0.105	0.117
MICODUR	0.348	0.162	0.305	0.119
MANNON	0.098	0.094	0.106	0.087
TRANS	0.100	0.043	0.113	0.044
WTRADE	0.043	0.022	0.053	0.022
RTRADE	0.091	0.112	0.113	0.127
FIRE	0.035	0.082	0.045	0.108
SERVS	0.182	0.431	0.174	0.430
GOVT	0.103	0.053	0.091	0.063
Sample size	1861	1085	1502	1130

Source: Michigan PSID.

TABLE A2

ORDINARY LEAST SQUARES REGRESSION RESULTS

Dependent Variable: Log of Hourly Earnings

	Men 1975		Women 1975		Men 1987		Women 1987	
	Coeff	Std Error	Coeff	Std Error	Coeff	Std Error	Coeff	Std Error
A. Human Capital Specification								
WHITE	0.1625	0.0327	0.0204	0.0425	0.2014	0.0423	0.0717	0.0417
EDYRS	0.0636	0.0046	0.0812	0.0083	0.0757	0.0087	0.1003	0.0104
COLLDEG	0.1023	0.0337	0.0671	0.0494	0.1376	0.0446	0.1027	0.0506
ADVDEG	0.0670	0.0430	0.3259	0.0748	0.1470	0.0602	0.1532	0.0704
EXPF	0.0387	0.0030	0.0440	0.0042	0.0512	0.0041	0.0492	0.0048
EXPFSQ	-0.0005	0.0001	-0.0008	0.0001	-0.0008	0.0001	-0.0010	0.0001
EXPP	-0.0084	0.0072	0.0096	0.0073	0.0019	0.0085	-0.0069	0.0066
EXPPSQ	0.0008	0.0004	-0.0008	0.0004	0.0004	0.0005	0.0003	0.0003
CONSTANT	0.9705	0.0671	0.5363	0.1044	0.5431	0.1167	0.1870	0.1364
R^2	.3394		.3349		.3338		.3381	
Sample size	1861		1085		1502		1130	
S.E.E.	.3821		.3995		.4443		.4211	
B. Full Specification								
WHITE	0.0685	0.0311	-0.0284	0.0385	0.1359	0.0394	0.0451	0.0386
EDYRS	0.0523	0.0047	0.0474	0.0083	0.0597	0.0087	0.0647	0.0103
COLLDEG	0.0854	0.0328	0.0015	0.0478	0.1140	0.0423	0.0672	0.0485
ADVDEG	0.0671	0.0437	0.2191	0.0726	0.1822	0.0578	0.1315	0.0673
EXPF	0.0309	0.0028	0.0353	0.0038	0.0396	0.0039	0.0419	0.0044
EXPFSQ	-0.0004	0.0001	-0.0006	0.0001	-0.0006	0.0001	-0.0008	0.0001
EXPP	-0.0084	0.0067	0.0032	0.0067	-0.0028	0.0079	0.0001	0.0061
EXPPSQ	0.0007	0.0003	-0.0004	0.0004	0.0006	0.0004	0.0001	0.0003

TABLE A2 CONT'D.

	Men 1975		Women 1975		Men 1987		Women 1987	
	Coeff	Std Error	Coeff	Std Error	Coeff	Std Error	Coeff	Std Error
B. Full Specification cont'd								
CB	0.1746	0.0196	0.2227	0.0293	0.2661	0.0271	0.2121	0.0327
MGR	0.0812	0.0304	-0.0317	0.0560	0.0611	0.0368	0.0147	0.0433
CLER	-0.2424	0.0415	-0.2555	0.0409	-0.2531	0.0586	-0.2106	0.0380
SALES	-0.0960	0.0454	-0.2058	0.0705	-0.0868	0.0541	-0.0728	0.0701
CRAFT	-0.1526	0.0318	-0.2187	0.1174	-0.1601	0.0405	-0.0268	0.0924
OPER	-0.2658	0.0352	-0.4273	0.0577	-0.3332	0.0429	-0.3467	0.0562
LABSERV	-0.4191	0.0417	-0.4757	0.0481	-0.3317	0.0478	-0.3763	0.0477
MICODUR	0.0376	0.0300	0.0512	0.0610	-0.0030	0.0423	-0.0652	0.0592
MANNON	0.0152	0.0381	-0.1264	0.0690	-0.0100	0.0491	-0.1524	0.0648
TRANS	0.0540	0.0375	0.0787	0.0712	-0.0121	0.0487	0.0339	0.0716
WTRADE	0.0809	0.0500	0.2306	0.0894	-0.0235	0.0605	0.0132	0.0907
RTRADE	-0.1653	0.0394	-0.2808	0.0601	-0.2235	0.0505	-0.3535	0.0584
FIRE	0.0146	0.0540	-0.0712	0.0615	-0.0071	0.0647	0.0379	0.0590
SERVS	-0.1491	0.0334	-0.1305	0.0525	-0.2809	0.0449	-0.1872	0.0509
CONSTANT	1.3850	0.0818	1.3876	0.1271	1.1096	0.1372	0.9937	0.1529
R^2	.4425		.4772		.4434		.4578	
Sample size	1861		1085		1502		1130	
S.E.E.	.3524		.3565		.4080		.3835	

Source: Michigan PSID.

