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WAS THERE A NATIONAL LABOR MARKET AT THE END OF THE NINETEENTH CENTURY? INTERCITY AND INTERREGIONAL VARIATION IN MALE EARNINGS IN MANUFACTURING

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Historical Paper No. 61

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
October 1994

I thank Tom Weiss, William Sundstrom, and Gavin Wright for their advice and Robert Whaples and Tom Weiss for providing some of the data used in this research. Astrid Marschatz provided able research assistance. This research was supported in part by an Arthur Cole Grant in Aid from the Economic History Association, and by University of Kansas General Research Allocation #3094-20-0038. This paper is part of NBER's research programs in the Historical Development of the American Economy and Labor Studies. Any opinions expressed are those of the author and not those of the National Bureau of Economic Research.

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ABSTRACT

Recent studies of late nineteenth century labor market integration have found that despite high rates of geographic mobility relatively large inter- and intra-regional differentials in real wages persisted with little tendency toward convergence. These results point to the absence of a unified national labor market, but the scope of these studies is limited by their reliance on comparisons of wage quotations for narrowly defined occupations. Such data are available for only a small and possibly unrepresentative segment of the labor force, and cover only a limited sample of cities and time periods. This paper uses an alternative source of data--average annual earnings calculated from the Census of Manufactures--to extend the examination of labor market integration to all male manufacturing workers in 114 cities from 1879 through 1919. In contrast to earlier research, the average earnings data indicate that a well integrated labor market had emerged in the Northeast and North Central regions of the country by 1879. They also reveal a strong tendency toward earnings convergence within the South Atlantic and South Central regions, suggesting the emergence of a unified southern labor market. Large and persistent North-South, and West-East differentials in earnings indicate, however, that despite the integration of regional labor markets after the Civil War, a unified national labor market had not yet developed.

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Recent studies of labor market integration in the late nineteenth century United States have found large and persistent inter- and intraregional differentials in real wages, suggesting that substantial frictions prevented the emergence of a single national labor market after the Civil War.[1] The scope of these studies is limited, however, by their reliance upon intercity or interregional comparisons of daily wage rates within narrowly defined occupations. This approach has the advantage of reducing the effects of heterogeneity in labor quality and working conditions, but it has meant that investigation has been restricted to that small segment of the labor force employed in occupations sufficiently ubiquitous that wage quotations could be obtained from a relatively large number of locations. In practice, this means that the data pertain primarily to skilled craftworkers in a few industries--mainly construction, metalworking, and job printing--that produced mostly for local markets.[2] Wages in these occupations may not be representative of developments in manufacturing labor markets more generally, where unionization was less significant, and product market competition greater. Moreover, the available occupational wage data typically rest on the records of only a small number of employers in each location, and cover a restricted sample of locations and years.[3]

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[1] Coelho and Shepherd, "Regional Differences in Real Wages;" Rosenbloom, "One Market or Many?"; Rosenbloom, "Occupational Differences;" and Sundstrom and Rosenbloom, "Occupational Differences."

[2] Although wage data are also available for unskilled laborers, it seems likely that wage quotations for these workers were drawn from the records of the same establishments contributing the other data, and thus may not be representative of larger labor market forces.

[3] The major sources of data on occupational wage differentials for the late nineteenth century are U.S. Congress, Report, commonly referred to as the Weeks Report, covering 1851-1880; U.S, Department of Labor, "Wages," referred to hereafter as Bulletin 18 of the Department of Labor, covering 1870-1898; and U.S. Department of Commerce and Labor,

In this paper I use an alternative source of data: average annual earnings calculated from the Census of Manufactures to examine labor market integration among male manufacturing workers in 114 cities in all parts of the country from 1879 through 1919. Both Clarence Long and Albert Rees made extensive use of census earnings data in their classic studies of the trend in wage levels during the late nineteenth and early twentieth centuries, but the patterns of geographic variation in census earnings data have not previously been examined.[4] Although the census earnings data are not without their defects, they provide a valuable alternative to the occupational wage data that have been used previously. Together these two sources of data can be used to reinforce and supplement eachother, adding substantially to our understanding of the history of the geographic integration of U.S. labor markets after the Civil War.

Comparisons of wage and earnings data for the times and places where both are available reveals a broad similarity in the pattern of intercity variation. Despite the parallel patterns of variation, the behavior of interregional differentials in wages and earnings differ

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Nineteenth Annual Report, referred to hereafter as the Nineteenth Annual Report of the Commissioner of Labor, covering 1890-1903. All of these studies collected retrospective data from manufacturers payroll records, and were thus limited to employers who had been in business and kept useable records over the time period under study. In most cases only a few such establishments meeting these criteria could be found in any one location. While efforts were made in each case to gather data from all parts of the country, the Northeast and Midwest are most heavily represented, while data from only a few locations in the South and West were included. For further discussion of these sources see Long, Wages and Earnings, pp. 7-12.

[4] Long, Wages and Earnings; Rees, Real Wages. Long did discuss geographic variations in earnings across broad regional aggregates in the period 1860-1890, but his results are not especially useful, because he considers only a few broad regions and does not make any attempt to adjust earnings for differences in the cost of living.

from eachother in important ways. In contrast to the persistent interregional differentials found in studies using occupational wage data, average earnings in manufacturing were roughly equalized across New England, the Mid Atlantic and East North Central regions as early as 1879, and earnings in the West North Central region converged rapidly toward the level of these regions after 1879. The more extensive coverage of the South and West in the earnings data also allows a more detailed examination of trends in labor market integration in these regions than has been possible previously.[5] Within the South, earnings in the South Central and South Atlantic regions showed a strong tendency toward convergence at the same time that a substantial North-South earnings gap was emerging. Earnings in western cities converged toward eastern levels prior to 1899, but this trend was reversed in the next two decades leading to the reemergence of a substantial West-East earnings gap within the North.

The interpretation of geographic variations in earnings is complicated by the fact that earnings may vary across locations for a variety of reasons other than the absence of market integration. Controlling for these other sources of earnings variation does not greatly alter the pattern of interregional variation, however. Thus it appears that labor market integration within the northern part of the country was more pronounced among manufacturing workers generally than was true for the limited selection of occupations examined in previous studies, and that the emergence of well integrated markets for manufacturing workers in the North and South coincided with the substantial isolation of these markets from one another.

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[5] Wright, "Postbellum" offers an extended examination of southern labor markets after the Civil War, but he bases his argument for the integration of labor markets within the South and the isolation of southern from northern markets solely on comparisons of agricultural wage rates.

I. Census Earnings Data

Prior to 1880 the collection of population and manufacturing statistics was conducted by temporarily employed census marshalls. Because these marshalls were poorly trained and motivated a number of observers have expressed doubts about the accuracy of the statistics they returned, especially as they pertained to the increasingly complex information requested of manufacturers.[6] In 1880 the Census Bureau responded to these concerns by assigning responsibility for the collection of manufacturing statistics in 279 principal cities and towns to a group of special agents knowledgeable about manufacturing conditions. Statistics for 100 of the largest cities canvassed by the special agents were reported separately in the published returns. Census officials believed that the data gathered by the special agents were substantially more accurate than those collected by regular census enumerators, and in subsequent censuses the number of cities for which special agents were assigned and statistics reported separately continued to expand.

Although the Census of Manufactures did not report the earnings of manufacturing employees, average earnings can be calculated from the Census as the ratio of the total wage payments to the average number of wage earners employed during the calendar year preceding the census.[7] For 1889, 1899, and 1904, average employment and total wages

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[6] Long, Wages and Earnings, pp. 39-40.

[7] Until 1905, the Census Bureau defined the census year for manufacturing data to be the 12 months ending on May 31 of the Census year, but firms were allowed to submit reports for the business year coinciding most closely with the census year. In most cases the reported data seem to pertain to the preceding calendar year. Reflecting this practice, beginning with the 1905 census, the census year was shifted to coincide with the previous calendar year, and greater efforts were made to ensure that all firms reported statistics for this period. Easterlin, "Manufacturing Activity," pp. 679-80.

were reported separately for men over 15, women over 15, and children, making it possible to calculate separate earnings figures for each of these groups. Although the published returns report average employment separately for these three age-sex categories for other years, they provide only a single aggregate wage figure.[8] For these years it is necessary to impute the earnings of male manufacturing workers on the basis of the age and sex composition of the manufacturing labor force, and the earnings of women and children relative to adult men in the years that these data are available.[9]

Despite a number of changes in census methods and coverage, it is possible to construct a consistent time series of observations on average earnings of male manufacturing wage earners in major cities throughout the United States beginning in 1879 and extending

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[8] In 1914 and 1919 employment is reported separately by age and sex for December. I have assumed that the proportions of men, women, and children in the labor force remained constant throughout the year, to obtain average employment figures for these two censuses.

[9] By definition total earnings for all workers in city i can be written as $E_i = WM_i*L^m_i + WF_i*L^f_i + WC_i*L^c_i$, where WM, WF, WC are average earnings of men, women and children, respectively, and L^m, L^f, and L^c are the average employment of men, women, and children respectively. Defining $F_i = WF_i/WM_i$, and $C_i = WC_i/WM_i$, and rearranging terms the average earnings of adult men can be written as $WM_i = W_i/\{L^m_i + F_i*L^f_i + C_i*L^c_i\}$. F, C, and WM can be calculated directly in 1889, 1899 and 1904, but in other years the average earnings of men can be imputed by substituting reasonable estimates of F, and C based on the data for 1889-1904. According to Goldin, Understanding, it does not appear unreasonable to assume a constant male-female earnings ratio over the period under consideration. "Nationwide the ratio of female to male earnings in manufacturing rose slowly from 1850 to 1885, when it reached a value of about 0.56....Although the ratio has varied considerably with economic fluctuations over the last century...over the long run it has not materially budged from its value in 1885" (pp. 63-66). Comparison of the ratios of women's and children's earnings to those of adult males in the years for which these data are available reveals substantial intercity variation, but suggests, consistent with Goldin's national estimates, that these ratios remained fairly steady within cities. Because of the changes in census coverage that occurred after 1899 (to be discussed below), I use values of F and C from 1904 to impute male earnings in 1909, 1914, and 1919; and use the averages of F and C calculated for 1889 and 1899 to impute male earnings in 1879.

until at least 1919. I have collected data on employment and wages for all manufacturing industries combined in the 100 cities separately enumerated in the published returns for 1879, and an additional 14 southern and western cities for which data first became available in 1889. The cities for which I have collected data are listed in Table 1 by region.[10] Because of changes in city boundaries that resulted in the incorporation of Brooklyn into New York City, and Allegheny into Pittsburgh, the number of observations in my data drops to 112 in 1904. In addition data on the age and sex composition of the labor force was not available for Washington, DC in 1914 or 1919, reducing the sample to 111 in those years.

