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EMPLOYMENT OF WOMEN AND DEMAND-SIDE FORCES

Donna K. Ginther and Chinhui Juhn

ABSTRACT

Using the 1964–1995 March Current Population Surveys and the 1940–1990 Census, this paper examines the relationship between female employment growth and changes in labor demand. Specifically, we examine whether industrial change and changes in labor demand can account for both the acceleration and deceleration of female employment growth across the decades as well as the pattern of biased growth in favor of more skilled women. We find that labor demand proxies are successful in accounting for the pattern of biased growth but are less successful in accounting for the overall acceleration of female employment, particularly in the 1970s.

I. INTRODUCTION

While average real wages in the U.S. stagnated during the 1970s and the 1980s, female employment continued to grow at a vigorous pace throughout these decades. In fact, while it is true that female employment has been rising since at least 1900 (Smith & Ward, 1984; Goldin, 1990), the pace of female employment growth actually accelerated during the most recent decades. One explanation that has been put forth is that income effects have played a

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dominant role in women's labor supply decisions. That is, women, and particularly married women, have increasingly joined the labor force to make up for the losses in husband's earnings and family incomes. While this story is appealing at the outset, previous work (Juhn & Murphy, 1997) has shown that employment of women in high-income households has increased even faster than employment of women in low-income households, indicating that income effects could not be the whole story.

Along with the rapid rise in overall employment during the 1970s and the 1980s, there has also been a distinct pattern of biased growth in favor of more skilled and educated women. While employment of high school and college-educated women have increased rapidly, employment of the least educated women, high school dropouts, have remained virtually flat since the early 1960s. Additionally, women married to high-income husbands are themselves likely to be highly skilled women due to positive assortative mating. The fact that employment growth has been more rapid among this group is another indication of the skill-biased nature of female employment growth in the recent decades.

If declining family incomes did not play a major role, what factors account for the acceleration in female employment in the 1970s and the 1980s? Can we also explain the faster growth in employment among the more skilled and educated women? In this paper, we examine to what extent changes in labor demand brought about changing industrial and occupation structure of the economy could account for these recent changes in female employment. In doing so, we examine whether the 1970s and the 1980s were decades of faster growth in "female-oriented" jobs. In addition, we evaluate whether sectors where predominantly skilled women were located grow faster than those where predominantly less skilled women were located.

To preview our results, we find that changes in industrial structure did favor skilled women over less skilled women but we find little systematic evidence that industrial structure favored women over men in the more recent decades. We conclude that observable measures of labor demand are successful in accounting for the pattern of biased growth in female employment in the 1970s and the 1980s, but are less successful in accounting for the overall acceleration in female employment, particularly in the 1970s.

The paper is organized as follows. Section II describes the data and the sample selection criteria used for analysis. The pattern of female employment growth is presented in Section III. Section IV describes changes in industrial and occupational structure of the economy and presents changes in relative demand for men and women in different education classes. Section V provides a brief summary of the findings.

II. THE DATA

The data used in this paper are from the 1964–1995 March Current Population surveys and the 1940–1990 decennial Census (1/100 sample). In addition, aggregate employment and population numbers published in *Employment and Earnings* were used for descriptive analysis covering the years 1950–1996. The published numbers include all civilian non-institutionalized women aged 16 and over. Employment-population ratios calculated from our own CPS samples are based on women with 1–40 years of potential experience (ages 18–64) who were not students or in the military during the previous year or the survey week. Employment-population ratios were calculated as average weeks worked last year divided by 52 which can be interpreted as the employment-population ratio averaged over the year. Employment-population ratios reported by husband's wage quintile (Fig. 5) is based on a sample of matched husband-wife households where the husband has 1–30 years of potential experience. Where the husband did not report a wage because he was not at work, we imputed his wage based on his observable characteristics such as race, education, and potential experience, as well as his weeks worked last year. The husband's wage quintile is based on the overall male wage distribution each year (including single and unmarried men). For calculating average wages, we constructed a more restrictive sample of women with strong labor market attachment. The wage sample includes women with 1–40 years of potential labor market experience who were not self-employed and who worked a minimum of 14 weeks last year. The wage measure used is the log hourly wage calculated as the logarithm of annual earnings last year divided by the product of weeks worked last year and usual hours worked. Annual earnings were deflated using the personal consumption expenditure deflator from the National Income and Product Accounts. Hourly wages below one dollar (in 1982 dollars) were deleted from the calculations.

For examining industrial and occupational structure of employment we constructed a sample of men and women from the 1940–1990 U.S. decennial Census with 1–40 years of potential labor market experience who were working during the survey week (including the self-employed) and therefore had a valid reported occupation and industry. To measure the expansion or contraction of different sectors (industry by occupation cells) we use cost-share weighted changes in labor inputs or in other words, changes in efficiency units of labor. Efficiency units of labor are calculated by first dividing the sample into 160 groups based on gender, five education categories (< 8, 8–11, 12, 13–15, 16+ years of schooling), and eight experience categories and multiplying total count of workers in the group by the group-specific average wage (which does not vary by year).

