CATCHING UP[†]

The Gender Gap in Wages, circa 2000

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The transition of women into the U.S. labor market was surely one of the most profound economic and social changes of the 20th century.[1] In 1900 about 20 percent of women were in the labor force. This percentage rose to about 34 in 1950 and reached 61 percent in 2000; not far below the 75-percent participation rate of men. A key element in this change was the dramatic rise in market work among married women with children under the age of 18, whose labor-force participation increased from a rate of 18 percent in 1950 to 71 percent in 2000.

However, for much of the last 50 years the rise in women's labor-force activity and its growing convergence with that of men, did not appear to be matched by a narrowing of the gender gap in pay. Between 1955 and 1980, the most commonly cited measure of that gap, the female-to-male ratio of median annual earnings of full-time year-round workers, hovered around 60 percent. But using the same measure, the ratio began to rise after 1980, reaching 69 percent in 1989 and 74 percent in the mid 1990's, after which it leveled off. Based on a more appropriate measure, average hourly wage rates (available since 1979), the gender gap is smaller, but the pattern of change is similar, and the ratio rises from 66 percent in 1979 to 80 percent in 1993 and then stabilizes (Fig. 1).

Through the years the gender gap in wages frequently has been a source of public concern and a puzzle to researchers. In this paper I examine evidence from the Current Population Survey (CPS) and the National Longitudinal Survey of Youth (NLSY79) on recent trends and current sources of the gender gap.

I. Unique Factors Underlying Gender Differences in Skills

In comparing the earnings of different demographic groups it is usually important to examine the effect of productivity differences between the groups that might account for any earnings differential. In the case of differences in earnings between racial and ethnic groups of the same sex, productivity differences most often stem from differences in the quantity and quality of education and other human capital acquired at home as well as in school. Differences in productivity between men and women, however, are not likely to be due to differences in educational background. Sisters and brothers are exposed to the same parental background and attend schools of the same quality. Their current educational attainment and their cognitive skills, as measured by achievement test scores, are similar.

Instead, the main source of productivity differences between women and men stems from the lesser amount of time and energy that many women can commit to labor-market careers as a result of the division of labor within the family.[2] Even though women's home responsibilities have fallen dramatically over the past 50 years, they are nonetheless, still significant. Consequently, women are less likely than men to work continuously after leaving school and therefore are less likely to gain experience that

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[1] See Jacob Mincer's (1962) pioneering work on the determinants of women's labor force participation.

[2] In an extension of his work on the economics of the family Gary Becker (1985) has developed a model of the allocation of energy which shows how the energy demands of childcare and housework reduce the energy available for market work.

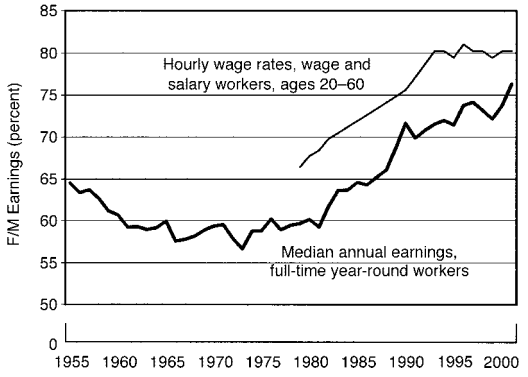

FIGURE 1. TRENDS IN FEMALE-TO-MALE RATIOS OF MEDIAN ANNUAL EARNINGS OF FULL-TIME YEAR-ROUND WORKERS AND HOURLY WAGE RATES

can only be acquired on the job. In addition, anticipation of child-related work interruptions and the need to coordinate home responsibilities with market work are likely to influence choice of occupation and type of firm.

One can argue whether the source of these gender role differences is a form of discrimination rather than an outcome of biological and other deeply rooted psychological and cultural factors. However, by the time they are old enough to make choices, many women make different choices than men regarding the extent of career attachment.

Current data continue to show the strong effect of the presence of children, particularly young children, on work participation and on hours of work among those who do work. In March 2001, at ages 25–44, the prime period for career development, 34 percent of women with children under the age of six were out of the labor force, compared to 16 percent of women without children. Thirty percent of employed mothers worked part-time, compared to 11 percent of women with no children. Among men, however, the presence of children is associated with an increase in work involvement. Only 4 percent of men with children under the age of six are out of the labor force, and among employed fathers only 2 percent work part-time.