Between 1879 and 1919 two important changes took place in census methods and coverage, but their impact on the comparability of the average earnings figures over time appears quite limited. The first was a revision in the methods used to measure average employment. For 1879 and 1889 instructions to enumerators indicate that employers were asked to report a single number reflecting average employment during that part of the year when the plant was in operation. If workers seasonally unemployed at one establishment were successful in finding alternative employment during times of slack demand this procedure would result in double counting in the employment figures, thus biasing upward average employment and biasing downward the resulting earnings estimate. While fluctuations in employment over the course of the year appear to have been relatively large, Engerman and Goldin's analysis of 1900 census data reveals that they were highly correlated

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[10] In general, I have followed the standard Census definitions. On the basis of location and other characteristics, however, I have included four cities along the southern shore of the Ohio River--Covington, KY, Louisville, KY, Newport, KY, and Wheeling, WVA--in the East North Central region, rather than the South Central; and I have included Wilmington, DE in the Mid-Atlantic, rather than the South Atlantic.

across industries, suggesting that opportunities for reemployment were probably quite limited, thus minimizing the double counting problem. Engerman and Goldin also find that employment fluctuations were quite similar across regions, indicating that even if average earnings estimates for 1879 and 1889 were reduced to some extent by double counting in the employment figures, this bias is not likely to have had much impact on relative regional earnings levels.[11]

Beginning with 1899, separate employment figures were requested for each month, and the census bureau computed average employment by summing these figures and dividing by 12.[12] In effect, census employment estimates for 1899 and later years reflect the number of full-time workers that would have been needed were production spread evenly throughout the year. To the extent that employment was seasonal or plants shut down for one or more months due to slack demand, this procedure will bias average employment downward relative to employment when the plant was in operation, and hence bias upward the estimated level of earnings. For highly seasonal employers, the resulting average earnings figures will be a misleading index of what any actual employee was paid, but when figures are aggregated

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[11] Engerman and Goldin, "Seasonality," pp. 111-16. Data by city for 1914 confirm this impression. Using the ratio of minimum employment to average employment as a measure of seasonality there is virtually no regional variation. Averaging this ratio across cities in each region the lowest value is .87 for the East North Central, and the highest is .9 for the West.

[12] for 1899 and 1904 employers were asked to report average employment for each month. Beginning with 1909 they were asked to report the employment on the 15th of each month, or the nearest representative day for which they were in operation. This latter sampling approach probably provides a more accurate measure of employment at a particular establishment, but so long as individual employers did not err systematically in estimating average employment, it should have no appreciable effect on the aggregate statistics.

across all establishments at a particular location, the resulting average annual earnings should provide a reasonable estimate of what an average manufacturing worker could expect to earn over the course of a year.

At the aggregate level, the effects of the shift in census employment concepts appear to have been quite small--consistent with the view that most seasonally unemployed manufacturing workers were unable to find alternative employment. To assess the impact of the change in census procedure I calculated for each city the ratio of manufacturing employment to population by sex in 1889 and 1899. To the extent that the change in census employment concepts affected measured employment this should be reflected in a systematic shift in these employment to population ratios between the two dates. Employment to population ratios did vary substantially across locations, reflecting the varying importance of manufacturing in different cities, but only small variations are apparent over time within each city. For men, the average change in the employment to population ratio from 1889 to 1899 was -0.016 with a variance of 0.003; for women the average change was 0.0001, with a variance of 0.0005.[13] Thus, while there was essentially no change for women, it appears that some double counting of male workers did occur prior to 1899. Given the small degree of variance of the changes in individual cities around the average, however, this should not pose a major problem in studying geographic variations in earnings over time.

The second potential discontinuity in the census data is the result of shifts in the scope

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[13] The aggregate employment to population ratio might also be expected to fluctuate from year to year in response to economic fluctuations. Fortuitously the two census years considered here both coincided with the initial phases of economic expansions, so that economic conditions would appear to be roughly similar. Easterlin, "Manufacturing Activity," p. 679.

of census coverage. There were minor changes in coverage at each census. However, a major redefinition occurred in 1904, when handicraft and neighborhood industries were excluded from the enumeration. The most significant impact of this change was to remove most of the building trades, and a number of branches of clothing manufacture from the census.[14] Elimination of hand and custom work reduced overall employment and payrolls by about 20 percent, and the number of establishments by nearly half. While these changes in coverage make it more difficult to use the census to identify long run trends in the levels of earnings and other variables, they will affect intercity and interregional differentials at a point in time only to the extent that changes in coverage varied across locations.

In 1904 the Census Bureau recalculated the returns from the 1899 census to make the coverage comparable with that adopted in 1904. Comparing the two sets of figures for 1899 reveals that while both employment and payrolls fell about 20 percent as a result of exclusion of hand and neighborhood trades, average earnings fell just 2 percent. Moreover, the effect on earnings was quite uniform across cities and regions. The standard deviation of the difference in earnings as a result of the change in census coverage was just 0.03, and there were no systematic regional differences in earnings associated with the change in coverage.[15]

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[14] Changes in census coverage over time, and the adjustments necessary to produce a consistent time series of aggregate manufacturing activity are discussed in Easterlin, "Manufacturing Activity," pp. 641-52.

[15] The ratio of average earnings excluding hand and neighborhood trades to average earnings including these industries was 0.98 or 0.99 in each region.

II. Geographic Variation in Census Earnings

Census average earnings and occupational wages provide two largely independent sources of information on late nineteenth century labor markets. Comparison of these two sources reveals a substantial amount of agreement between them. In Figure 1 census average earnings in 12 major cities are plotted against an index of relative wages in 23 occupations derived from my previous analysis of data reported in Bulletin 18 of the Department of Labor.[16] The data are not adjusted for intercity differences in the cost of living, since applying a common deflator will affect both wages and earnings in the same way. The three panels compare earnings in 1879, 1889, and 1899 to relative wages in 1875-79, 1885-89, and 1895-98 respectively. The solid line in each graph shows the relationship one would expect if earnings varied in exact proportion to wages. While earnings and wages were clearly imperfectly correlated there is nonetheless a strong positive association between earnings and wages, and one that appears to grow stronger over time. [17] Figure 2 compares census average earnings in 1889 to average wages in 1890 for three separate occupation groups--skilled construction, skilled metalworking, and unskilled labor--in as many as 40 cities, using wage data from the Nineteenth Annual Report of the Commissioner of Labor. Once again,

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[16] Rosenbloom, "One Market or Many?" The index of relative occupational wages is derived from an regression of log wages on dummy variables for each occupation and city. The coefficients on the respective city dummy variables reflect systematic differences in wages attributable to location, and can be referred to as the "city effect" on wages. The index of relative earnings employed in Figure 1 is obtained by exponentiating this "city effect."

[17] In a regression of earnings on a constant and relative wages, the coefficient on wages is positive and significant in each case. The strength of the relationship is best summarized by the R-squared of the regression, which increased from .42 for 1879 to .60 for 1889, and .67 for 1899.

there is a strong positive relationship between earnings and wages.[18]

Despite the correlation of census earnings and wages, census earnings display a greater degree of equalization across the Northeast and North Central regions than has been found in previous studies of occupational wages. Table 2 presents unweighted regional averages of census earnings of male manufacturing wage earners adjusted for the local differences in the cost of living at each census date.[19] It is apparent from Table 2 that earnings were essentially equalized across the New England, Mid Atlantic, and East North Central Regions as early as 1879, and remained quite close thereafter. While more sizeable differentials emerged occasionally, such as the rise in relative earnings in the East North Central in 1904, they were quickly eliminated. Earnings in the West North Central region began in 1879 well above eastern levels but converged very quickly during the 1880s, so that by 1889 the differential with the Mid Atlantic region had fallen to only about 8 percent, where it remained until 1919. In the twenty years from 1879 to 1899 earnings in the West

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[18] Regressing earnings on a constant wages yields a positive and significant coefficient on wages in each case. The R-squared of the regression is .57 for skilled building trades' wages, .44 for unskilled labor, and just .24 for skilled metalworkers. But the weak relationship between earnings and average wages of skilled metalworkers appears attributable largely to six southern cities in which wages were quite high and earnings low. Dropping these observations the remaining points exhibit a much closer relationship.

[19] Michael Haines, "State and Local Consumer Price Index," has constructed state cost of living estimates for 1890 using retail price data from the Aldrich report for commodities accounting for about 86% of household expenditures. The only major category of expenditures not covered by his index is housing. I use the state level estimates because it is only possible to match a fraction of the cities for which earnings data are available to the cities for which cost of living estimates are provided. There are no data to construct location specific cost of living estimates between 1870 and 1890, so I use Haines index to deflate earnings in both 1879 and 1889. For subsequent years I use regional price indices reported by the U.S. Department of Labor, "Retail Prices, 1890," "Retail Prices, 1907," and "Retail Prices, 1913" to adjust Haines 1890 figures for differences in regional price trends.

appear to have been converging toward eastern levels, but this trend was reversed around the turn of the century, with the gap jumping back into the 20 to 25 percent range until at least 1914.

Earnings in the two southern regions were converging with eachother, at the same time that they were falling increasingly below northern levels.[20] In the South Atlantic region earnings were already 16 percent below the Mid Atlantic in 1879, and fell sharply over the next two decades, increasing the North-South gap by nearly 50 percent. Although earnings in the South Central region were initially relatively high, they fell consistently over the next four decades, reaching equality with the South Atlantic in 1919.

Interregional differentials are only one dimension of earnings variations. Within each region, earnings varied around their average level, but in most cases the extent of this variation was falling over time. Table 3 reports one measure of this within-region variation: the coefficient of variation of earnings. The greatest dispersion in earnings occurred within the two southern regions, where the coefficient of variation was greater than 0.3 in 1879. In both regions, however, earnings converged dramatically, so that by the end of the period dispersion was comparable to that in other parts of the country. Similar, though weaker trends toward regional equalization are also apparent within New England, the Mid Atlantic, and West North Central regions. In the East North Central and West regions, where there was no trend in earnings dispersion, the extent of within region variation was already quite low in 1879.

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[20] Gavin Wright, "Postbellum," documents a similar pattern in of within region convergence and between region divergence in farm wages at this time.