III. EMPLOYMENT OF WOMEN: 1950–1996

A. *Employment and Husband's Earnings*

Figure 1 illustrates the employment-population ratio among women with 1–40 years of potential labor market experience based on our own calculations using the March CPS. The employment-population ratio rises from 0.39 in 1963 to approximately 0.69 in 1994. In Fig. 2 we present a longer series based on published numbers from *Employment and Earnings*. The sample upon which these numbers are based includes younger and older women compared to our CPS samples and therefore are not directly comparable. Nevertheless, Fig. 2 also establishes a large increase in the employment of women rising from 0.32 in 1950 to 0.56 in 1996. The longer times series enables us to more systematically compare the rates of employment growth across the different decades. For this purpose, we regressed the employment-population ratio on decade-specific splines and the actual and predicted values are graphed in Fig. 3. The results are also presented in tabular form in Table 1. Column (1) of Table 1 shows that employment-population ratio increased 0.25 percentage points annually over the 1950s, 0.49 percentage points annually in the 1960s, accelerated to 0.69 and 0.72 percentage points annually over the 1970s and the 1980s before slowing down again to 0.24 percentage points annually during the first half of the 1990s. In column (2) we control for cyclical factors by including the civilian unemployment rate in the regression. The results are not changed much qualitatively with the exception that once we control for cyclical factors, the 1970s stand out clearly as the decade of the fastest female employment growth. Similar conclusions are reached from employment-population ratios calculated from Census data and are reported in Table 1 in the appendix.

Figure 4 documents the faster employment growth among better-educated women. The employment-population ratio of high school dropout women increased roughly 7 percentage points from 0.35 in 1963 to 0.42 in 1994 while employment-population ratios of high school graduate, some college, and college graduate women rose 25, 34, and 29 percentage points respectively over this same time period. Figure 5 shows the employment growth among married women stratified by the relative wage of the husbands. The figure shows that among women married to men in the bottom quintile of the male wage distribution, the employment-population ratio increased approximately 25 percentage points from 0.37 in 1963 to 0.62 in 1994. Among women married to husbands in the middle wage quintile, employment-population ratio increased 38 percentage points from 0.34 in 1963 to 0.72 in 1994. Among women married to men in the top wage quintile, employment-population ratio



Fig. 1. Employment-Population Ratio of Prime-Age Women.

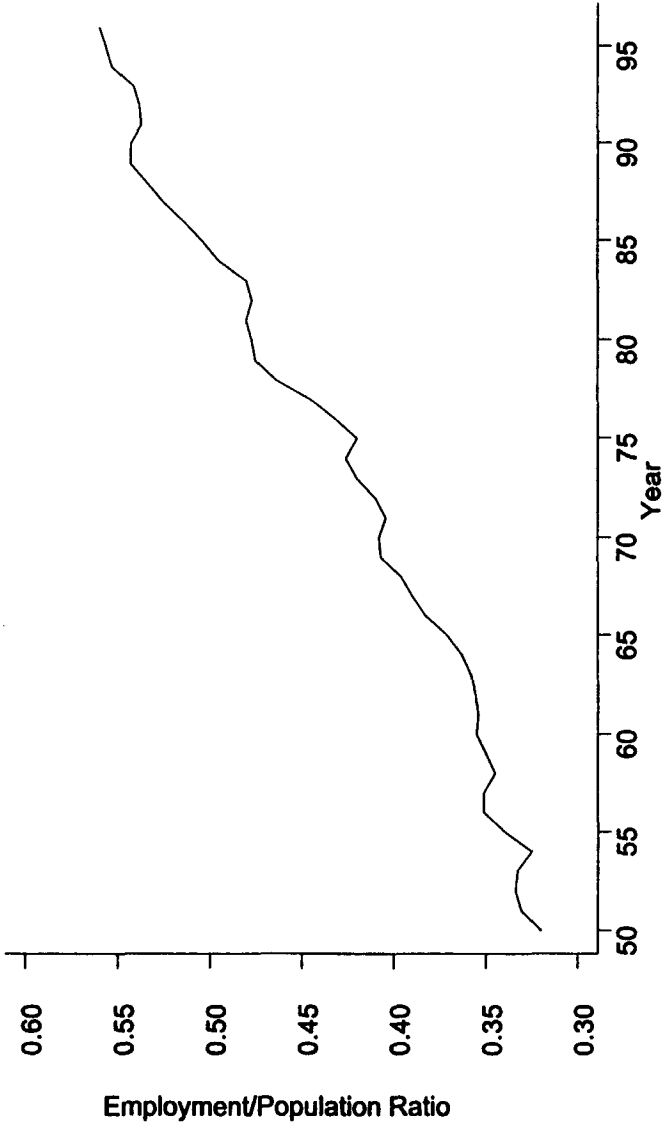


Fig. 2. Employment-Population Ratio of Prime-Age Women.