The expectation of withdrawals from the labor force and the need to work fewer hours during the week are likely to influence the type of occupations that women train for and ultimately pursue. More subtle factors such as the level of stress at work and the ability to take unplanned time off for family emergencies are also likely to influence the choice of occupation and work place. Thus, certain characteristics of jobs may affect women's occupational choices because they are particularly compatible or incompatible with women's dual home/market roles. These adaptive occupational choices will tend to lower the market earnings of women relative to men.

For example, some occupations require lengthy investment in skills with applicability only to highly specific market activities (e.g., aerospace engineer, surgeon, top management in large complex organizations). The payoff to such investments is obviously reduced when years in the labor force are reduced. Moreover, skills depreciate during periods of withdrawal from work (Jacob Mincer and Haim Ofek, 1982), and the rate of depreciation is likely to vary depending on the rate of technological change and obsolescence of the skills acquired. Fields such as physics, where knowledge depreciates rapidly have disproportionately fewer women. Other types of schooling and training are more general in their applicability to different situations and impart skills that are less prone to depreciate. For example, nursing and teaching skills are valuable to mothers and can be practiced widely in different settings with relatively little additional firm-specific training.

Certain characteristics of the workplace are more compatible with women's home responsibilities than others. The depreciation in skills and earnings related to complete withdrawal from the labor force may be ameliorated by work situations that accommodate the need for less demanding work while raising a family. Part-time work is the most obvious manifestation of this adjustment. Even if a woman does not always work part-time she may be more likely to choose an occupation or job setting that provides a shorter or more flexible work week in the event it may be needed, or a more informal work setting where time off for unpredictable events is acceptable.

Both work attachment and the choice of occupation are expected to be important determinants of women's earnings and important factors underlying the gender wage gap. In the analysis discussed below I incorporate measures and proxies for these factors. I examine

the factors associated with changes in the wage gap over the past two decades using data from the CPS and then examine sources of the current differential for a cohort of workers using the more comprehensive and detailed variables of the NLSY.

II. Findings from the Current Population Survey: 1979–2001

The CPS analysis is based on data from the CPS outgoing-rotation-group files (CPS ORG) merged with data on occupational characteristics from the Department of Labor's Fourth Dictionary of Occupational Titles (DOT), 1991 revision. The analysis includes part-time and full-time wage and salary workers, ages 20–60.

The major changes that have occurred during the 1979–2001 period in the gender differential in earnings-related characteristics are as follows. Women continue to be much more likely than men to work part-time (19 percent versus 5 percent in 2001), although that difference narrowed. With respect to education, women gained relative to men at the college level. By 2001 they were somewhat more likely than men to be college graduates and were almost as likely to receive a higher degree. Women also have been entering occupations requiring more job-specific skills, as measured by SVP (specific vocational preparation), the time required to attain the average level of proficiency in an occupation—a DOT variable. The gender gap in SVP declined by almost half between 1984 and 1994 and has since declined further, but at a slower rate.

However, despite these changes, women and men remain in occupations that are disproportionately female or male. In 2001 women, on average, worked in occupations in which the percentage of female employees was close to 68 percent; men worked in occupations that were only 30-percent female. The percentage female in an occupation is one simple way of measuring the characteristics of an occupation that are conducive to women's particular needs. However, in the CPS analysis I have taken the more direct path of including specific characteristics of occupations as individual variables.

Returns to "Potential Experience."—As a number of studies have shown, there is evidence that the years of work experience of employed women increased during the 1980's (M. Anne Hill and O'Neill, 1992). In fact, the narrowing of the work-experience gap was a key factor causing the gender wage gap to narrow during the 1980's (O'Neill and Solomon Polachek, 1993; Francine Blau and Lawrence Kahn, 1997). Nonetheless, longitudinal data show that a significant experience gap remains. The CPS, however, contains no direct measure of years of work experience. The standard way of inferring past work experience in the CPS is to construct "potential experience"—essentially the number of years since leaving school (or since age 17, if the person left school at a younger age). Actual experience is reasonably close to potential experience for men. For women that is not the case. The return to potential experience is typically lower for women than for men, and the fact that the difference between actual and potential experience is larger for women than for men likely accounts for at least part of the difference in returns. Therefore, if women's actual experience has been catching up to their potential experience, one would expect that the effect of potential experience on the female wage rate would increase over time for women, and more so than for men, if the return to experience generally was rising for other reasons. As shown in Table 1, that is in fact what has happened. I have conducted a series of annual cross-sectional regressions, for the years 1979–2001, separately by sex, in which the log wage is regressed on potential experience (quadratic specification), schooling, whether the