One of the most striking features of the earnings data is the near equalization of average earnings across the Northeast and East North Central regions, and the rapid convergence of earnings in the West North Central toward eastern levels from 1879 to 1889, which contrasts with the large real wage gaps noted in previous research. My examination of wage data from Bulletin 18 found that the real wage gap between 4 midwestern and 5 eastern cities rose from around 23 percent in the early 1870s to a peak of 28 percent in the late 1870s before declining gradually to 20.5 percent by the late 1890s. Similarly, my analysis of data for 1890 from the Nineteenth Annual Report found real wage gaps ranging from 22 percent for skilled building trades workers to 9 or 10 percent for skilled metalworkers, and unskilled labor respectively.[21] These occupational wage differentials are not directly comparable to the earnings differentials in Table 2, however, because the earnings comparisons are based on a data from more cities, and the cost of living deflators are different.

As Table 4 shows, deflating earnings and wages by the same cost-of-living index and calculating wage and earnings gaps using the same cities reduces the size of the differences between wage and earnings gaps, but does not alter the conclusion that the interregional differential in earnings was smaller and tended to decline more rapidly than the wage differential. The first two columns of Table 4 reproduce the results of previous studies of occupational wages; in the first column wages are deflated by the city-specific cost-of-living indices I calculated in the earlier wage studies, while in the second column they are deflated using Haines' state-level cost-of-living index. The third and fourth columns of the table

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[21] Rosenbloom, "One Market or Many?"; Rosenbloom, "Occupational Differences."

show the ratio of midwestern to eastern earnings for the same cities used in the wage comparison. Again the difference between the two columns is the cost of living deflator: column 3 uses the same cost of living adjustment used in the wage studies, while column 4 uses Haines' index. Thus wage and earnings gaps can be compared using either columns one and three, or two and four.

Haines' state-level cost-of-living estimates and the city-specific cost-of-living indices used in the wage studies both show that the price level was generally lower in the Midwest than in the the Northeast, but the size of this differential is smaller in Haines' index. As a result, using Haines' index leads to smaller estimates of both the wage and earnings gaps, than are obtained using the city specific indices. Whichever index is used, however, earnings gaps are smaller than wage gaps, and the tendency toward convergence more pronounced. For the Bulletin 18 cities, earnings and wage differentials were roughly comparable at the end of the 1870s, but earnings fell more rapidly thereafter. Using Haines' cost-of-living index earnings are equalized by 1889 while the wage gap remains around 10 percent. Using the city-specific index, earnings remain 9 percent higher in the midwestern cities in 1889, but this represents a nearly 60 percent reduction in the size of the gap. In contrast, the wage gap had declined by less than 25 percent. Turning to the comparison of earnings with wages for those cities covered in the Nineteenth Annual Report data, the effect of using the different cost-of-living indices is less pronounced. For all three occupation groups, the wage gap remains larger than the earnings gap, though only in the case of the skilled building trades is the difference between wage and earning gaps substantial.

There is no obvious a priori basis for selecting between the different of cost-of-living

indices.[22] Overall, Haines index and my earlier indices are in substantial agreement about the pattern of price variation, but it appears likely that state level variations in the cost of living understate price levels in the largest eastern cities (especially New York and Philadelphia).[23] For the small sample of cities covered by Bulletin 18 this is likely to be a significant factor, suggesting that the wage and earnings gaps in columns 1 and 3, respectively, are probably closer to the truth than those in columns 2 and 4. For larger samples of cities, the understatement of price levels in a few cities is likely to be less important--a conjecture confirmed by the smaller effects of shifting cost-of-living indices for the Nineteenth Annual Report cities. For the full sample of cities for which earnings data are available the issue is moot, since city-specific cost of living deflators are not available, but it seems unlikely that the interregional differentials in Table 2 would be greatly altered by the use of a different cost-of-living index.

III. The Sources of Earnings Variation

The existence of a well functioning labor market requires the creation of channels of communication linking employers and job-seekers, and the establishment of institutions to

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[22] Because Haines' index is calculated at the state level it will not reflect intrastate variations in prices. On the other hand, it is based on more comprehensive price data, covering all major expenditure categories except housing, while the indices I constructed previously are based only on retail food prices.

[23] For the 9 eastern and midwestern cities from Bulletin 18, the correlation between Haines' state cost of living estimates and my city specific estimates is 0.801. For the larger sample of cities covered in the Nineteenth Annual Report the correlation coefficient between the two indices is 0.662. Haines city cost of living estimates point to much higher prices in New York, and Philadelphia than for other locations in their respective states. See Haines, "A State and Local Consumer Price Index," Tables 1 and 2.

facilitate the movement of job-seekers in response to employment opportunities in different locations. Within such a market the migration of workers in response to localized shocks to supply or demand will equilibrate conditions throughout the market. Because supply and demand conditions are difficult to observe directly, however, the extent of labor market integration must be inferred from the behavior of observable quantities such as wages or earnings, and migration. When these data can be observed over short intervals it may be possible to use time series methods to directly measure the transmission of localized disturbances across locations.[24] Where the frequency of observations is low, however, it is necessary to rely on variations in the level of wages or earnings across locations as measure of the extent of market integration.

Within an integrated market, migration will tend to equalize the real earnings of homogeneous labor across locations. Earnings differentials can persist in equilibrium, however, if locations differ in non-traded attributes (amenities) that affect workers' utility.[25] In interpreting the observed patterns of variation in census earnings, it is also necessary to

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[24] For example see Stigler and Sherwin, "The Extent of the Market;" and Spiller and Huang "On the Extent of the Market." Odell, "Integration," suggests a means of combining time series variation and differences in levels in a single procedure.

[25] Roback, "Wages," makes the point that general equilibrium requires the equalization of both utility and the returns to capital across locations. Together these conditions uniquely determine both nominal earnings and the local price level as functions solely of the non-traded characteristics of each location. The importance of considering both equilibrium conditions simultaneously depends on the importance of local variation in prices on the returns to capital. If, as seems likely in the late nineteenth-century context, local variation in prices was dwarfed by other considerations such as access to raw materials, low-cost transportation, proximity to expanding markets (and the availability of an adequate labor supply) then the capital market equilibrium condition can be safely dropped from consideration. In this case the worker equilibrium condition is well identified, and the cost of living can be treated as an exogenous regressor as is done below.

account for the effects of labor force heterogeneity. After controlling for amenities and labor force composition, any remaining variation in earnings must reflect differences in relative labor supply and demand conditions. Such differences may arise in the short run as the result of localized supply or demand shocks, but they should not persist for an extended period of time within an integrated market. Persistent differentials then are an indication that migration responses are not adequate to equilibrate labor market conditions across locations.[26] Moreover, the larger the differentials are, the larger must be the imperfections in market responses.

The foregoing considerations suggest that earnings in location i at time t may be written as:

$$E_{it} = G(S_{it}, Y_{it}, P_{it}; V_{it}) \tag{1}$$

where S is a vector of variables measuring non-traded locational attributes, Y is a vector of labor force characteristics, P is the local price level, and V is a measure of local supply and demand shocks. Equation (1) is a reduced form describing the equilibrium variation in earnings across location, and has no structural interpretation. Empirical application of (1) requires that the function G( ) be approximated by some specific functional form. Assuming a log-log specification we can rewrite (1) as:

$$e_{it} = a + bs_i + cy_{it} + dp_{it} + v_{it} \tag{2}$$

where lower case variables indicate natural logarithms, and a, b, c, and d are vectors of coefficients to be estimated. This expression can be estimated by ordinary least squares

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[26] Or that the market is being subjected to a persistent pattern of exogenous supply or demand shocks

regression of log earnings on measures of non-traded amenities, labor force characteristics and the local cost of living. The residual variation (v_{it}) can then be interpreted as a measure of the impact of localized supply and demand shocks.

Disentangling the effects of labor force heterogeneity, non-traded amenities, and the cost of living, from those of supply and demand disturbances requires that we be able to adequately measure the sources of equilibrium earnings variation. The data which are available for this purpose are unfortunately less than complete. Nonetheless, as will be seen, the available evidence suggests that taking account of these factors would not substantially alter the pattern of interregional earnings differentials described above.

Because census earnings data are an average across all adult male wage earners at a particular location, geographic differences in labor force composition could give rise to differences in average earnings even if earnings were in fact equalized for workers with the same skills performing the same tasks. During the late nineteenth century the importance of traditional craft-based skills was declining as the increasing scale of production and standardization of products promoted the increasing homogenization of the factory labor force. According to Claudia Goldin, at the turn of the century, the market for manufacturing labor was essentially a spot market. "Most manufacturing jobs were easily learned" she argues, and "with the exception of jobs like supervisor [and high skilled occupations like steel puddlers]. most could be handled by the average entrant."[27] Similarly, Gordon, Edwards, and Reich, contend that "More and more wage earners in manufacturing shared the experience of working in similar kinds of jobs....Now, more and more, there was a single

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[27] Claudia Goldin, Understanding the Gender Gap, p. 115.

class of semiskilled factory operatives."[28] Aggregate census occupational statistics show, for example, that by the turn of the century two-thirds of male blue collar workers were either operatives or laborers, while only one-third were craftsmen, foremen, or other more skilled workers.[29] Differences in these proportions across cities, however, are likely to be an important source of equilibrium variation in earnings.

Despite the increasing homogenization of the mass of manufacturing workers, it is not safe to treat them as an entirely homogeneous body. The same technological changes that were contributing to the reduction of traditional craft-based skills were giving rise to new new sorts of skill requirements. Although formal bureaucratic systems of internal promotion were not common, William Sundstrom has shown that many firms relied heavily on internal promotion to fill more skilled positions. Similarly, other researchers have shown that many workers could expect eventually to find relatively long-lived jobs suggesting that firm specific human capital was of some importance.[30] Variations in these dimensions of human capital are not likely to be captured in occupational data, but experience and other indicators of basic labor quality such as literacy may be of some help here.

Historical research on urban amenities has concentrated on the effects of mortality--interpreted both as a disamenity in its own right, and as an index of other undesirable

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[28] Gordon, Edwards, and Reich, Segmented Work, pp. 112-28; quotation, p. 118. Nelson, Managers, pp.79-100.

[29] U.S. Department of Commerce, Historical Statistics, p. 74.

[30] Carter and Savocca, "Labor Mobility"; James, "Job Tenure"; and Sundstrom, "Internal Labor Markets" make the case for the importance of long-term attachments and on-the-job learning. See, however, Jacoby and Sharma, "Employment Duration" for a dissenting interpretation of the job-tenure evidence.

characteristics like inadequate sanitation, and overcrowding.[31] Other available measures of amenities that have been commonly used include city size, and climatic conditions.[32] Larger cities may be associated with crowding which diminishes the quality of life and/or a greater diversity of goods and services, which presumably increases the quality of life. Larger cities are likely to have more diverse employment opportunities as well, which may allow for better matching of workers skills and employers requirements. Better weather conditions presumably increase residents enjoyment of a location.