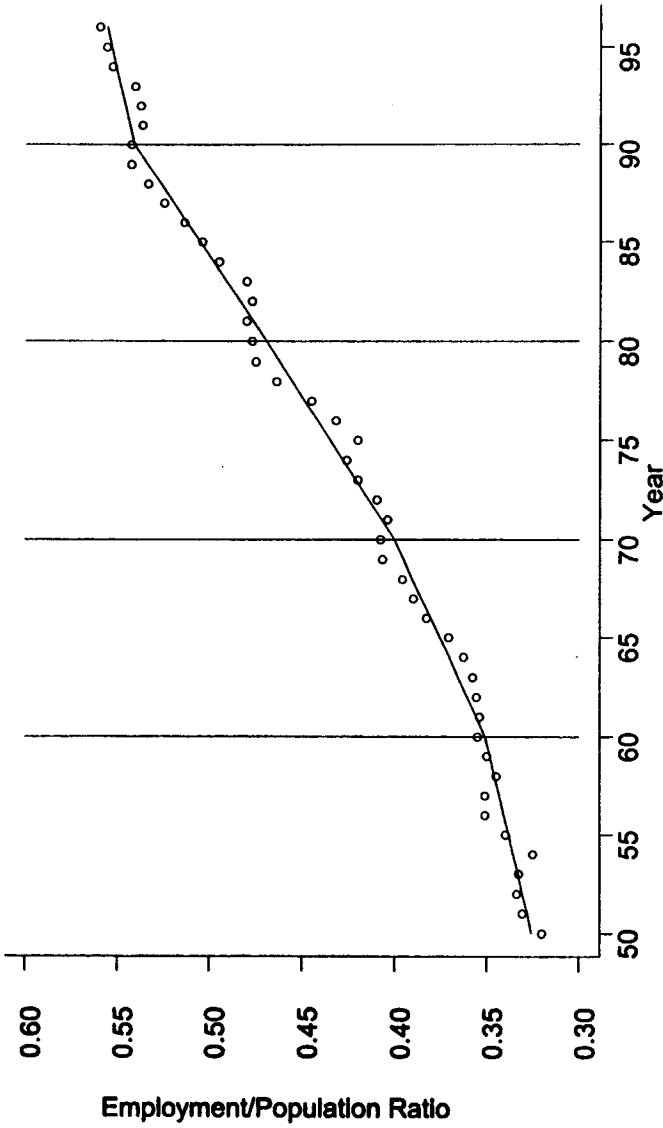


Fig. 3. Employment-Population Ratio of Prime-Age Women.

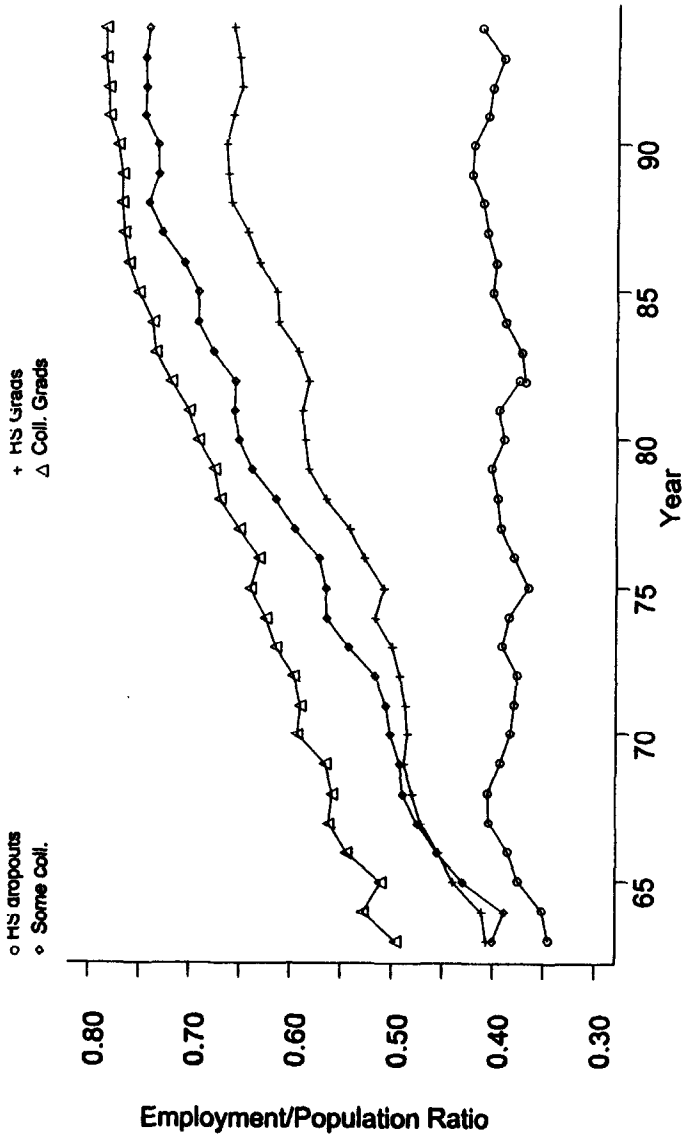


Fig. 4. Employment-Population Ratio of Women by Education.

