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A LONG-TERM VIEW

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ABSTRACT

I investigate how the distribution of daily hours worked among prime-aged men has changed since the 1890s by occupational and industrial group and by the hourly wage. I find that although hours of work have fallen for all workers, the decline was disproportionately large among the lowest paid workers. In the past hours worked were very unevenly distributed with the lowest paid workers working the longest day whereas today it is the highest paid workers who work the longest day. I argue that much of the change in the relative length of the work day can be accounted for by changes in the number of daily hours workers are willing to supply. I show that the unequal distribution of work hours in the past equalized income and that in recent times the unequal distribution of hours worked magnifies income disparities, suggesting that wage or wealth data may underestimate long-run improvements in the welfare of the lowest paid workers.

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The length of the work day has fallen sharply over the last century. The typical worker in the 1880s labored ten hours a day whereas his 1940s counterpart worked an eight-hour day. Time diary studies suggest that the typical worker today works less than eight hours a day (Robinson and Godbey 1997: 95). The primary beneficiaries of the relatively small declines in the length of the work day since mid-century have been lower paid workers. Robinson and Godbey (1997: 217) note that Americans with a college education work longer hours than Americans with less formal education and, to a lesser extent, those with larger incomes or in professional occupations work the longest hours. Coleman and Pencavel (1993) find that increases in weekly hours of work for the college educated and declines for those with a high school education or less have been ongoing since 1940.

Less is known about the distribution of hours worked prior to 1940, the year of the first census to contain a question on weekly hours worked. Indirect evidence that the distribution of work hours narrowed is available from national consumer expenditure surveys dating back as far as 1888. These show that the difference in recreational expenditures, and hence leisure hours, by social class narrowed sharply prior to 1940 (Costa 1997), implying that inequality of living standards fell. In contrast, the existing data on trends in wage inequality prior to 1940 (although sometimes contradictory) suggests that wage inequality declined only slightly from the end of the nineteenth century to 1940 and never fell below today's levels (Goldin and Margo 1992). If the lowest paid workers worked the longest hours in the past whereas today it is the most highly paid who work the longest hours, then wage or wealth data may underestimate long-run improvements in the welfare of the lowest income workers and may present a skewed picture of recent trends in the inequality of living standards.

I. Who Worked the Longest Day?

The data that reveal the distribution of hours worked in the past come from the numerous surveys of the personal, occupational, and economic circumstances of non-farm wage earners

published by state Bureaus of Labor Statistics in the last quarter of the nineteenth century.¹ Although the surveys are predominately of upper working class men, when the datasets that provide information on men's daily hours of work, their wages, and their age are pooled to yield a sample of over 11,000 men aged 25 to 64 there is enough variation in the data to reweight by broad occupational or industry category.

The questions that were asked about hours of work varied slightly by state, but all referred to usual hours of work per day. The mean length of the work day in the pooled dataset was about 10 hours (even when the data are reweighted to be representative of either the 1900 or the 1910 industrial distribution), an estimate similar to that obtained from other sources such as the 1880 manufacturing census (Atack and Bateman 1992) and the Reports of the Commissioner of Labor (Whaples 1990: 33). A comparable measure of usual daily hours of work is provided by the 1991 May supplement to the Current Population Survey and can be inferred from usual hours per week divided by usual days per week as given in the 1973 May supplement. Mean daily hours of work in both years were 8.6 and, although the coefficient of variation increased somewhat from the 1890s to 1973, the distribution between the 90th and 10th percentiles has become more compressed because the majority of workers now work an eight hour day.