Before controlling for the effects of occupational composition, city size, and climatic conditions on earnings, it is necessary to establish a baseline for comparison. Table 5 presents estimates of equation (2) in which the log of earnings is regressed on the log of the cost of living and a set of regional indicator variables taking the value 1 if the city is located in the region, and 0 otherwise. In effect, this specification assigns differences in amenities or labor force composition across cities to the error term of the regression. The regional effects are included to measure the extent of systematic variation in earnings across regions, and will thus pick up systematic regional differences in demand conditions, amenities, or labor quality. The constant term in the equation measures the level of earnings in the Mid-Atlantic region, and the coefficients on the regional indicator variables measure the deviation of earnings in each corresponding region relative to the Mid-Atlantic.

The coefficients for each region are analogous to the regional averages reported in

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[31] See, for example, Williamson, "Was the Industrial Revolution Worth It?"; Brown, "The Condition of England."

[32] Clark, Kahn, and Ofek, "City size"; Roback, "Wages."

Table 2, except that the average is calculated over log earnings, and the coefficient of the cost of living is determined by the regression, rather than being assumed equal to unity. Reassuringly, the regional effects closely parallel the patterns of variation found in Table 2. The only difference of any note is that while average earnings in the South Atlantic region appeared to drift downward relative to northeastern earnings, Table 5 suggests a fluctuation in regional differentials with no clear trend. Although the coefficient on the cost of living is nowhere precisely equal to one, the hypothesis that its true value is one can be rejected in only one year--1914. Paralleling the declining intraregional dispersion of earnings shown in Table 3, the increasing R-squared of the estimates over time indicates that systematic regional variations accounted for an increasing fraction of the total variation in earnings, while intraregional variations accounted for a smaller fraction of the total. The sharp drop in R-squared and the changes in some of the regional effects in 1919 suggests that World War I was associated with substantial shifts in labor supply and demand conditions to which the market had not completely adjusted by this date.

Table 6 examines the effects of adding labor quality and local amenities to the earnings regression. Because of the stability of regional differences in earnings and the cost of collecting labor force and amenity data for other years, the analysis is restricted to 1899. The first column of the table repeats the results of the baseline regression for 1899. Unfortunately it is not possible to obtain amenity and labor force data for all of the cities covered by the earnings data, so column 2 repeats the baseline regression for the smaller sample of cities for which all of the explanatory variables are available. The pattern of regional variation is similar, but exclusion of several of the lowest wage southern cities

results in a substantial reduction of the gap between earnings in the South Atlantic region and the North. At the same time, earnings in the East and West North Central regions are raised slightly, producing a somewhat greater degree of interregional variation within the North. The third and fourth columns add a variety of variables intended to control for differences in labor quality and amenity differences, respectively, while the fifth column reports the results of including both labor quality and amenity differences.

In the regression reported in column 3, three variables are included to control for differences in occupational composition across cities: the fraction of male manufacturing workers employed in a variety of skilled building (PCTBLDG), and metalworking occuptions (PCTMETAL) are included to capture major categories of highly paid, traditional craftbased skills, while the fraction of gainfully employed males giving their occupation as laborers (PCTLAB), is included to control for the use of the least skilled manual workers.[33] It is not possible to directly measure experience or other dimensions of labor quality, but the census of population does provide data on the age distribution and literacy of the adult population,

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[33] The building trades fraction reflects the sum of workers listing their occupations as: carpenters and joiners, stone and brick masons, and plumbers and gas and steam fitters. The metal working trades fraction reflects the sum of workers listing their occupations as: blacksmiths, iron and steel workers, steam boilermakers, and other metal workers. Regional variations in occupational composition were fairly substantial. Not surprisingly building trades workers were most numerous in rapidly growing areas; in the West North Central, the West, and the two southern regions 15-17 percent of males employed in manufacturing listed an occupation in the building trades, as compared to about 10 percent in the Mid Atlantic, East North Central and New England regions. On the other hand, metal trades workers were most numerous in the Mid Atlantic, New England, and East North Central regions than elsewhere. Finally, laborers were somewhat more common in the South, accounting for nearly 16 percent of gainfully employed males, and least important in New England, where they were just 8 percent of the male labor force.

both of which are included in the regression.[34] To reflect differences in the age distribution of the labor force the regression includes variables measuring the fraction of the male population in each of four age categories--15 to 24 years, 25 to 34, 35 to 44, and 45 to 64. Earnings are expected to increase with age at first, reflecting increased experience and physical strength. Among the oldest category of male workers, however, partial retirement through demotion to less demanding types of work, and the decline of physical strength are expected to be associated with a drop in earnings. The fraction of the population over age 10 that is illiterate is also included as a rough measure of labor quality.

Controlling for labor quality improves the fit of the regression modestly, raising the adjusted R-squared from .35 to .39. As expected greater numbers of skilled construction and metal trades workers tended to raise average earnings. The coefficients on both these

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[34] The population census also contains information on the nativity and racial composition of the population in different cities, characteristics which are often treated as proxies for skill. There was substantial variation across cities in both the fraction foreign born and the fraction non-white, but consideration of the relationship between these variables and earnings variations leads me to reject them as proxies for labor skill, and thus to exclude them from the analysis. In particular, one would expect that if these dimensions of labor force variation were proxies for skill, their relationship to earnings should be fairly stable across different groups of cities. In fact, however, neither nativity nor race had a significant relationship with earnings outside the South. Within the South the fraction foreign born was significantly and positively related to earnings levels, suggesting that differences in labor force composition were the result of differences in migration rates in response to earnings differences. In contrast, there was a strong negative relationship between earnings and the fraction non-white. Indeed, the elasticity of earnings with respect to the fraction non-white is close to -1, suggesting that a one percent increase in the fraction non-white would lower earnings by one percentage point. Wright, Old South, New South, pp.68-70. argues, however, that there is little evidence of pronounced racial wage differentials within occupations in the South, suggesting that variations in the fraction non-white must be capturing some other factor affecting earnings.

variables are positive and significant, statistically and economically.[35] The coefficient on PCTLAB indicates that greater numbers of the least skilled workers tended to depress earnings, but the coefficient is not statistically significant. None of the age composition coefficients is statistically significant, either, but their relative magnitudes are consistent with expectations, showing that greater numbers of the youngest and oldest age groups tended to depress earnings. Also consistent with expectations the coefficient on the illiteracy rate is negative though not statistically significant. Inclusion of these controls reduces the differential between the North Central regions and the Northeast relative to column 2, indicating that some of the intercity variation within these regions is indeed accounted for by differences in labor quality. To the extent that the North-South differential is affected, it is actually widened after controlling for labor quality.

Column 4 adds to the earnings regression the infant mortality rate measured in deaths per thousand (INFMORT), the logarithm of city population,and three variables intended to reflect different aspects of climatic conditions: (1) average annual sunshine as a percentage of potential sunshine (SUN), (2) the log of the average temperature in January (JANTEMP), and (3) the annual precipitation in tenths of inches of rain (RAIN). Inclusion of these explanatory variables increases the adjusted R-squared substantially, raising it to .48. Most of the additional explanatory power comes from the city size variable, which indicates a

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[35] The coefficient estimates imply that increasing the fraction of skilled metal trades workers one percent would increase average earnings by nearly .3 percent, while raising the fraction of skilled building trades workers one percent would increase earnings .85 percent. The smaller numbers of skilled metal workers can account for between 2 and 3 percent of the earnings disadvantage of the South Atlantic, while the higher number of skilled building trades workers in the South Central region would on its own would have raised average earnings by nearly 6 percent relative to the Mid Atlantic.

strong and statistically significant positive relationship between earnings and population. One interpretation of this relationship is that increasing size was associated with disamenities such as crowding which required compensating payments. The coefficient on infant mortality is also statistically significant and negative, as expected. None of the climatic variables was statisticaly significant. Inclusion of these variables again narrows the differentials between the North Central and Northeast relative to column 2, but widens the North-South earnings gap. Controlling for amenities also lowers western earnings, causing them to fall slightly below eastern levels.

Column 5 reports the results of a combined regression including both labor quality and amenities data. The coefficient estimates for the labor quality and amenity variables in column 5 closely resemble those in the preceeding columns. Controlling for labor force and amenity differences does not greatly alter the initial pattern of interregional differentials. Labor quality and amenity differences do account for some of the variation in earnings within the Northeast and North Central regions, strengthening the earlier impression of equalization across these regions. On the other hand, controlling for labor quality and amenity differences actually tends to exacerbate North-South differences, substantially widening the gap between the South Atlantic region and the North. Earnings in the West are also reduced slightly. Judging from these results, it appears that accounting for labor quality and amenity differences neither alters the impression of earnings equalization across the Northeast and North Central regions, nor reduces the North-South earnings gap. The earnings gap between the West and the East is reduced, but only modestly.

IV. Earnings Variation and Labor Market Integration

In contrast to previous research based on comparisons of occupational wage rates for a limited number of occupations, the census earnings data suggest that by the late nineteenth century a well integrated market for manufacturing labor existed within the northern United States. Average earnings in manufacturing were nearly equalized across New England, the Mid Atlantic and the East North Central regions as early as 1879, and over the course of the 1880s the differential between earnings in the West North Central and other northern regions narrowed substantially. At the same time, earnings dispersion within each of these regions was tending to decline. These conclusions are not altered when the effects of occupational composition and locational attributes are taken into account.

Locations in the South and West are poorly represented in sources of occupational wage data. Census earnings data allow a more extensive examination of the evolution of labor market conditions in these regions than is possible using occupational wage data. Between 1879 and 1919, census average earnings in the South Atlantic and South Central regions fell substantially relative to northern levels, giving rise to the widely remarked upon North-South wage gap of the first half of the twentieth century. If anything, accounting for differences in labor force composition and locational attributes only tends to expand this gap. By 1919 earnings in the two southern regions were nearly equalized, and dispersion around these regional averages had fallen sharply. Thus, the census data suggest that labor market integration and dis-integration coincided with eachother. While well unified northern and southern labor markets were emerging, there was little connection between conditions in these two regions.

The behavior of earnings in the West is more difficult to interpret. From 1879 to 1899 western earnings declined toward eastern levels, but in the following twenty years this trend was reversed leading to a widening of the earnings gap into the 20 to 25 percent range. Consideration of occupational composition and locational attributes appears to account for part of this gap, but seems unlikely to fully explain it. Thus it appears that western labor markets were not yet well integrated with those in the Northeast and North Central regions.