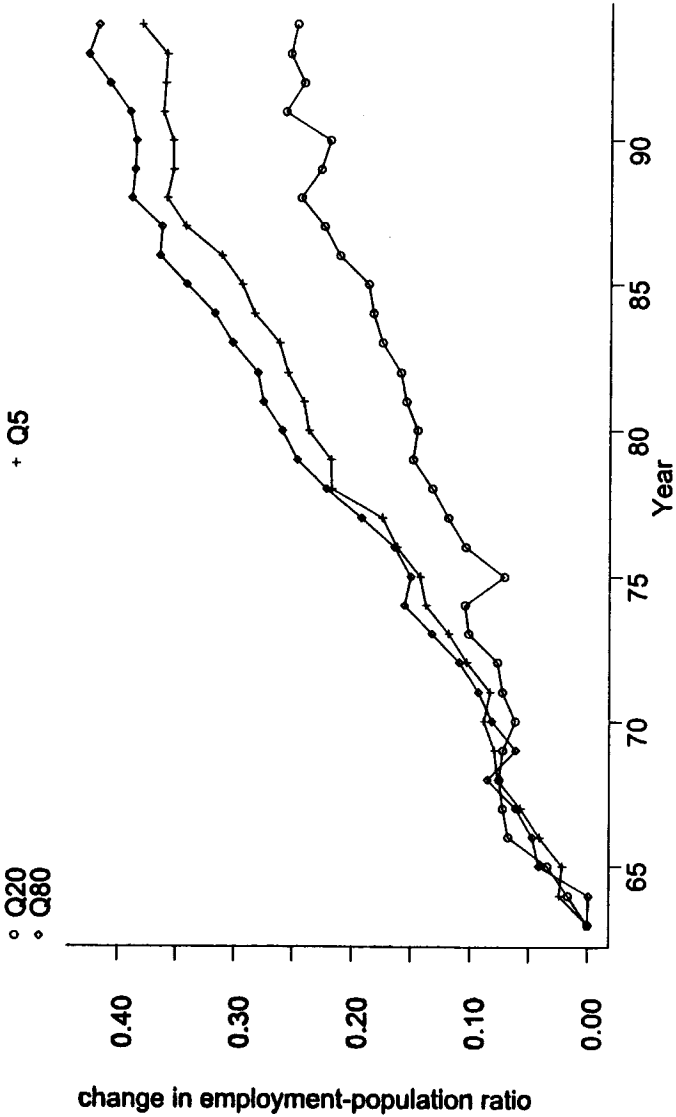


Fig. 5. Change in Employment-Population Ratios for Married Women.

Table 1. Estimated Annual Rates of Change in Female Employment-Population Ratio.

	(1) annual percentage point change	(2) annual percentage point change
1950–1959	0.25	0.37
1960–1969	0.49	0.42
1970–1979	0.69	0.89
1980–1989	0.72	0.62
1990–1996	0.24	0.23

Source: Employment and Earnings. Column (1) reports the estimated annual rates of change regressing employment-population ratios for civilian women aged 16+ on decade-specific splines. The civilian unemployment rate was also included in the regression reported in column (2).

increased the most rising 41 percentage points from 0.22 in 1963 to 0.63 in 1994. The figure shows that employment growth has been the largest among women married to high wage husbands whose incomes (unlike incomes of men in other wage categories) had continued to increase during the 1970s and the 1980s. This pattern of employment growth in favor of women in high income households suggests that declining family income has not been the only, and probably not the major, factor in determining married women's employment behavior. One interpretation of the pattern described above is that the women married to high wage husbands are themselves highly skilled women and that what we are seeing is biased employment growth in favor of skilled women in another guise.

B. Employment and Wages

If declining husband's incomes has not played the major role, what other factors could account for both the acceleration of female employment growth in the 1970s and the 1980s, as well as the pattern of biased growth in favor of more skilled women? We consider whether market opportunities for women increased dramatically during the more recent decades and whether increases in opportunities differed for different types of women. A natural place to start in measuring changing market opportunities for women is observed wages among working women. Figure 6 presents indexed average log hourly wage of working women (with 1963 as the base year). The figure shows that from 1963 to 1970, average wages of working women increased 20 log points. Real wages among working women were stagnant during the 1970s before rising again (albeit at