Table 1 gives average hours worked per day by deciles of the average hourly wage both for men paid by the hour and for all men aged 25 to 64 in the 1890s, 1973, and 1991. Note that in the 1890s hours worked decrease sharply for men in higher deciles. By 1973 the decrease in hours was no longer as pronounced. By 1991 daily hours increase with the wage decile and then level off, rising only slightly at a higher wage decile. Even within wage deciles and within occupational and industry categories the lower paid workers worked the longest day in the 1890s

¹Many of these surveys were collected by Susan Carter, Roger Ransom, Richard Sutch, and Hongcheng Zhao and are available from <http://www.eh.net/Databases/Labor/>. The surveys used in this study are California in 1892, Kansas in 1895, 1896, 1897, and 1899, Maine in 1890, Michigan stone workers in 1888, Michigan railway workers in 1893, and Wisconsin in 1895.

whereas the higher paid workers worked the shortest day in 1991. The pattern persists controlling for age, marital status, number of dependents, and state and year fixed effects as well.

Although the micro data required to ascertain exactly when the distributional change between the 1890s and 1973 occurred do not exist, the trend in the mean length of the work day suggests that most of the change occurred by the mid 1920s. Because the decline in hours worked between the 1890s and 1973 was largest among men earning the lowest wages, most changes in the mean length of the work day must have come from disproportionate declines in the hours of men in the lowest deciles of the wage distribution, and by 1926, if not earlier, the length of the work day for manufacturing workers was around 8.3 hours (Douglas 1930).

II. Explanations

Various factors might account for the change in the distribution of daily hours worked by different wage deciles. The number of daily hours supplied by men in the lowest wage decile may have fallen relative to the number of hours supplied by men in the top decile. Technological change such as electrification that allows firms to use different shifts of workers may have decreased firms' demand for daily hours from each individual worker, but disproportionately so for hours of work of lower skilled and hence lower paid workers. Hours legislation may have lowered the hours worked by men in the lowest wage deciles. Lastly, the distribution of daily hours may be a poor indicator of total or yearly hours.

II.A Demand and Supply

If some of the occupations or industries that experienced large hours declines were the occupations or industries that employed many low decile workers, then hours of workers in the lowest deciles may have fallen simply because they were over-represented in the occupations or industries that experienced declines in hours. In the 1890s professionals, craft workers,

and laborers worked a much shorter day compared to managers, service, and sales workers. Classifying men by industry shows that the longest hours were worked in trade and personal service and the shortest in mining and construction. By 1991, managers and sales workers still worked the longest day, but service and clerical workers worked the shortest day. The longest were in mining, transportation, communication, utilities and trade, and the shortest in entertainment and personal service. Because hours worked are not known for some industries in the 1890s, I only analyze demand shifts due to broad interoccupational hours changes.

The horizontal shift in demand for daily hours of work from an individual in wage decile i due to changes in the interoccupational mix of daily hours at fixed wages is

$$\Delta h_i = \sum_j \alpha_{ij} a_{ij} \Delta H_j ,$$

where H_j is the average number of daily hours worked in occupation or industry j , a_{ij} is the ratio of daily hours worked in wage decile i to average occupation or industry hours (H_{ij}/H_j), α_{ij} is the fraction of workers in wage decile i in occupation or industry j , and α_{ij} and a_{ij} are evaluated at the base year.

I determine changes in the supply of daily hours worked of men in a given wage decile by explicitly estimating labor supply equations for each period and then using the estimated regressions to predict daily hours of work within each wage decile. The equations that I estimate are

$$h_i = \beta_0 + \beta_w w_i + x_i' \beta \tag{1}$$

for the 1890s and

$$h_i = \beta_0 + \beta_w \ln(w_i) + x_i' \beta \tag{2}$$

for 1991 and 1973, where h is hours worked, w is the hourly wage, and x is a vector of demographic characteristics, such as age and number of dependents. Endogeneity between the wage and hours presents potential problems. Because individuals may influence their own wage through investment in human capital the wage is likely to be correlated with the stochastic error term due to unobserved tastes and abilities that help determine the wage and that determine current labor supply. I therefore use industry dummies as instruments under the assumption that hours demanded from each worker depend upon the industry (perhaps because of technological factors) and hours supplied by each worker do not. For one subsample of the 1890s data I use years of occupational experience as an instrument under the assumption that years of occupational experience does not have a taste effect on labor supply and for another subsample I use last year's wage.