It will never be possible to fully account for the effects of labor force composition and locational attributes on earnings. To this extent conclusions based on the census earnings data must remain tentative. Nonetheless, data on population redistribution provide at least partial confirmation of the interpretations advanced above. Within an integrated market earnings differentials should give rise to corresponding labor supply adjustments. Labor supply responses cannot be directly observed, but changes in population between census dates provide one rough proxy for this variable. Between 1880 and 1890, for example, the high level of earnings in the West North Central region appears to have given rise to a rapid influx of population. While the population of cities in New England, the Mid-Atlantic and East North Central regions grew by about 40 percent, the population of the West North Central cities in my sample increased by nearly 115 percent. With the convergence of earnings by 1889, population growth rates in the West North Central fell to equality with other northern regions.

Table 7 explores the relationship between population growth and earnings more generally. For each decade I have regressed the change in the log of city population on a constant and the log of census average earnings adjusted for differences in the cost of living.

The first column shows the results when the regression is estimated across all of the cities in the sample. The coefficient on log earnings is consistently positive, but varies in magnitude and is only occasionally significant. In the second column, attention is restricted to cities in the Northeast, North Central and West regions. Consistent with the view that these areas comprised a distinct and well integrated labor market, the coefficients on log earnings are larger and, except for 1890-1900, statistically significant. The third column reports estimates of the population growth-earnings relationship within the South. These estimates suggest a much weaker relationship, possibly because higher rates of natural increase in the South mask the relationship between variations in migration and population growth that is operative in the North.

V. Conclusions

Previous studies of labor market integration during the late nineteenth and early twentieth centuries have relied on comparisons of occupational wage rates. Puzzlingly in light of the substantial improvements in transportation and communication that took place in this period, and the massive population redistributions to which they gave rise, these studies have found persistent and relatively large interregional real wage differentials. Occupational wage data are available for only a few occupations, and a small number of locations, however. This paper has employed data on average annual earnings calculated from the census of manufactures to expand the scope of investigation to include all adult male manufacturing workers.

Although comparison of relative wage and earnings data for locations and dates where

both are available indicates a broad similarity in wage and earnings variation, the census data suggest a higher degree of labor market integration within the northeastern and midwestern parts of the country, than is true of the occupational wage data. When occupational wage data are considered separately by occupation, it is apparent that the greatest interregional differentials were present among the skilled building trades, and the smallest differentials were found among unskilled laborers. Thus the differences in findings based on the different data sources may be explained by differences in their coverage. While markets for certain skilled trades--mainly in construction and metalworking--remained less than completely integrated, markets for manufacturing workers more generally, where labor remained largely unorganized, and entry requirements were small, were becoming highly integrated at this time.

Census earnings data also present a much more detailed picture of labor market developments outside the Northeast and North Central regions. They make clear what was tentatively suggested on the basis of the occupational wage data--that while labor market integration was proceeding on a regional level, there was a process of labor market dis-integration taking place between northern and southern regional markets. Evidence on western labor markets is mixed, but it appears that the developments encouraging labor market integration were not yet strong enough to overcome completely the barriers of distance that separated the West from the East.

Figure 1:
Comparison of Relative Average Earnings and Occupational Wages,
For the Twelve Bulletin 18 Cities, 1879-1899

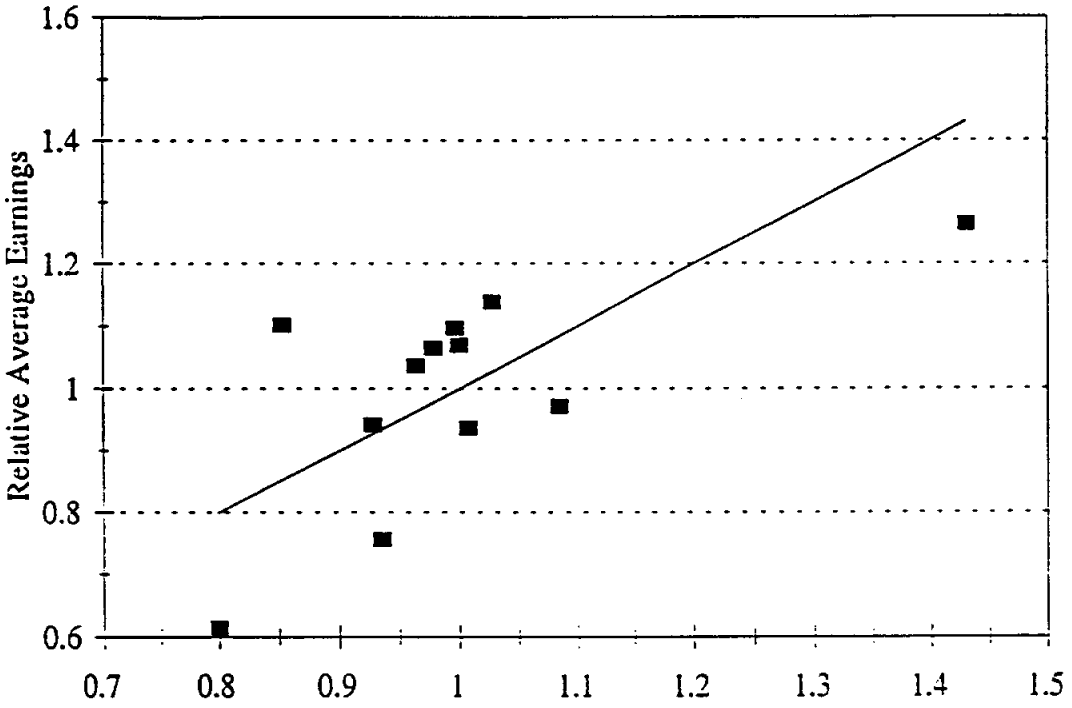

Figure 1(a): 1879

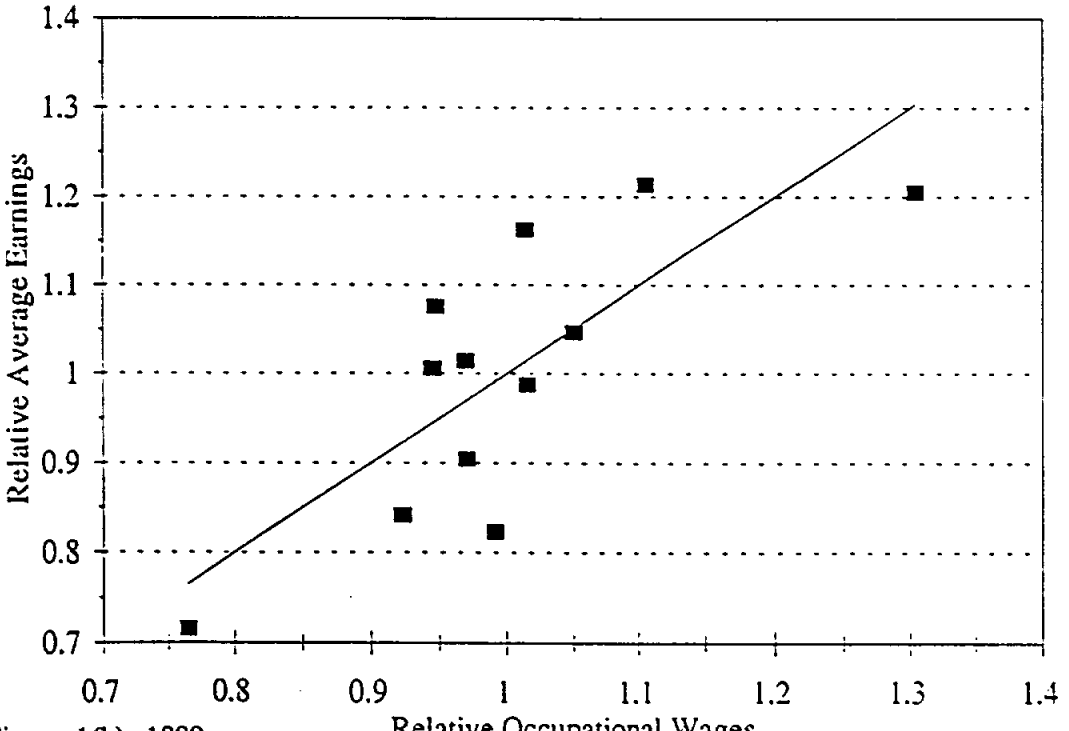

Figure 1(b): 1889

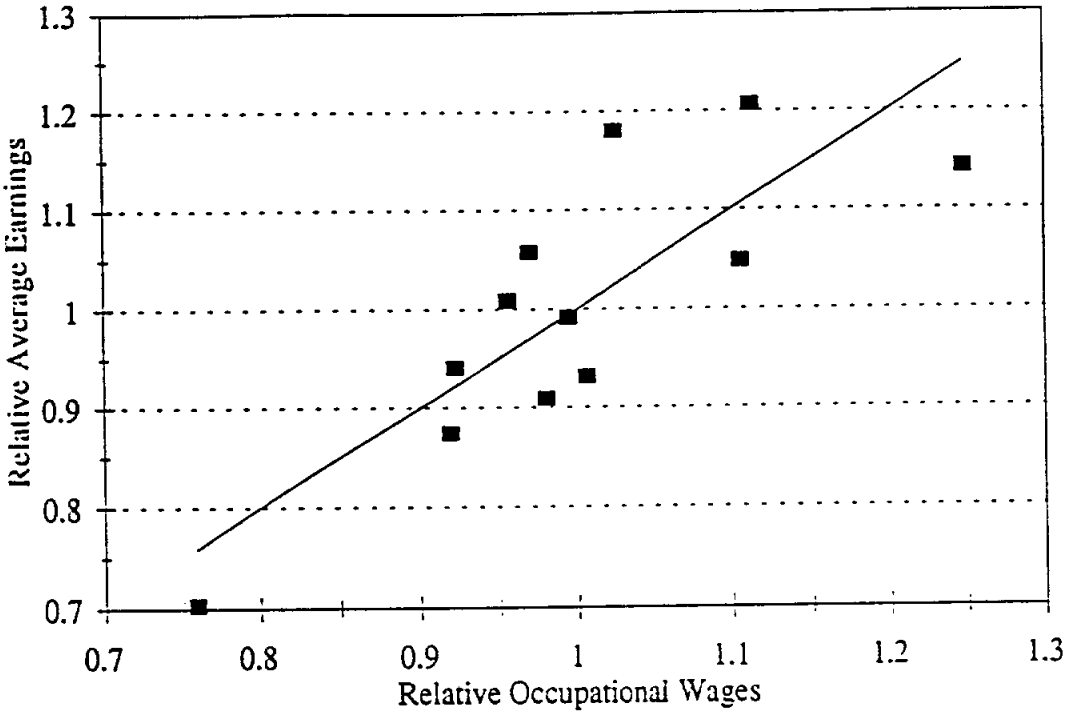

Figure 1(c): 1899

Notes: Each graph compared average earnings to relative occupational wages for the 12 cities surveyed in the U.S. Department of Labor's Bulletin 18 wage data .. Earnings and wages are expressed relative to the average for all 12 cities. Earnings are compared to the relative wage level reported in Rosenbloom, "One Market or Many?" p. 94, for the five year period ending in the census year (for 1899 earnings are compared to the wage level for 1895-98).