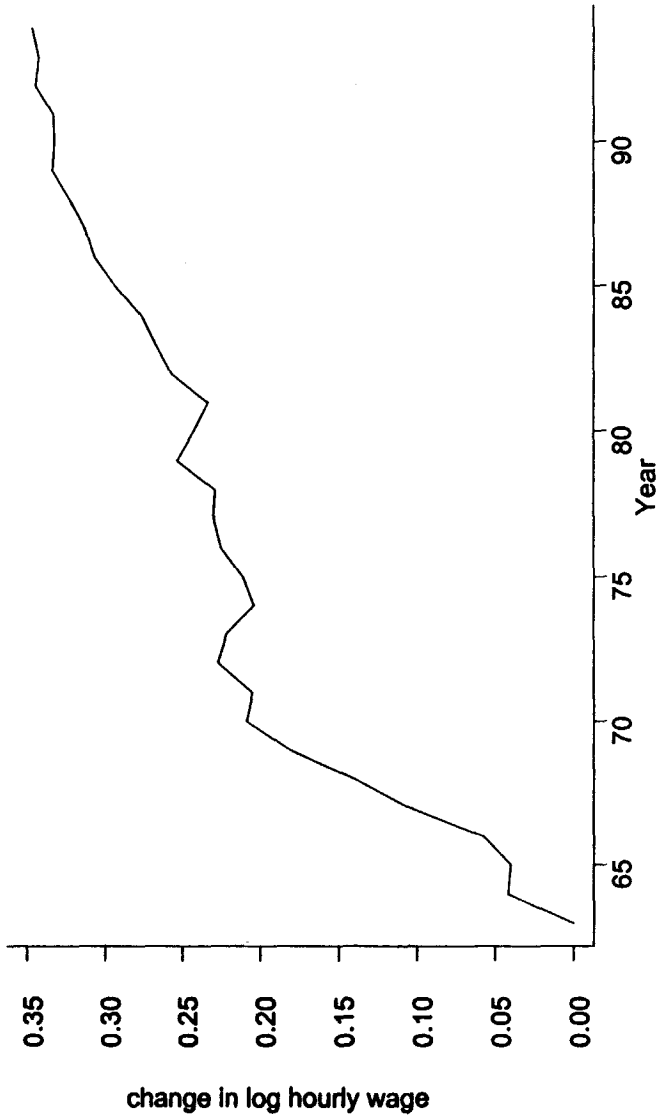


Fig. 6. Change in Log Hourly Wage for Women.

a much slower pace) during the 1980s. While rising real wages could account for the rise in female employment during the 1980s, the vigorous growth in employment during the 1970s is particularly puzzling given the stagnant real wages observed during the 1970s.

There are of course many reasons why observed wage changes illustrated in Fig. 6 is likely to be a poor measure of changing market opportunities for all women. For one, as a number of authors have pointed out (Smith & Ward, 1986; Goldin, 1989; O'Neill & Polachek, 1993; Polachek & Robst, 2001) the composition of working women has changed over time and the entry of women with little or no previous labor market experience most likely understated the true rise in market opportunities for all women. Since a significant fraction of women still do not work, changing selection into the labor market based on unobservable characteristics could also be an important factor. To the extent that men and women are imperfect substitutes in production, the increase in supply of women itself will mute the increase in observed wages of women.¹ In addition, current wages are net of human capital investments and labor market discrimination, all of which are not easily observed in these data sets. Thus, using changes in wages to evaluate the increase in female employment is problematic.

In this paper, we propose to investigate changes in labor market opportunities for women by examining changes in industrial and occupational structure of the economy. The basic question we ask is the following: have changes in the industrial and occupation structure of the economy favored female workers over male workers during the 1970s and the 1980s, the decades of accelerating female employment growth? In addition, did industrial and occupational change particularly favor highly skilled and educated women over less skilled and less educated women?

IV. INDUSTRIAL CHANGE AND CHANGES IN RELATIVE DEMAND FOR FEMALE LABOR

In this section we first describe the changes in the overall industrial and occupational structure of the economy using the 1940–1990 Census. Our approach here is similar to Katz and Murphy (1992) and Blau and Kahn (1997) in that changes in relative demand for different types of labor (distinguished by gender and education) are inferred from the overall changes in the composition of employment across different sectors of the economy (distinguished by industry and occupation). The basic identifying assumption is that long-run changes in the composition of employment across different sectors are demand-driven. To the extent that employment grows in those sectors that

intensively use female and/or skilled factors, one would conclude that there has been a general increase in demand for female and/or skilled labor in the economy.

Table 2 shows average employment shares of women across different industries and occupations. Table 2 shows that high school dropout women work

Table 2. Distribution of Female Employment Across Industries and Occupations.

	Education			
	< 12	=12	13-15	16+
A. Industry				
Mining	0.2	0.3	0.5	0.3
Construction	0.7	1.4	1.7	0.7
Manufacturing:				
Low Tech	18.3	7.3	3.2	1.3
Basic	12.3	11.1	7.0	3.9
High Tech	2.3	2.8	2.3	1.5
Transport & Utilities	2.7	5.6	5.2	2.6
Wholesale	2.2	3.6	3.4	1.8
Retail	22.2	19.9	13.5	6.0
Professional Services	14.0	26.7	38.8	28.3
Education & Welfare	4.7	7.7	11.9	45.8
Public Administration	2.3	6.7	7.9	5.9
Other Services	18.2	6.9	4.8	2.1
	100.0	100.0	100.0	100.0
B. Occupation				
Professionals	2.7	7.1	22.6	64.6
Managers	4.5	7.9	13.0	13.3
Sales	6.3	6.7	6.3	4.4
Clerical	17.6	47.5	42.3	13.1
Crafts	2.9	2.4	1.7	0.7
Operatives	30.7	11.4	3.4	0.9
Transport Operatives	0.7	0.8	0.5	0.1
Laborers	1.8	1.1	0.5	0.1
Domestic	9.7	1.4	0.6	0.2
Services	23.2	13.8	9.1	2.6
	100.0	100.0	100.0	100.0

Source: Numbers are based on the 1940-1990 Public Use Microdata Samples (PUMS).