TABLE 1—MALE AND FEMALE RETURNS TO POTENTIAL EXPERIENCE AT 15 YEARS (LOG WAGE GAIN) (CPS)

Year	Men	Women	Difference (M − W)
1979	0.447	0.207	0.240
1981	0.439	0.223	0.216
1983	0.497	0.263	0.234
1985	0.497	0.288	0.208
1987	0.471	0.305	0.165
1989	0.482	0.307	0.175
1991	0.477	0.312	0.166
1993	0.463	0.334	0.128
1995	0.477	0.358	0.119
1997	0.452	0.350	0.102
1999	0.425	0.306	0.119
2001	0.398	0.309	0.089

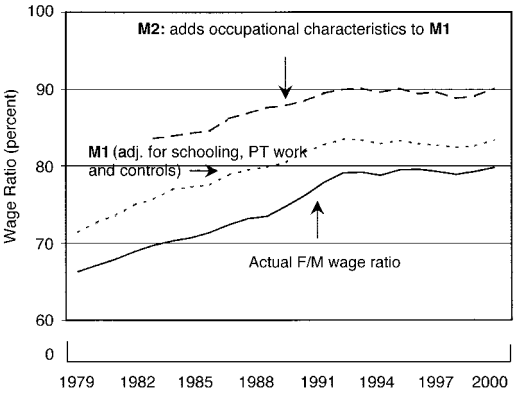

FIGURE 2. ACTUAL AND REGRESSION-ADJUSTED HOURLY WAGE RATIOS (USING MALE COEFFICIENTS)

individual worked part-time, and basic demographic controls. The results indicate that, evaluated at 15 years of potential experience, the return for both women and men increased from 1979 until about 1995 after which it declined somewhat. However, women's returns to potential experience increased much more rapidly than men's, and the difference between men and women narrowed sharply. This suggests that the relative quantity and/or quality of women's accumulated work experience probably continued to rise through 2001.

The "Adjusted" Wage Gap Using Available CPS Variables.—To discern the effect of gender differences in characteristics on the wage gap and how the relation may have changed, I have conducted standard decompositions of the CPS annual regressions using, alternatively, male and female coefficients and different model specifications. The results, using male coefficients, are shown in Figure 2.[3] Model 1 (M1), which adjusts for potential experience, schooling, whether the individual worked part-time, and basic demographic controls, raises the wage ratio by about 5 percentage points in the early years and by a little less than 4 percentage points in the later years. Model 2 (M2) adds a series of variables measuring a variety of occupational characteristics including SVP and other

[3] Regression specifications and complete results, both for the CPS and NLSY regression analyses, are available from the author upon request.

TABLE 2—CHARACTERISTICS OF NLSY MEN AND WOMEN IN 2000 (AGES 35–43)

Characteristic	Men	Women	Difference (M − W)
AFQT	42.29	39.61	2.68
High-school dropout	25.05	19.54	5.51
College graduate	12.82	12.26	0.56
Higher degree	9.55	10.00	−0.45
Full-year equivalents worked since age 18 (weeks/52)	16.14	14.20	1.93
Percentage of full-year equivalents worked part-time	8.66	15.71	−7.05
Tenure (years)	6.49	5.70	0.79
Years out of labor force	2.51	5.41	−2.90
Percentage worked for nonprofit	4.66	9.45	−4.79
Percentage with one child or more	75.31	82.08	−6.77
Percentage age at first birth ≥ 30	13.85	9.48	4.37
Percentage childcare cited as reason for out of labor force	12.85	58.12	−45.27
Characteristics of Occupation:			
Percentage female in occupation	28.86	65.10	−36.24
SVP (months)	30.22	26.15	4.07
Percentage use computer for database	30.85	36.66	−5.81
Percentage use computer for programming	8.83	7.73	1.10
Percentage left labor force in a year	3.56	4.59	−1.03
Percentage exposed to:			
Work hazards	9.13	1.35	7.78
Fumes	4.56	0.40	4.16
High noise	33.69	8.44	25.25
Medium strength requirement	24.50	10.61	13.89
Outdoor conditions	22.07	3.73	18.34

variables that are proxies for aspects of working conditions. (Table 2 lists these variables for the NLSY regressions; the CPS analysis uses the same variables, except for computer usage.)