Figure 2:
Comparison of Relative Average Earnings and Occupational Wages,
For 40 Cities Included in the Nineteenth Annual Report
of the Commissioner of Labor, 1890, by Occupation Group

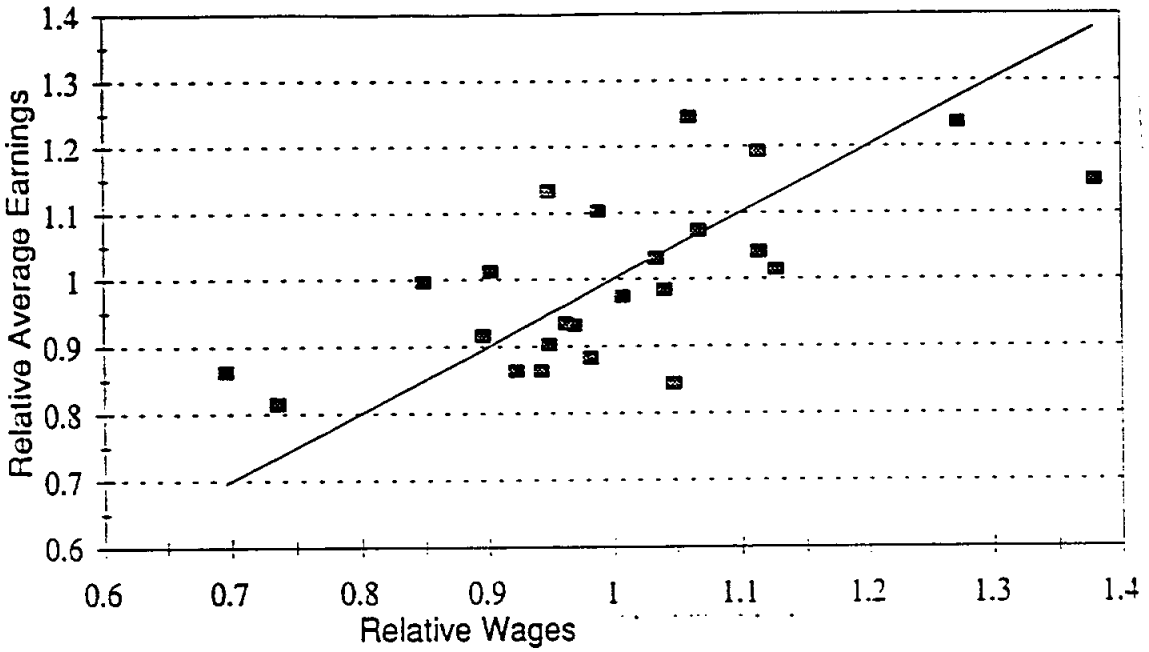

Figure 2(a): Unskilled Laborers

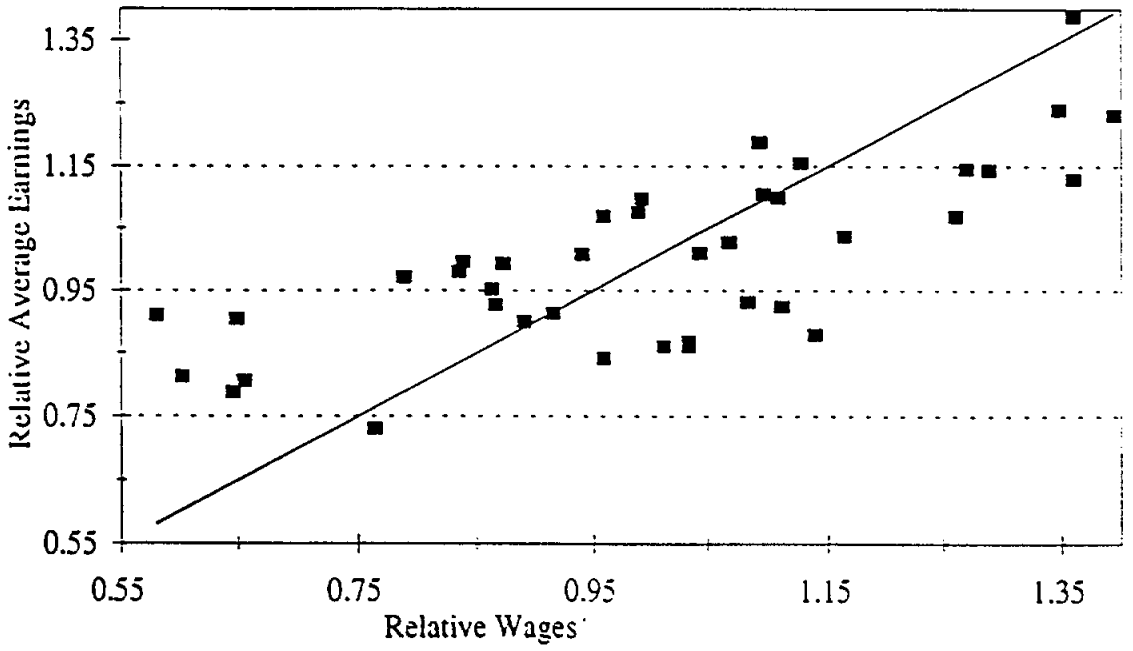

Figure 2(b): Skilled Building Trades Workers

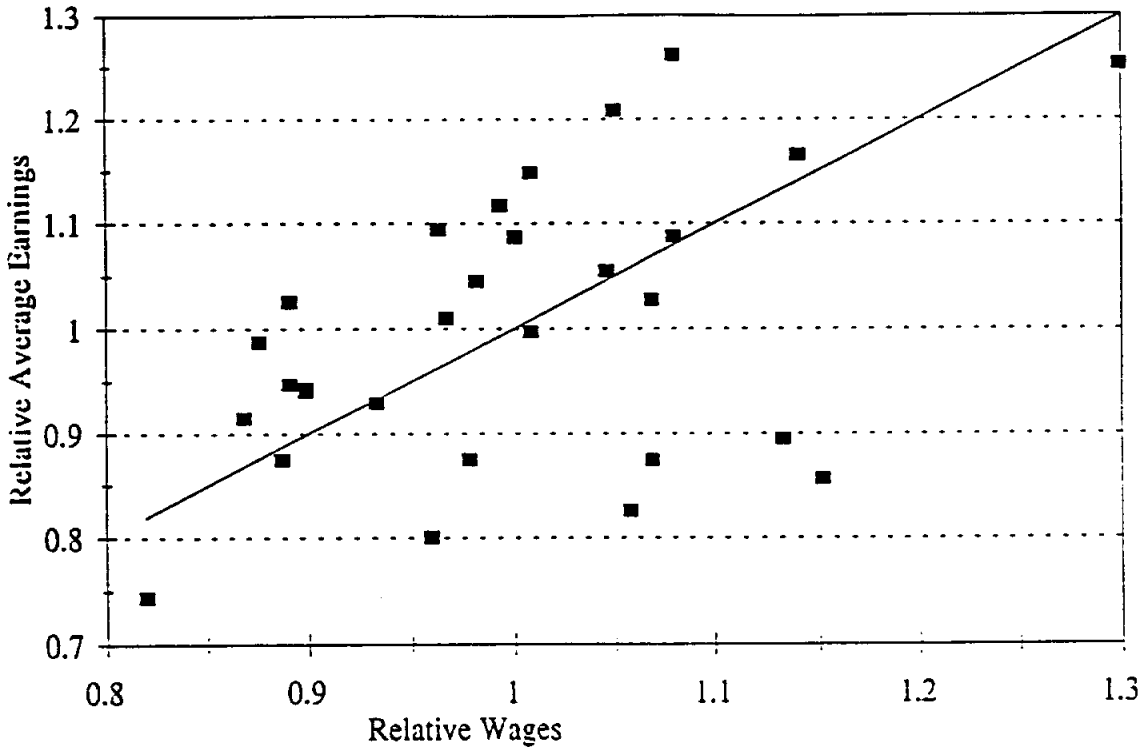

Figure 2(c): Skilled Metal Trades Workers

Notes: Each figure compared nominal census average earnings in 1889 to the average of occupational wage rates reported for 1890 in the Nineteenth Annual Report of the Commissioner of Labor. Average earnings and wages are each expressed relative to the average for all cities being compared. Average occupational wages are reported in Rosenbloom, "Occupational Differences," p. 430.

Table 1:
Geographic Coverage and Regional Definitions

New England	Mid-Atlantic	East North Central	West North Central
Boston, MA	Albany, NY	Bay City, MI	Davenport, IA
Bridgeport, CT	Allegheny, PA	Chicago, IL	Des Moines, IA
Cambridge, MA	Auburn, NY	Cincinnati, OH	Dubuque, IA
Chelsea, MA	Brooklyn, NY	Cleveland, OH	Kansas City, KS*
Fall River, MA	Buffalo, NY	Columbus, OH	Kansas City, MO
Hartford, CT	Camden, NJ	Covington, KY	Minneapolis, MN
Holyoke, MA	Elizabeth, NJ	Dayton, OH	Omaha, NB
Lawrence, MA	Elmira, NY	Detroit, MI	St. Joseph, MO
Lowell, MA	Erie, PA	Evansville, IN	St. Louis, MO
Lynn, MA	Harrisburg, PA	Fort Wayne, IN	St. Paul, MN
Manchester, NH	Hoboken, NJ	Grand Rapids, MI	Topeka, KS*
New Bedford, MA	Jersey City, NJ	Indianapolis, IN	Wichita, KS*
New Haven, CT	Lancaster, PA	Louisville, KY	
Portland, ME	New York, NY	Milwaukee, WI	
Providence, RI	Newark, NJ	Newport, KY	
Salem, MA	Oswego, NY	Peoria, IL	
Somerville, MA	Paterson, NJ	Quincy, IL	
Springfield, MA	Philadelphia, PA	Springfield, IL	
Taunton, MA	Pittsburg, PA	Springfield, OH	
Worcester, MA	Poughkeepsie, NY	Terre Haute, IN	
	Reading, PA	Toledo, OH	
	Rochester, NY	Wheeling, WV	
	Scranton, PA		
	Syracuse, NY		
	Trenton, NJ		
	Troy, NY		
	Utica, NY		
	Wilkesbarre, PA		
	Wilmington, DE		

South Atlantic	South Central	West
Atlanta, GA	Birmingham, AL*	Denver, CO
Augusta, GA	Dallas, TX*	Los Angeles, CA
Baltimore, MD	Galveston, TX	Oakland, CA
Charleston, SC	Houston, TX*	Portland, OR*
Macon, GA	Memphis, TN	Pueblo, CO*
Norfolk, VA	Mobile, AL	Sacramento, CA
Peterburg, VA	Montgomery, AL*	Salt Lake City, UT
Richmond, VA	Nashville, TN	San Francisco, CA
Savannah, GA	New Orleans, LA	Seattle, WA*
Washington, DC	San Antonio, TX	Tacoma, WA*
Wilmington, NC		

* Cities marked with an asterisk are included in the data set beginning in 1889.