Notes: 1. The sample includes men and women with 1-40 years of experience who were in the non-agricultural sector, and who were not enrolled in school or the military during the survey week. Employment shares are calculated as the fraction of total wage-weighted count of workers in the non-agricultural sector.

mostly as operatives in low-tech manufacturing, and also as low-skilled service workers in the retail and other services industries.² High school educated women work predominantly as clerical workers in retail and professional service industries. The vast majority of college-educated women are professionals working in the education sector. Similar tabulations for men are shown in Table

Table 3. Distribution of Male Employment Across Industries and Occupations.

	Education			
	< 12	=12	13-15	16+
A. Industry				
Mining	2.9	1.8	1.3	1.2
Construction	12.9	10.9	8.8	3.8
Manufacturing:				
Low Tech	13.3	7.7	5.1	3.2
Basic	19.7	20.4	16.3	11.5
High Tech	3.5	4.6	5.0	5.6
Transport & Utilities	11.3	11.4	9.6	4.5
Wholesale	4.6	6.2	7.3	5.1
Retail	14.3	14.9	14.6	7.6
Professional Services	4.7	7.7	14.7	29.7
Education & Welfare	1.8	1.9	2.8	17.5
Public Administration	4.1	7.4	9.7	8.3
Other Services	6.8	5.2	4.8	2.1
	100.0	100.0	100.0	100.0
B. Occupation				
Professionals	1.8	6.1	15.9	49.5
Managers	8.5	13.3	22.1	26.7
Sales	4.1	7.2	11.0	9.3
Clerical	5.5	9.7	10.4	5.3
Crafts	28.4	28.8	19.9	4.6
Operatives	21.1	14.4	6.7	1.2
Transport Operatives	10.6	7.7	3.9	0.7
Laborers	10.8	5.3	2.6	0.6
Domestic	0.2	0.1	0.0	0.0
Services	9.0	7.7	7.5	2.2
	100.0	100.0	100.0	100.0

Source: Numbers are based on the 1940-1990 Public Use Microdata Samples (PUMS).

Notes: 1. The sample includes men and women with 1-40 years of experience who were in the non-agricultural sector, and who were not enrolled in school or the military during the survey week. Employment shares are calculated as the fraction of total wage-weighted count of workers in the non-agricultural sector.

3 for comparison. In contrast to the less educated women, a larger fraction of both high school dropout and high school graduate men work as craft workers and operatives in low tech and basic manufacturing sectors. In contrast to women, college educated men are more likely to be located in the professional services sector and less likely to be in education.

Table 4 shows distribution of total employment across industries and occupations for different years. The table shows that employment has been shifting towards more skill-intensive sectors. For example, employment shares of less skilled industries such as low tech manufacturing, retail, and other services and less skilled occupations such as laborers and services fell continuously over the decades. Whether the employment changes illustrated in Table 4 favored female over male labor is less clear. While the manufacturing sector (a male-intensive industry) did decline in the recent decades, growth of the education sector (a female-intensive sector) also significantly lagged behind professional services.

While examination of industry and occupation employment shares gives some preliminary indications, it is difficult to assess the total impact of industrial and occupational changes on different groups defined by gender and skill type. We quantify the total impact by constructing relative demand indexes by education and gender group. We calculate the percentage change in labor demand for group j , $\Delta D_j / D_j$ as the following:

$$\Delta D_j / D_j = \sum_i N_{ijt} / N_{jt} * (N_{it+1} - N_{it}) / N_{it} \tag{1}$$

where j indexes a labor type and i indexes sectors (industry by occupation cells), N_{ijt-1} / N_{jt-1} is the group's initial employment distribution over different sectors, and $(N_{it+1} - N_{it}) / N_{it}$ is the employment growth of sector i (measured in efficiency units). Intuitively, the groups that are largely employed in expanding sectors will experience rising demand for their services while those groups in contracting sectors will experience a fall in demand for their services.

The results of the relative demand indexes calculated as in (1) are presented in Table 5.³ The table shows that labor demand has shifted in favor of skilled women over less skilled women. For example, during the 1970s the relative demand for college educated women increased 8.8% while the relative demand for high school dropout women declined 9.9%. Similarly, during the 1980s, the relative demand for college educated women rose 8.2% while the relative demand for high school dropout and high school graduate women again declined. The relative demand shifts in favor of skilled women mirror the relative demand shifts favoring skilled men illustrated in the bottom panel

Table 4. Distribution of Total Employment Across Industries and Occupations.

	Year					
	1940	1950	1960	1970	1980	1990
A. Industry						
Mining	2.9	2.2	1.5	1.2	1.5	1.0
Construction	6.2	7.2	7.2	6.7	6.8	7.5
Manufacturing:						
Low Tech	12.6	11.1	9.7	7.5	6.1	5.2
Basic	13.0	16.1	17.9	17.1	15.4	12.1
High Tech	2.8	3.3	4.7	4.7	4.1	3.7
Transport & Utilities	10.0	9.9	8.4	7.9	8.0	6.6
Wholesale	3.9	4.7	4.4	5.0	5.1	5.3
Retail	18.1	16.6	14.1	13.0	11.9	12.9
Professional Services	9.4	9.8	12.4	15.4	19.1	23.6
Education & Welfare	5.3	5.2	7.0	9.5	10.4	10.7
Public Administration	5.0	6.1	6.7	7.2	7.3	7.1
Other Services	11.0	7.8	6.1	4.9	4.4	4.3
B. Occupation						
Professionals	11.1	13.1	16.7	20.0	21.2	23.8
Managers	13.1	13.0	12.6	12.8	15.6	18.5
Sales	7.5	8.1	7.8	7.4	6.8	7.0
Clerical	13.4	12.7	13.5	14.5	14.8	13.8
Crafts	15.6	18.3	17.8	16.7	15.7	13.3
Operatives	15.2	15.8	14.2	12.5	10.0	7.7
Transport Operatives	5.8	5.1	5.1	4.4	4.2	3.9
Laborers	7.9	6.0	4.4	3.5	3.1	3.0
Domestic	3.3	1.3	1.1	0.5	0.2	0.2
Services	7.3	6.6	6.7	7.6	8.2	8.7