Table 2 presents estimates of wage elasticities for the 1890s, 1973, and 1991. Note that the supply curve of daily hours in the 1890s was very backwards bending, consistent with other estimates for the period (e.g. Whaples 1990) and with contemporary observations. However, the elasticity falls to -0.224 when I use years of occupational experience as an instrument and to -0.107 when I use last year's wage. In the latter case, the estimate is similar to that obtained from ordinary least squares on the subsample. I obtain negative labor supply elasticities conditioning on broad occupational group as well.

In contrast to the estimates for the 1890s, elasticities estimated for 1973 and 1991, although negative, are fairly small. For workers paid by the hour they are positive in 1991. Of course, the negative labor supply elasticities estimated for 1973 and 1991 may well be spurious. Estimates derived from modern panel data sets suggest that once past wage is used to instrument for current wage the relationship between annual or weekly hours worked is positive, even when ordinary least squares indicates that it is negative (e.g. Lundberg 1985). Regardless of whether recent labor supply elasticities are positive or slightly negative but small, the comparison with

past labor supply elasticities suggests that at least between the 1890s and 1973 the labor supply curve has become less backwards bending.

Table 3 summarizes changes in relative supply and demand shifts for daily hours of men in the top wage decile to those of men in the bottom wage decile. Assuming that total demand shifts were proportional to the estimated partial demand shifts, Table 3 suggests that changes in labor supply dominated changes in labor demand.

II.B Other Factors

Although hours legislation may explain much of the current heaping on eight hours of work, it cannot explain the bulk of the distributional change in the length of the work day. Recall that I argued that most of the distributional change probably occurred by the mid-1920s. But, prior to the 1930s state legislation restricting maximum hours of work applied only to women and to relatively few men in dangerous industries.

Workers' trading-off a long work day for a short work week or year is also an unlikely explanation. In the 1890s workers who reported that Sunday work was required were more likely to work a longer day, as were those who reported either no reduction or an increase in Saturday hours. In 1991 men who worked a longer usual day reported working longer usual weekly hours and more days per week. That declines in seasonality have led to less substitution by workers of a longer work day for downtime can be ruled out as well. The number of days lost by the individual worker in the past year has a negative, but negligible, effect on his usual hours of work. Controlling for observable characteristics such as the wage and demographic information, workers in occupations where mean unemployment was three months in the year labored almost 2 hours less per day than workers in occupations with mean unemployment of 0.

III. Implications

The distribution of hours worked has implications for trends in income inequality. Table 4 shows that between 1973 and 1991 26 percent of the earnings inequality between the 90th and the 10th wage deciles could be attributed to differences in hours worked. Table 4 also shows that had the 1991 pattern of hours worked prevailed in the 1890s (but the number of days worked per week had remained unchanged) weekly earnings inequality would have been much greater in the 1890s than it actually was. In the past an inegalitarian distribution of work equalized income whereas today it magnifies earnings disparities.

Changes in the structure of daily work hours could largely be accounted for by declines in the relative number of daily hours workers were willing to supply. Compared to the 1890s increases in the hourly wage no longer have a large, negative impact on hours worked. In fact, workers are now slightly more willing to increase their hours as their wages rise. Several factors could explain this change. Because the work day is now so much shorter, workers are no longer as time poor. Because their incomes are now higher the income effect of a wage increase could be smaller. The availability of new consumer goods might have increased demand for goods relative to leisure. The cost of recreation may have fallen disproportionately for lower income workers. Alternatively, workers may now prefer to take their leisure at older ages and work longer hours during their prime perhaps because it is now easier for them to save for their retirement, because Social Security and private pension plans provide strong financial incentives to take leisure at older ages, or because leisure at older ages is now much more fun. Regardless of the reason for the change in the distribution of work hours the results of this paper imply that although the rich and the poor will always differ in terms of income, income differences no longer mean that the poor have less time for fun.