Notes: Because of changes in city boundaries Allegheny is combined with Pittsburgh and Brooklyn is reported as part of the total for New York beginning with the census of 1904. Data on the age and sex of manufacturing wage earners are not available for Washington, DC in 1914 and 1919, so it is not included in the sample in these years.

Table 2:
Average Annual Earnings of Male Wage Earners in Manufacturing
Adjusted for Intercity Cost of Living Differences, 1879-1919

Region	1879	1889-A	1889-B	1899	1904	1909	1914	1919
Average Earnings (current dollars)								
MA	426.37	528.33	528.33	511.59	534.83	607.68	671.24	1297.23
NE	422.04	510.63	510.63	504.73	519.47	585.65	633.98	1197.82
ENC	445.60	528.61	528.61	521.41	576.66	612.47	710.00	1268.82
WNC	536.07	581.23	568.34	545.41	594.51	649.87	722.36	1257.94
SA	355.54	432.20	420.16	374.73	414.26	458.78	493.33	1005.72
SC	456.36	509.89	511.53	470.77	492.62	529.02	574.81	1027.28
West	498.92	623.20	639.16	553.43	674.98	757.57	834.38	1470.30
Relative Average Earnings (Mid-Atlantic = 100)								
MA	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
NE	98.98	96.65	96.65	98.66	97.13	96.37	94.45	92.34
ENC	104.51	100.05	100.05	101.92	107.82	100.79	105.77	97.81
WNC	125.73	110.01	107.57	106.61	111.16	106.94	107.62	96.97
SA	83.39	81.80	79.53	73.25	77.46	75.50	73.50	77.53
SC	107.03	96.51	96.82	92.02	92.11	87.05	85.63	79.19
West	117.02	117.96	120.98	108.18	126.20	124.67	124.30	113.34

Notes: Regional Abreviations: MA--Mid-Atlantic; NE--New England; ENC--East North Central; WNC--West North Central; SA--South Atlantic; SC--South Central; West--West. For cities in each region see Table 1. For 1889 two figures are reported, the column labeled 1889-I is based on the same 100 cities used for 1879, while the column labeled 1889-II shows average earnings for all 114 cities in the sample. Earnings are adjusted in each year for intercity differences in the cost of living, but not for changes over time in the general price level. Details of the cost of living adjustment are provided in the text.

Table 3:
Within Region Coefficient of Variation of Average Earnings
of Male Manufacturing Wage Earners, 1879-1919

Region	1879	1889	1899	1904	1909	1914	1919
MA	0.124	0.133	0.086	0.081	0.077	0.073	0.086
NE	0.149	0.117	0.104	0.116	0.114	0.112	0.092
ENC	0.068	0.094	0.064	0.089	0.079	0.104	0.108
WNC	0.118	0.117	0.100	0.086	0.085	0.101	0.077
SA	0.304	0.204	0.236	0.196	0.197	0.125	0.148
SC	0.325	0.173	0.147	0.158	0.108	0.097	0.086
West	0.058	0.072	0.092	0.047	0.078	0.054	0.090

Notes: Regional abreviations are the same as those used in Table 2. The coefficient of variation is calculated as the ratio of the standard deviation of earnings to the average level of earnings across all cities for which data are available in each region at each date.

Table 4:
Comparison of Midwest-Northeast Differential Implied by
Census Average Earnings and Various Occupational Wage Studies

Source of Occupational Wage Comparison	Relative Midwestern Earnings or Wages (Northeast = 100)			
	Occupational Wages		Census Average Earnings	
	Wage Study COL Index	Haines State COL Index	Wage Study COL Index	Haines State COL Index
Bulletin 18 23 Occupations Combined				
1875-79	128.0	110.8	123.6	109.2
1885-89	121.8	108.2	111.1	99.8
1895-98	120.5	107.8	109.3	98.1
Nineteenth Annual Report				
Skilled Bldg. Trades, 1890	122.2	115.2	107.8	103.4
Skilled Foundry Workers, 1890	109.1	105.1	102.8	100.1
Common Laborers, 1890	110.1	104.9	104.6	100.4

Notes and Sources: Bulletin 18 occupational wage comparisons are reported in Rosenbloom, "One Market or Many?", pp. 94-95. In this source the Midwest is represented by four cities--Cincinnati, Chicago, St. Louis, and St. Paul--and the Northeast by five cities--New York, Boston, Baltimore, Philadelphia, and Pittsburgh. Wages are compared to earnings at the end of each specified time period. 19th Annual Report wage comparisons are from Rosenbloom, "Occupational Differences," p. 430. The Northeast is represented by up to 20 cities, and the Midwest is represented by up to 11 cities. Precise coverage varies between occupation groups. Skilled Bldg. Trades includes: bricklayers, carpenters, painters, and plumbers; Skilled Foundry Workers includes: blacksmiths, boilermakers, pattern makers, and iron molders; Common Laborers includes: building trades laborers, and foundry and machine shop laborers. In each case wages are compared to earnings in 1889.

For each comparison the first and third columns adjust nominal wages or earnings using the Cost of Living indices reported in the occupational wage study. The second and fourth columns adjust wages and earnings using Haines state Cost of Living index.

Table 5:
Regression Estimates of Regional Effects on
Average Earnings of Male Manufacturing Workers, 1879-1919
(Standard Errors in Parentheses)

	1879	1889-I	1889-II	1899	1904	1909	1914	1919
Constant	6.042[a]	6.258[a]	6.261[a]	6.234[a]	6.283[a]	6.398[a]	6.487[a]	7.155[a]
	(0.031)	(0.026)	(0.025)	(0.022)	(0.023)	(0.022)	(0.020)	(0.021)
NE	-0.030	-0.039	-0.031	-0.013	-0.024	-0.029	-0.036	-0.069[a]
	(0.051)	(0.044)	(0.041)	(0.034)	(0.036)	(0.033)	(0.030)	(0.032)
ENC	0.086	0.021	0.003	0.019	0.058	0.002	0.048[b]	-0.022
	(0.067)	(0.057)	(0.050)	(0.046)	(0.042)	(0.031)	(0.027)	(0.030)
WNC	0.278[a]	0.117	0.074	0.062	0.088	0.060	0.062[b]	-0.030
	(0.088)	(0.075)	(0.055)	(0.051)	(0.048)	(0.037)	(0.033)	(0.036)
SA	-0.219[a]	-0.215[a]	-0.240[a]	-0.330[a]	-0.267[a]	-0.272[a]	-0.240[a]	-0.219[a]
	(0.061)	(0.052)	(0.047)	(0.042)	(0.040)	(0.044)	(0.047)	(0.058)
SC	0.046	-0.038	-0.038	-0.089[a]	-0.081[b]	-0.103[b]	-0.069	-0.192[a]
	(0.072)	(0.062)	(0.049)	(0.042)	(0.044)	(0.056)	(0.051)	(0.058)
West	0.099	0.144	0.200[a]	0.081	0.247[a]	0.252[a]	0.251[a]	0.119[a]
	(0.118)	(0.100)	(0.075)	(0.058)	(0.046)	(0.051)	(0.038)	(0.039)
Log(Cost of Living)	1.493[c]	1.213[c]	0.975[c]	0.983[c]	0.747[c]	0.632[c]	0.155	0.650[c]
	(0.677)	(0.576)	(0.451)	(0.400)	(0.405)	(0.394)	(0.360)	(0.385)
R^2	.326	.371	.492	.514	.555	.585	.585	.294
N Obs.	100	100	114	114	112	112	111	111

Notes: Regional abbreviations are the same as those used in Tables 2 and 3. Regional effects are estimated as the coefficients on zero-one indicator variables that take the value one when a city is in the region, and zero otherwise. The constant term measures the level of log average earnings in the Mid-Atlantic region, and the regional effects measure the relative deviation of earnings in each region from this level. All regressions are estimated by Ordinary Least Squares. The column headed 1889-I is estimated for the same 100 cities included in the estimates for 1879, while the column headed 1889-II is estimated across all 114 cities in the sample.

[a] Coefficient estimate is statistically significantly different from zero at the 95% confidence level.
[b] Coefficient estimate is statistically significantly different from zero at the 90% confidence level.
[c] Coefficient estimate is not statistically significantly different from one at the 95% confidence level.

Table 6:
Regression Estimates of Regional Effects on Average Earnings
of Male Manufacturing Workers, Controlling for Differences
in Occupation Mix and Locational Characteristics, 1899
(Standard Errors in Parentheses)

Variable	(1)	(2)	(3)	(4)	(5)
Constant	6.234[a]	6.221[a]	6.632[a]	4.883[a]	5.183[a]
	(0.022)	(0.025)	(0.320)	(0.635)	(0.717)
New England	-0.013	-0.025	-0.023	-0.022	-0.013
	(0.034)	(0.037)	(0.041)	(0.035)	(0.038)
East North Central	0.019	0.069	0.018	0.028	0.015
	(0.046)	(0.050)	(0.051)	(0.048)	(0.048)
West North Central	0.062	0.130[a]	0.060	0.082	0.068
	(0.051)	(0.057)	(0.067)	(0.056)	(0.064)
South Atlantic	-0.330[a]	-0.192[a]	-0.197[a]	-0.254[a]	-0.252[a]
	(0.042)	(0.052)	(0.603)	(0.056)	(0.065)
South Central	-0.089[a]	-0.058	-0.087	-0.120[a]	-0.125[b]
	(0.042)	(0.043)	(0.055)	(0.060)	(0.066)
West	0.081	-0.007	-0.012	-0.039	-0.043
	(0.058)	(0.066)	(0.073)	(0.069)	(0.078)
Log(Cost of Living)	0.983[c]	1.593[c]	1.164[c]	1.323[c]	1.231[c]
	(0.399)	(0.439)	(0.475)	(0.421)	(0.442)
PCTLAB			-0.322		-0.256
			(0.330)		(0.310)
PCTBLDG			0.840[b]		0.792[b]
			(0.449)		(0.442)
PCTMETAL			0.289[b]		0.344[a]
			(0.156)		(0.147)
AGE 15-24			-1.456		-1.236
			(1.161)		(1.065)
AGE 25-34			0.306		0.223
			(0.919)		(0.896)
AGE 35-44			-0.856		-1.253
			(1.152)		(1.095)
AGE 45-64			-0.873		0.518
			(0.767)		(0.771)
ILLITERATE			-0.423		0.363
			(0.330)		(0.465)
LOG(Population)				0.043[a]	0.051[a]
				(0.011)	(0.013)

Table 6 Continued

	(1)	(2)	(3)	(4)	(5)
INFMORT				-0.0005[a]	-0.0006[b]
				(0.0002)	(0.0003)
SUN				0.002	0.002
				(0.002)	(0.002)
JANTEMP				0.192	0.158
				(0.162)	(0.170)
RAIN				0.0002	0.0001
				(0.0002)	(0.0002)
R^2-Adjusted	.481	.352	.390	.484	.497
N Obs.	114	84	84	84	84

Notes: Estimation of regional effects is explained in the notes to Table 5. The remaining variables are defined in the text. Columns 2-5 are estimated using only those cities for which data are available for all of the regressors.