Source: Numbers are based on the 1940–1990 Public Use Microdata Samples (PUMS).

Notes: 1. The sample includes men and women with 1–40 years of experience who were in the non-agricultural sector, and who were not enrolled in school or the military during the survey week. Employment shares are calculated as the fraction of total wage-weighted count of workers in the non-agricultural sector.

of Table 5. In fact, these data show that the relative demand shifts in favor of more skilled workers is not a new phenomenon but a continuation of past trends. With regards to the relative demand shifts in favor of women vs. men, the last row of the top panel in Table 5 shows that since the 1940s, industrial change has slightly favored female over male workers. The results reported in Table 5 are broadly consistent with those reported by Blau and

Table 5. Change in Relative Demand Index by Gender and Education.

	Year				
	39-49	49-59	59-69	69-79	79-89
A. Women					
Education					
< 12	-0.176	-0.066	-0.073	-0.099	-0.049
= 12	-0.068	0.034	0.055	0.002	-0.014
13-15	-0.024	0.127	0.136	0.069	0.051
16+	0.010	0.231	0.205	0.088	0.082
All Women	-0.108	0.031	0.044	0.002	0.018
B. Men					
Education					
< 12	-0.002	-0.070	-0.077	-0.065	-0.089
= 12	0.032	-0.009	-0.037	-0.032	-0.074
13-15	0.056	0.038	0.020	0.024	-0.003
16+	0.114	0.179	0.144	0.105	0.099
All Men	0.024	-0.007	-0.012	-0.001	-0.007

Source: Numbers are based on the 1940-1990 Public Use Microdata Samples (PUMS).

Notes: 1. The sample includes men and women with 1-40 years of experience who were in the non-agricultural sector, and who were not enrolled in school or the military during the survey week. Employment shares are calculated as the fraction of total wage-weighted count of workers in the non-agricultural sector.

2. The change in relative demand for a particular group is calculated as the change in the national composition of employment across industries and occupations multiplied by the group's initial employment distribution across industries and occupations. Relative demand changes summed over all groups equal zero.

Kahn (1997) who find, using a different data set and a slightly different methodology, that relative demand shifted in favor of less skilled women over less skilled men but away from skilled women in favor of skilled men during the 1980s.

One criticism of the demand indexes reported in Table 5 is that it requires the assumption that changes in industrial and occupational composition of employment at the aggregate level reflect shifts in demand rather than supply. In particular, there may be exogenous shifts over time in female labor supply and sectoral composition of employment (including women) may have shifted due to the increased number of women in the labor force. More specifically, the service sector may have increased its employment share in the aggregate

not because of increases in demand but because women have increased their labor supply and they are more likely to locate in services than manufacturing. We therefore modified the demand indexes using an alternative assumption about female labor. We assume that the aggregate increase in female labor is exogenous (supply shifts) while changes in the sectoral composition of female labor are assumed to be endogenous (demand-driven). In other words, demand indexes are calculated in the following manner:

$$\Delta D_j / D_j = \sum_i N_{ijt} / N_{jt}^* (M_{it+1}^* - M_{it}) / N_{it} \quad (2)$$

where $M_{it+1}^* = N_{it+1} - F_{it+1}^*$ and $F_{it+1}^* = F_{it}^* (F_{t+1} / F_t)$. In other words, the growth or decline of sector i is measured by changes in the male share of employment in sector i , $(M_{it+1}^* - M_{it}) / N_{it}$. The male share of employment at time $t+1$, M_{it+1}^* , is predicted by first predicting the female share of labor in sector i from the distribution of female labor across sectors at time t , F_{it} , and the aggregate change in female labor from time t to $t+1$, F_{t+1} / F_t .

The relative demand indexes as calculated in (2) are presented in Table 6. The main difference between the results presented in Table 6 in contrast to those presented in Table 5 is that relative demand shifts in favor of women during the 1970s and the 1980s disappear. In fact, according to these measures, relative demand shifted away from women by 3.6% during the 1970s and was essentially unchanged in the 1980s.

The demand indexes reported in the previous tables are measured using observed changes in employment. Since women's wages are rising in the 1980s, observed changes in employment will understate demand shifts measured at constant wages. Taking this bias into account, our calculations suggest the relative demand for women may have increased about 2% in the 1980s. Thus, we conclude that while demand shifts in favor of women may have occurred in the 1980s, demand based stories have a particularly difficult time explaining the acceleration of female employment in the 1970s.