TABLE A3

MEAN VALUES OF EXPLANATORY VARIABLES BY ABSOLUTE SKILL GROUPS

Variables	Skill Group 0-20				Skill Group 20-80				Skill Group 80-100			
	1976		1988		1976		1988		1976		1988	
	men	women	men	women	men	women	men	women	men	women	men	women
WHITE	0.781	0.752	0.799	0.739	0.945	0.933	0.926	0.886	0.973	0.977	0.977	0.963
EDYRS	10.551	10.860	11.648	11.622	12.107	12.353	12.874	12.733	15.970	14.783	16.011	14.872
COLLDEG	---	---	---	---	0.093	0.109	0.138	0.104	0.493	0.387	0.524	0.363
ADVDEG	---	---	---	---	0.035	0.011	0.021	0.009	0.275	0.175	0.271	0.179
EXPF	9.850	3.514	7.114	3.649	21.142	10.939	17.861	10.879	24.868	19.871	22.738	18.680
EXPFSQ	198.250	24.925	92.256	22.856	561.900	171.550	423.400	162.920	683.890	492.090	589.870	418.380
EXPP	0.802	1.365	1.178	2.198	0.911	1.873	1.349	1.935	1.755	1.820	2.174	3.109
EXPPSQ	5.599	9.851	5.790	13.099	8.003	16.157	7.930	13.991	12.693	13.645	12.499	37.440
CB	0.372	0.131	0.187	0.126	0.387	0.228	0.265	0.148	0.121	0.212	0.148	0.219
PROF	0.016	0.037	0.037	0.054	0.142	0.145	0.147	0.185	0.444	0.419	0.467	0.432
MGR	0.032	0.019	0.046	0.090	0.137	0.060	0.163	0.123	0.358	0.106	0.322	0.155
CLER	0.064	0.304	0.064	0.306	0.078	0.405	0.049	0.377	0.038	0.313	0.026	0.264
SALES	0.024	0.028	0.046	0.063	0.062	0.047	0.060	0.037	0.081	0.028	0.074	0.024
CRAFT	0.332	0.009	0.306	0.018	0.327	0.011	0.281	0.023	0.046	0.009	0.037	0.008
OPER	0.358	0.276	0.260	0.261	0.187	0.170	0.197	0.124	0.022	0.097	0.048	0.051
LABSERV	0.174	0.327	0.242	0.207	0.067	0.162	0.102	0.130	0.011	0.028	0.026	0.067
MICODUR	0.404	0.126	0.329	0.108	0.352	0.186	0.348	0.138	0.278	0.097	0.177	0.088
MANNON	0.115	0.201	0.100	0.108	0.110	0.073	0.101	0.102	0.046	0.051	0.123	0.053
TRANS	0.112	0.005	0.082	0.036	0.108	0.055	0.128	0.039	0.062	0.046	0.094	0.056
WTRADE	0.029	0.023	0.050	0.018	0.040	0.026	0.057	0.030	0.065	0.009	0.046	0.011
RTRADE	0.104	0.159	0.210	0.243	0.099	0.113	0.104	0.141	0.054	0.085	0.077	0.069
FIRE	0.019	0.075	0.014	0.117	0.028	0.092	0.040	0.124	0.073	0.060	0.077	0.077
SERVS	0.110	0.379	0.128	0.315	0.147	0.385	0.147	0.371	0.361	0.622	0.276	0.565
GOVT	0.107	0.033	0.087	0.054	0.116	0.060	0.076	0.054	0.061	0.050	0.131	0.080

TABLE A4

WAGE EFFECTS OF CHANGES IN CHARACTERISTICS, ABSOLUTE SKILL GROUPS, 1975-87

	Human Capital Specification		Full Specification	
	men	women	men	women
Skill Group 0-20				
all X's	0.027	0.074	-0.047	0.123
educ vars	0.086	0.060	0.089	0.062
exp vars	-0.062	0.017	-0.046	0.023
occ vars	----	----	0.005	0.032
cb	----	----	-0.066	-0.002
ind vars	----	----	-0.033	0.011
Skill Group 20-80				
all X's	-0.010	0.017	-0.051	0.020
educ vars	0.064	0.028	0.044	0.020
exp vars	-0.070	-0.0003	-0.053	-0.001
occ vars	----	----	0.0005	0.038
cb	----	----	-0.038	-0.025
ind vars	----	----	-0.002	-0.003
Skill Group 80-100				
all X's	-0.022	0.035	-0.006	0.071
educ vars	0.006	0.008	0.005	0.005
exp vars	-0.027	0.026	-0.021	0.024
occ vars	----	----	-0.006	0.029
cb	----	----	0.001	0.0004
ind vars	----	----	0.015	0.012

Notes to Table A4:

The entries show the contribution of changes in the means of the indicated variables to the 1975-87 change in male and female log wages separately. For example, for each sex group s (s = m, f), the impact of the indicated variables is:

$$(X_{sp1} - X_{sp0})B_{mp1}$$

where B_{mp1} is a vector of coefficients from the indicated OLS regression specification estimated for men in skill group p in 1987, and X_{spt} is a vector of means of the variables for sex s in skill group p in year t (1 = 1987 and 0 = 1975).