[a] Coefficient is statistically significantly different from zero at the 95% confidence level.
[b] Coefficient is statistically significantly different from zero at the 90% confidence level.
[c] Coefficient is not statistically significantly different from one at the 95% confidence level.

Table 7:
Regression of Log Difference in City Population on Beginning of Period Average Earnings of Male Manufacturing Workers, 1880-1920
(Standard Errors in Parentheses)

	Estimated Slope Coefficient		
Period	All Cities	Northern Cities	Southern Cities
1880-1890	0.386[a]	0.662[a]	0.082
	(0.133)	(0.190)	(0.177)
1890-1900	0.234[a]	0.160	0.319[a]
	(0.084)	(0.118)	(0.141)
1900-1910	0.133	0.416[b]	0.237
	(0.144)	(0.248)	(0.302)
1910-1920	0.062	0.374[a]	0.216
	(0.084)	(0.118)	(0.187)

Notes: This table reports the estimated slope coefficients from a regression of the change in log population between census dates on a constant and the log of average earnings of male manufacturing workers adjusted for intercity differences in the cost of living. Estimates of the constant term are not reported here. Northern cities include all cities in the Mid-Atlantic, New England, East North Central, West North Central, and West regions. Southern cities include all cities in the South Atlantic and South Central regions.

[a] Coefficient is statistically significantly different from 0 at the 95% confidence level.
[b] Coefficient is statistically significantly different from 0 at the 90% confidence level.

References

Brisendon, Paul F., Earnings of Factory Workers, 1899-1927, Census Monograph X, (Washington, DC: GPO, 1929).

Brown, John C. "The Condition of England and the Standard of Living: Cotton Textiles in the Northwest, 1806-1850," Journal of Economic History 50 (Sept. 1990), 591-614

Carter, Susan B. and Elizabeth Savoca, " Labor Mobility and Lengthy Jobs in Nineteenth-Century America," Journal of Economic History 50 (March 1990), 1-16.

Clark, David, James Kahn and Haim Ofek, "City Size, Quality of Life, and the Urbanization Deflator of the GNP: 1910-1984," Southern Economic Journal (Jan. 1988), 701-14.

Coelho, Philip R. P. and James F. Shepherd, "Regional Differences in Real Wages: The United States, 1851-1880," Explorations in Economic History 13 (1974), 551-91.

Davis, Lance E., "The Investment Market, 1870-1914: The Evolution of a National Market," Journal of Economic History 25 (1965), 355-99.

Duboff, Richard B., "The Telegraph and the Structure of Markets in the United States, 1845-1890," Research in Economic History, vol. 8, (Greenwich, CT: JAI Press, 1982).

Easterlin, Richard A., "Estimates of Manufacturing Activity," in Everett S. Lee., et al, Population Redistribution and Economic Growth, United States, 1870-1950, Vol. I: "Methodological Considerations and Reference Tables," (Philadelphia: American Philosophical Society, 1957), 635-702.

Engerman, Stanley and Claudia Goldin, "Seasonality in Nineteenth-Century Labor Markets," in Thomas Weiss and Donald Schaefer (eds.), American Economic Development in Historical Perspective (Stanford, CA: Stanford Univ. Press, 1994).

Goldin, Claudia, Understanding the Gender Gap: An Economic History of American Women (New York and Oxford: Oxford University Press, 1990).

Gordon, David M., Richard Edwards, and Michael Reich, Segmented Work, Divided Workers: The Historical Transformation of Labor in the United States, (Cambridge: Cambridge Univ. Press, 1982).

Haines, Michael R., " A State and Local Consumer Price Index for the United States in 1890," Historical Methods 22 (1989), 97-105.

Jacoby, Sanford M. and Sunil Sharma, "Employment Duration and Industrial Labor Mobility in the United States, 1880-1980," Journal of Economic History 52 (March 1992), 161-79.

James, John A., Money and Capital Markets in Postbellum America, (Princeton: Princeton Univ. Press, 1978).

James, John A. "Job Tenure in the Gilded Age," in George Grantham and Mary MacKinnon (eds.), Labour Market Evolution: The Economic History of Market Integration, Wage Flexibility, and the Employment Relationship (London and New York: Routledge, 1994).

Lebergott, Stanley, Manpower in Economic Growth: The American Record Since 1800, (New York: McGraw Hill, 1964).

Long, Clarence D., Wages and Earnings in the United States, 1860-1890, National Bureau of Economic Research General Series, no. 67, (Princeton: Princeton Univ. Press, 1960).

Nelson, Daniel, Managers and Workers: Origins of the New Factory System in the United States, 1880-1920, (Madison: Univ. of Wisconsin Press, 1975).

Odell, Kerry A., "The Integration of Regional and Interregional Capital Markets: Evidence

from the Pacific Coast States, 1883-1913," Journal of Economic History 49 (1989), 297-310.

Rees, Albert, Real Wages in Manufacturing, 1890-1914, National Bureau of Economic Research, General Series, no. 70, (Princeton: Princeton Univ. Press, 1961).

Roback, Jennifer, "Wages, Rents, and the Quality of Life," Journal of Political Economy 90 (December 1982), 1257-78.

Rosenbloom, Joshua L., "One Market or Many? Labor Market Integration in the Late Nineteenth-Century United States," Journal of Economic History 50 (March 1990), 85-107.

Rosenbloom, Joshua L., "Occupational Differences in Labor Market Integration: The United States in 1890," Journal of Economic History 51 (June 1991), 427-39.

Spiller, Pablo T. and Cliff J. Huang, "On the Extent of the Market: Wholesale Gasoline in the Northeastern United States," Journal of Industrial Economics 35 (1986), 131-45.

Stigler, George J. and Robert A. Sherwin, "The Extent of the Market," Journal of Law and Economics 28 (1985), 555-85.

Sundstrom, William A., "Internal Labor Markets Before World War I: On-the-Job Training and Employee Promotion," Explorations in Economic History 25 (Oct. 1988), 424-45.

Sundstrom, William A. and Joshua L. Rosenbloom, "Occupational Differences in the Dispersion of Wages and Working Hours: Labor Market Integration in the United States, 1890-1903," Explorations in Economic History 30 (1993), 379-408.

U.S. Census Office, Twelfth Census, 1900, Population, Part I, (Washington, DC: GPO, 1901).

U.S. Congress, House of Representatives, Report on the Statistics of Wages in Manufacturing with Supplementary Reports, by Joseph D. Weeks, House Misc. Doc. 42, Vol. 13, Part 20, 47th Cong., 2nd Sess., (Washington, DC: GPO, 1886).

U.S. Department of Commerce, Historical Statistics of the United States: Colonial Times to 1957 (Washington, DC: USGPO, 1960).

U.S. Department of Commerce and Labor, Ninteenth Annual Report of the Commissioner of Labor, 1904: Wages and Hours of Labor, (Washington, DC: GPO, 1904).

U.S. Department of Commerce and Labor, Bureau of the Census, Manufactures, 1905, Part II: States and Territories, (Washington, DC: GPO, 1907).

U.S. Department of Commerce and Labor, Bureau of the Census, Thirteenth Census of the United States, 1910, Vol IX: Manufactures, 1909, Reports by States with Statistics for Principal Cities, (Washington, DC: GPO, 1912).

U.S. Department of Commerce and Labor, Bureau of the Census, Thirteenth Census of the United Stats, 1910, Abstract of the Census, (Washington, DC: GPO, 1913).

U.S. Department of Commerce, Bureau of the Census, Census of Manufactures, 1914, Vol I: Reports by States with Statistics for Principal Cities and Metropolitan Districts (Washington, DC: GPO, 1918).

U.S. Department of Commerce, Bureau of the Census, Fourteenth Census of the United States, 1920, Vol. IX: Manufactures, 1919: Reports for States, with Statistics for Principal Cities, (Washington, DC: GPO, 1923).

U.S. Department of Commerce, Bureau of the Census, Fourtheenth Census of the United States, 1920, Abstract of the Census, (Washington, DC: GPO, 1923).

U.S. Department of Interior, Census Office, Compendium of the 10th Census, Part I, (Washington, DC: GPO, 1883).

U.S. Department of Interior, Census Office, Eleventh Census, 1890, Population, Part I, (Washington, DC: GPO, 1895).
U.S. Department of Interior, Census Office, Twelfth Census of the United States, 1900, Manufactures, Part II: States and Territories, (Washington, DC: GPO, 1902).
U.S. Department of Labor, "Wages in the United States and Europe, 1870-1898," Bulletin no. 18 (Washington, DC: GPO, 1898), 665-93.
U.S. Department of Labor, "Retail Prices 1890 to June 1912," Bulletin no. 106, (Washington, DC: GPO, 1912)
U.S. Department of Labor, "Retail Prices, 1907 to December 1914," Bulletin no. 156, (Washington, DC: GPO, 1915).
U.S. Department of Labor, "Retail Prices, 1913 to December 1920," Bulletin no. 300, (Washington, DC: GPO, 1922).
Williamson, Jeffrey G., "Was the Industrial Revolution Worth It? Disamenities and Death in 19th Century British Towns," Explorations in Economic History 19 (1982), 221-45.
Wright, Gavin, Old South, New South: Revolutions in the Southern Economy Since the Civil War, (New York: Basic Books, 1986).
Wright, Gavin, "Postbellum Southern Labor Markets," in Peter Kilby (ed.), Quantity and Quiddity: Essays in U.S. Economic History (Middletown, CT: Wesleyan Univ. Press, 1987).