One caveat to these findings is, of course, that the demand indexes reported here only measure relative demand shifts that occur between sectors but are unable to capture skill-biased or in this case, "female-biased" demand shifts which may have occurred within sectors. Using the October Current Population Surveys for 1984 and 1993, Weinberg (2000) shows that female share of employment grew fastest in sectors with the largest increases in share of workers using computers. His findings suggest that computers may have benefited not only skilled workers but female workers as well. However, this explanation is again more compelling for the 1980s when the use of computers became more widespread.

Table 6. Change in Relative Demand Index by Gender and Education.
(Assuming Exogenous Increase in Total Female Employment).

	Year				
	39-49	49-59	59-69	69-79	79-89
<i>A. Women</i>					
Education					
<12	-0.198	-0.081	-0.106	-0.135	-0.068
=12	-0.083	0.019	0.021	-0.041	-0.039
13-15	-0.037	0.111	0.105	0.029	0.029
16+	-0.004	0.215	0.177	0.058	0.066
All Women	-0.127	0.031	0.011	-0.036	-0.004
<i>B. Men</i>					
Education					
<12	0.004	-0.065	-0.066	-0.050	-0.077
=12	0.035	-0.006	-0.027	-0.018	-0.062
13-15	0.059	0.041	0.028	0.038	0.006
16+	0.114	0.180	0.146	0.111	0.102
All Men	0.029	-0.004	-0.003	0.012	0.001

Source: Numbers are based on the 1940-1990 Public Use Microdata Samples (PUMS).

Notes: 1. The sample includes men and women with 1-40 years of experience who were in the non-agricultural sector, and who were not enrolled in school or the military during the survey week. Employment shares are calculated as the fraction of total wage-weighted count of workers in the non-agricultural sector.

2. The change in relative demand for a particular group is calculated as the change in the male composition of employment across industries and occupations multiplied by the group's initial employment distribution across industries and occupations. Relative demand changes summed over all groups equal zero.

V. SUMMARY

In this paper we documented both the acceleration in women's employment in the 1970s and the 1980s and the biased employment growth in favor of skilled women. We examine to what extent these patterns are consistent with changes in labor demand brought about by changes in the industrial and occupational structure of the economy. We find a great deal of evidence of relative demand shifts in favor of skilled women over less skilled women, much like the type of demand shifts that have been documented for men. We find, however, little systematic evidence that demand shifted in favor of female over male workers

during the 1970s and the 1980s. We conclude that measurable changes in labor demand have a particularly difficult time explaining the rapid increase in female employment during the 1970s. Supply-side factors such as changes in divorce laws, contraceptive methods, marriage rates, and fertility appear to be more promising explanations for the changes observed over this decade.

NOTES

1. Some authors have argued that since both relative wages *and* employment of women have increased, demand must have shifted in favor of women (Katz & Murphy, 1992; Topel, 1997). These arguments are more compelling for the 1980s when women's wages rise. While this type of argument is irrefutable in the case of skill demand, similar arguments for women are more problematic because of the difficulties in measuring women's wages given selection into the labor market and changes in discrimination.

2. "Low tech" manufacturing includes lumber, furniture, stone, clay, glass, food, textile, apparel and leather. "Basic" manufacturing includes metal, machinery, auto and other transportation equipment, tobacco, paper, printing and rubber. "High tech" manufacturing includes such industries as aircraft, photographic equipment, chemicals and petroleum.

3. The demand indexes presented in Table 5 are *relative* demand indexes in the sense that total employment is normalized to equal 1 in each period. The weighted average of demand changes reported in Table 5 equal zero.

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APPENDIX

Table A.1. Female Employment Population Ratios – Census.

	<i>A. All Women</i>					
	1940	1950	1960	1970	1980	1990
	0.263	0.324	0.392	0.474	0.585	0.679
	<i>B. Education</i>					
	1940	1950	1960	1970	1980	1990
< 8	0.205	0.265	0.327	0.362	0.377	0.397
8–11	0.232	0.291	0.364	0.418	0.446	0.470
12	0.346	0.365	0.408	0.495	0.595	0.667
13–15	0.340	0.381	0.434	0.512	0.654	0.743
16+	0.455	0.477	0.546	0.601	0.723	0.804
	<i>C. Employment of Married Women</i>					
Husband's Wage Quintile	1940	1960	1970	1980	1990	
1–20	0.149	0.326	0.437	0.511	0.598	
21–40	0.153	0.320	0.440	0.555	0.678	
41–60	0.144	0.293	0.409	0.550	0.688	
61–80	0.138	0.262	0.376	0.522	0.666	
81–100	0.122	0.194	0.306	0.471	0.610	

Notes: The numbers are calculated from the 1940–1990 PUMS files. The sample includes women with 1–40 years of potential labor market experience who were not in school or military service. Employment rates reported in Panels A and B are fractions of women who were working during the survey week. The employment rates reported in Panel C are based on a sample of married women and numbers are reported by husband's wage quintile. Employment rates are calculated by dividing number of weeks worked last year by 52.