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Table 1: Distribution of Usual Length Work Day by Hourly Wage Deciles, Men Aged 25 to 64, 1890s, 1973, and 1991

Wage Decile	All Workers			Paid by Hour		
	1890s	1973	1991	1890s	1973	1991
< 10 (Bottom)	10.99	8.83	8.05	11.14	8.17	7.64
10-20	10.46	8.47	8.47	10.08	8.23	8.14
20-30	10.50	8.54	8.53	9.62	8.23	8.24
30-40	10.62	8.38	8.61	9.62	8.16	8.30
40-50	10.31	8.34	8.59	9.62	8.12	8.38
50-60	9.99	8.33	8.61	9.33	8.15	8.48
60-70	10.29	8.33	8.47	9.42	8.16	8.26
70-80	10.07	8.32	8.66	8.67	8.20	8.47
80-90	9.64	8.26	8.64	8.50	8.15	8.40
≥ 90 (Top)	8.95	8.22	8.72	8.88	8.01	8.51
90th/10th	0.81	0.93	1.08	0.80	0.98	1.11
90th/50th	0.90	0.99	1.01	0.95	0.98	1.00
50th/10th	0.94	0.94	1.07	0.86	0.99	1.10

Note. The 1890s data are weighted to have the same distribution of occupational categories as the population in 1900. For workers paid by the hour the hourly wage is the reported hourly wage. For 1973 and 1991 the hourly wage for all workers was estimated from information on weekly earnings. For the 1890s, this rate had to be estimated for workers paid by the week, month, or year by assuming a standard work year, month, or week and subtracting the number of days lost due to ill health, unemployment, or other factors. Although this imputation procedure might introduce systematic bias, examining workers paid by the hour provides some indication of the direction and magnitude of the bias.

Table 2: Elasticity (IV Estimates) of Daily Hours Worked with Respect to the Hourly Wage, Men Aged 25 to 64, 1890s, 1973, and 1991

	Instruments:				
	Industry Dummies			Occupational Experience	Last Year's Wage
	1890s	1973	1991	1890s	1890s
All Workers	-0.304 (0.023)	-0.087 (0.013)	-0.017 (0.016)	-0.224 (0.027)	-0.107 (0.005)
Paid by Hour	-0.536 (0.126)	-0.023 (0.011)	0.104 (0.019)	-1.737 (5.443)	-0.232 (0.060)

Note. Standard errors are in parentheses. Control variables for the 1890s data are age, age squared, dummies for foreign birth, homeownership, whether the worker has any dependents, and fixed effects indicating which State Bureau of Labor Statistics Report the data came from. Control variables for 1973 and 1991 are age, age squared, dummies for nonwhite and married, state fixed effects, and for 1991 the number of children under age 18. Subsamples of the data were used to estimate elasticities using years of occupational experience and last year's wage as instruments. All elasticities are estimated at the variable means.

Table 3: Annual Demand and Supply Shifts for Daily Hours of Workers in Top Decile Relative to Daily Hours of Workers in Bottom Decile

	Relative Shift	
	Demand	Supply
All Workers		
1973-1890	0.04	0.30
1991-1973	0.08	1.26
Paid by Hour		
1973-1890		0.39
1991-1973		1.33

Note. See the text for details. Supply shifts were estimated using predicted average daily hours from the industry IV specifications.

Table 4: Weekly Earnings Inequality, 1890s, 1973, and 1991

Difference Deciles Log Weekly Earnings	Actual			At 1991 Hours	
	1890s	1973	1991	1890s	1973
90th-10th	1.13	1.16	1.39	1.36	1.22
90th-50th	0.57	0.56	0.65	0.68	0.59
50th-10th	0.56	0.60	0.73	0.67	0.63

Note. The 1890s data are weighted by the distribution of occupational groups in the 1900 population; nonetheless, because the 1890s data are not a random sample of the population, wage inequality in the 1890s may be underestimated. Weekly earnings in the 1890s were estimated assuming a regular work year of 307 days minus days lost due to unemployment, sickness, or other causes.