Occupational characteristics explain a substantial portion of the wage gap. (I have not added these variables prior to 1983 because of the major change in occupational codes.) The female/male wage ratio, adjusted for all model-2 variables, increased from 84 percent in 1983 to 90 percent in 2001; the unadjusted ratio rose from 70 percent to 80 percent over the same

TABLE 3—EXPLAINING THE WAGE GAP IN 2000 BETWEEN NLSY WOMEN AND MEN, AGES 35–43 (USING MALE COEFFICIENTS)

Measure	Model 1	Model 2	Model 3
Log Wage Gap Attributable to Differences in Characteristics:			
Demographic	0.0086	0.0067	0.0067
Education	−0.0120	−0.0071	−0.0072
AFQT	0.0100	0.0063	0.0063
Work experience since age 18	0.1472	0.1037	0.1030
Workplace characteristics	—	0.0231	0.0222
Child-related factors	—	0.0167	0.0173
SVP	—	0.0129	0.0119
Other occupational characteristics	—	0.0335	0.0173
Percentage female in occupation	—	—	0.0436
Unadjusted log wage gap	0.2463	0.2463	0.2463
Gap explained by model	0.1563	0.1957	0.2210
Unexplained gap	0.0900	0.0506	0.0253
Observed F/M wage ratios:	78.2	78.2	78.2
Adjusted F/M wage ratios:	91.4	95.1	97.5

period. When female coefficients are used, the effects are smaller, largely because women's earnings are less negatively affected by working in occupations that provide part-time work and allow for labor-force turnover.

III. Findings from the NLSY

Analysis of data from the NLSY permits a more complete assessment of the extent to which important differences in human capital and job and occupational characteristics can explain the gender gap in wages. The analysis uses the 2000 NLSY when the cohort has reached ages 35–43.

The variables included in the analysis and the differences in the characteristics of the NLSY men and women are given in Table 2. Table 3 shows the proportion of the wage gap "explained" by sets of variables in three model specifications, using male coefficients. Here are the highlights:

(i) The gross log wage differential in 2000 was 0.246, corresponding to a wage ratio of 78.2 percent. Years of schooling and scores on the AFQT (Armed Forces Qualification Test) explain hardly any of the differential because women and men differ little in these characteristics.

(ii) Actual work experience accounts for much of the gap. Using model 1, a basic human-capital specification, work experience, accounts for 0.1472 of the unadjusted log wage gap, which is almost all of the explained portion of the gap using male coefficients. Although it is reduced, the contribution of work experience remains large when other, intercorrelated variables are added as in models 2 and 3.

(iii) The addition of occupational and workplace characteristics in model 2 reduces the unexplained portion of the gap from 0.0900 (model 1) to 0.0506. Model 3 adds the variable FEM (percentage female in occupation). For men, FEM has a strong negative effect. It accounts for 0.0436 of the gap and reduces the effect of the occupational characteristics with which it is obviously correlated. (But note that in the separate regressions for women, the effect of FEM is weak but positive.)[4] Including all of the variables in model 3 reduces the unexplained gap to 0.0253, a wage ratio of 97.5 percent. (The comparable ratio using female coefficients is 91.3 percent.)

I have conducted additional analysis of the NLSY cohort separately by schooling level. Gender differences in work experience are much greater at the high-school level than they are for college graduates. Consequently, work experience accounts for a particularly large share of the gap. At the high-school level the wage gap falls to 3 percent using model 1; it is eliminated when occupational characteristics and FEM are added.

The unadjusted wage gap is larger for college graduates than it is at the high-school level. The field of college major, a harbinger of occupational choice, accounts for a significant amount of the

[4] In an extensive analysis of the effect of occupation on the gender wage gap, David Macpherson and Barry Hirsch (1995) find that the effect of FEM on the wage rate is sensitive to model specifications and is negative and significant in female as well as in male regressions under certain specifications.

gap, a result consistent with that of Charles Brown and Mary Corcoran (1997). At the college-graduate level FEM does not have a significant effect on the outcome. The results are similar whether the male or female coefficients are used. The unexplained gap is about 6 percentage points when both field of college major and occupational characteristics are included, and that is the case using either the male or female coefficients.

IV. Concluding Comments

Understanding the gender gap in pay is important because even in the absence of any labor-market discrimination it is unlikely that the wage rates of women and men would be equal. As I have shown in this paper, the unadjusted gender gap can be explained to a large extent by nondiscriminatory factors. Those factors are unlikely to change radically in the near future unless the roles of women and men in the home become more nearly identical. Thus an unadjusted gender gap may be with us for quite a while.

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