Accounting for wage and employment changes in the US from 1968–2000: A dynamic model of labor market equilibrium

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ABSTRACT

In this article, we present a unified treatment of and explanation for the evolution of wages and employment in the US over the last 30 years. Specifically, we account for the pattern of changes in wage inequality, for the increased relative wage and employment of women, for the emergence of the college wage premium and for the shift in employment from the goods to the service-producing sector. The underlying theory we adopt is neoclassical, a two-sector competitive labor market economy in which the supply of and demand for labor of heterogeneous skill determines spot market skill rental prices. The empirical approach is structural. The model embeds many of the features that have been posited in the literature to have contributed to the changing US wage and employment structure including skill-biased technical change, capital-skill complementarity, changes in relative product-market prices, changes in the productivity of labor in home production and demographics such as changing cohort size and fertility.

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1. Introduction

In this article, we present a unified treatment of and explanation for the evolution of wages and employment in the US over the last 30 years. Specifically, we account for the pattern of changes in wage inequality, for the increased relative wage and employment of women, for the emergence of the college wage premium and for the shift in employment from the goods to the service-producing sector. The underlying theory we adopt is neoclassical, a two-sector competitive labor market economy in which the supply of and demand for labor of heterogeneous skill determines spot market skill rental prices. The empirical approach is structural. The model embeds many of the features that have been posited in the literature to have contributed to the changing US wage and employment structure including skill-biased technical change, capital-skill complementarity, changes in relative product-market prices, changes in the productivity of labor in home production and demographics such as changing cohort size and fertility.

Although changes in wages and employment have been well documented for much of the period covered in our analysis, it is useful to summarize the patterns in order to establish a common reference.[1] Table 1 presents statistics on the distribution

of (accepted) hourly wages over the period 1968–2000 based on March CPS data.[2] For ease of exposition, the annual figures are grouped into, and averaged over, six periods, 1968–1974, 1975–1979, 1980–1984, 1985–1989, 1990–1994, 1995–2000. Table 1 highlights a number of trends: (1) Mean and median wages were relatively unchanged in the first three periods; between the periods 1968–1974 and 1980–1984, the mean wage grew by about 4% and the median wage fell by about 2%.[3] Mean and median wages grew slowly in the post 1980–1984 period; mean wages by 21.5% and median wages by 15% through the 1995–2000 period. (2) Wage growth has been uneven over different percentiles of the wage distribution. Wages below the median grew very little over the whole period, while they grew a great deal for those above the median, particularly those in the highest percentiles of the distribution. Specifically, up to the 1990–1994 period, workers in the 10th, and 25th percentiles experienced no wage growth, with some growth since then. However, between the periods 1968–1974 and 1995–2000, the hourly wage of workers in the 75th

[1] See, for example, Katz and Autor (1999) and, more recently, Eckstein and Nagypal (2004) and Autor et al. (2004).

[2] An individual is defined as working in a calendar year if annual hours are at least 780. Wages, converted to 1983 dollars using the GDP deflator, are for those aged 16–64. Imputed wages are dropped, top-coded wages are set at twice the top-coded level and wages below 2 dollars are dropped. The self-employed are not included.

[3] Only accepted wages, wages for those that chose to work, are observed. The difference between accepted and offered wages is potentially important in understanding the trends in observed wages (see e.g., Heckman and Sedlacek (1985)).

Table 1
The distribution of (accepted) hourly wages: 1968–2000.[5]

Period[a]	10th percentile	25th percentile	50th percentile	75th percentile	90th percentile	Mean
1968–74	4.10	5.72	8.40	11.65	15.88	9.60
1975–79	4.06	5.61	8.22	11.96	16.06	9.76
1980–84	3.98	5.57	8.21	12.17	16.61	9.99
1985–89	4.03	5.75	8.68	13.05	18.13	10.72
1990–94	4.02	5.75	8.89	13.40	19.04	11.17
1995–2000	4.24	6.22	9.44	14.42	21.10	12.14

[a] Average of annual figures over the period.

percentile grew by 24% and those in the 90th percentile by 33%.[4] (3) Even those workers with the highest wages experienced little wage growth before the 1980–1984 period; for example, between 1968–1974 and 1980–1984, the growth in wages for workers in the 90th percentile of the wage distribution was only 8%.

Wage inequality not only has grown among all workers, but has also grown after accounting for wage differences that result from changes in schooling, age, gender and occupation-sector of employment. Table 2 reports the standard deviation of the log wage (in the first column) and the root mean square error from regressions of the log wage on alternative sets of regressors. The first set of regressors (1) includes schooling, age, age squared and gender, the second (2) adds dummies for six sector-occupations, and the following sets, (3)–(8), use the same regressors as (1) but condition on each occupation-sector in turn. Without controls, the standard deviation of the log wage increased from 0.542 in the 1968–1974 period to 0.642 in the 1995–2000 period. There is a drop in dispersion in all periods when controls are added, but the increase in dispersion over time remains. For example, in comparison, in specification (2) the root mean square error rises over time from 0.406 to 0.509. The specifications that condition on occupation-sector, and that control for the other regressors, indicate that increased wage dispersion is not confined to one sector or to one occupation, but is a more general phenomenon.

Given the pattern of increased wage inequality as seen in Table 1, it should not be surprising that wages of more-schooled workers have grown faster than for those with less schooling. Table 3 documents this. The median hourly wage of high school graduates (12 years of schooling) was essentially flat over the entire period, falling until the 1980–1984 period (by 7%), and then rising essentially back to the level of the earliest period by 1995–2000. The median hourly wage of college graduates (16 years or greater), on the other hand, exhibited significant growth. Although, like the high school graduates, wages fell until 1980 (by 4%), they subsequently grew by about 25% from then until the 1995–2000 period. Given these patterns, the median wage of college graduates grew from being 52% higher than that of high school graduates in 1968–1974 to being 78% higher in 1995–2000. However, almost the entire increase occurred between 1980 and 1995; the "college premium" actually dropped slightly between 1968–1974 and 1975–1979 and has been essentially constant during the 1990s.[6]

Although the pattern of wage change differed over time, with there being a significant trend break beginning in the 1980–1984 period, the proportion of the age 25–65 population who were college graduates grew steadily throughout. College graduates comprised only about 17% of that group in the 1968–1974 period, 24% by the 1980–84 period and 27% by 1995–2000.[7] While the potential supply of college graduates to the labor market was increasing relative to high school graduates, as seen in Table 3, employment rates of each group grew similarly (from 70.0% to 78.8% for college graduates and from 58.2% to 65.7% for high school graduates). Overall, the number of employed college graduates for every 100 employed high school graduates grew from only 40 in the 1968–1974 to 84 in the 1995–2000 period.

Equally striking has been the very large increase over this period in female employment, both absolutely and relative to men, coupled with a substantial increase in the female-to-male wage ratio. These changes are shown in Table 4. Although the median wage grew by only about 90 cents/h for male workers over the 1968–1974 to 1995–2000 period, the median wage for female workers grew by over 2 dollars an hour, leading to a 15% point increase in the female–male median wage ratio (from 0.585 to 0.733). Over the same period, the male employment rate remained roughly constant (although there was again a trend break before and after the 1980–1984 period, with the male employment rate declining and then rising), while the female employment rate rose by over 20% points. Thus, in 1968–74, there were 55 working women for every 100 working men, while by 1995–2000, there were 82 working women for every 100 working men.[8]

Finally, while these major changes were occurring in the labor market, the production sector of the economy was also undergoing a dramatic shift. As has been going on for more than 50 years, the US economy was continuing to shift its production from the goods-producing to the service-producing sector.[9] Table 5 highlights these changes.[10] Although the growth rate in the value of service-sector output relative to goods-sector output (in constant dollars) was monotonic, it accelerated after 1980. Between 1968 and 1980, the value of service-sector output in constant dollars grew by 1.26% per year more than the value of goods-sector output, while between 1981 and 2000 the differential growth rate was 2.51% per year. This increase in the differential rate of growth of the value of service-sector output between the periods 1968–1980 and 1981–2000 was mirrored by an even larger change in the relative rate of growth of capital allocated to the service sector. In the first period, the annual growth rate of capital was 0.67% less per year in the service sector, but 1.51% more in the second period. On the other hand, the relative rate of growth in service sector employment was slightly greater in the first period, 2.45% per year, than in the second, 2.09.

Given the differing occupational distribution among sectors, the shift towards service-sector production and employment

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[4] Hourly wages grew by 42% for the 95th percentile.

[5] Real (1983) hourly wage rate.

[6] The pattern is similar for mean wages; the college premium grew from 62% to 93%.

[7] There has been a concomitant decline in the proportion of high school non-completers (less than 12 years).

[8] Recall that our definition of work includes what is considered part-time. The overall patterns would not be changed if we restricted attention to full-time work.

[9] See Fuchs (1968, 1980) and Lee and Wolpin (2006).

[10] The data in Table 5 on output and capital come from the Bureau of Economic Analysis. The goods-producing sector consists of the agriculture, mining, construction and manufacturing industry categories, the service sector of the transportation and public utilities, trade, finance, insurance, real estate, private household service, miscellaneous service and public administration industry categories.