In the distribution of income have found growing inequality since the 1960s (Blander, 1991; Congressional Budget Office, 1985, 28), and wage studies have reached the same conclusion (Juhn, Murphy, and Pierce, 1993, 410-11). Moreover, between the 1950s and 1990-1995 unskilled unemployment rose from 5.4 percent to 8.3 percent, while skilled unemployment rose from 2.6 percent to 4.2 percent [Appendix A]. The differences between the unskilled and skilled unemployment rates by decades were as follows: 1950-59: 2.8; 1960-69: 3.3; 1970-79: 3.9; 1980-89: 5.3; 1990-96: 4.1.

Wage inequality and unskilled unemployment increased despite the growing supply of skilled workers resulting from the increase in the number of college graduates. Most wage-employment studies attribute the growth of wage inequality to a rise in the relative demand for skilled workers large enough to overwhelm the effect of the expanded relative supply (Schwartzman, 1997). An indication of the rise in the relative demand is the increase in the unskilled-skilled difference in unemployment.

Katz and Murphy (1992) interpret the rise in the employment and earnings of college graduates relative to nongraduates to confirm the relative-demand hypothesis. They ascribe the rise in the college premium in the 1980s to the small increase in the number of college graduates that decade (ibid., 50) compared to the preceding decade. They suggest that a steady climb in the relative demand for skilled workers combined with a slowdown in the growth of the supply increased their relative earnings. Katz and Murphy suggest that skill-biased technological change, changes in prices of nonlabor inputs, and the growth of imports were the sources of the increase in relative demand. They suggest that technical and price changes caused the within-industry skill shifts, but they provide no evidence. Their analysis of inter-industry shifts in demand leads them to conclude that imports had a small effect on wage inequality.

Reflections
David Schwartzman
New School for Social Research

David Schwartzman, well-known as a student of industrial organization, has been has been a Professor of Economics on the Graduate Faculty of the New School for Social Research since 1960. A graduate of McGill, he received his Ph.D. from the University of California at Berkeley and has taught, as well, at Columbia and NYU.

The Growth of Inequality

Income Inequality, Earnings, and Employment

Studies of the distribution of income have found growing inequality since the 1960s (Blander, 1991; Congressional Budget Office, 1985, 28), and wage studies have reached the same conclusion (Juhn, Murphy, and Pierce, 1993, 410-11). Moreover, between the 1950s and 1990-1995 unskilled unemployment rose from 5.4 percent to 8.3 percent, while skilled unemployment rose from 2.6 percent to 4.2 percent [Appendix A]. The differences between the unskilled and skilled unemployment rates by decades were as follows: 1950-59: 2.8; 1960-69: 3.3; 1970-79: 3.9; 1980-89: 5.3; 1990-96: 4.1.

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Supporting the technical-change hypothesis, Berman, Bound, and Griliches (1993) estimate that increased computer usage accounted for between one-quarter and one-half of the decline between 1979 and 1989 in the production-worker share of manufacturing employment. However, as Howell and Wieler (1994) point out, while most of the increase in computer usage took place in the latter half of that decade, Berman, Bound, and Griliches’s own data show that the shift from unskilled to skilled workers occurred between 1980 and 1982.

The present paper provides some evidence that substitution of capital and of skilled labor accounted for part of the decline in the relative demand for unskilled labor. The study employs a binary occupational skill classification rather than the popular educational-attainment skill index. The skilled occupations include managers, professionals, technicians, sales occupations, administrative support, and precision production, craft, and repair occupations. The unskilled occupations include service occupations, operators, fabricators, laborers, farming, forestry, and fishing occupations. As Table 1 shows, earnings in the occupations classified as skilled exceeded those in unskilled occupations.

This classification permits the use of occupational earnings and employment data. Much of the increase in the skill composition of the labor force took the form of shifts between occupations rather than gains in skill within occupations. The white-collar share of total employment grew between 1950 and 1995 from 38 percent to 55 percent (Schwartzman, 1997, 78).

A disadvantage is that some occupations within the two broad groups may be misclassified. A more detailed classification would transfer some clerical occupations to the unskilled group and some service occupations to the skilled group. Since any reasonable reclassification makes little difference to the overall results, this paper retains the skill classification based on major occupational groups.

---

**TABLE 1**

<table>
<thead>
<tr>
<th>Occupations</th>
<th>Earnings in Dollars per Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skilled Occupations</td>
<td>866</td>
</tr>
<tr>
<td>Race, admin., managerial</td>
<td>857</td>
</tr>
<tr>
<td>Technical and related support</td>
<td>650</td>
</tr>
<tr>
<td>Sales</td>
<td>500</td>
</tr>
<tr>
<td>Admin. support, incl. clerical</td>
<td>680</td>
</tr>
<tr>
<td>Precision production</td>
<td>660</td>
</tr>
<tr>
<td>Unskilled Occupations</td>
<td>367</td>
</tr>
<tr>
<td>Service</td>
<td>422</td>
</tr>
<tr>
<td>Operators, fabricators, and laborers</td>
<td>400</td>
</tr>
<tr>
<td>Farming, forestry, and fishing</td>
<td>366</td>
</tr>
</tbody>
</table>


---

The educational attainment index ignores differences in nonschool attributes and in the quality of schooling. In 1982 39.1 percent of persons employed in executive, administrative, and managerial occupations had only a high-school education or less. In addition, over the postwar period the educational attainment level of workers increased without the skill level of their jobs rising. The decline in the number of high-school dropouts among male laborers between 1970 and 1981 from 72.3 percent to 45.4 percent [Statistical Abstract of the United States, 1982-83, 87] did not signify improved skill.

The concurrent drops in the relative employment and earnings of unskilled occupations between 1945 and 1990 indicate a fall in the relative demand for these occupations (See Tables 2 and 3). The earnings of operatives and laborers fell relative to those of professionals and managers. For the present we ignore the change between 1959 and 1945.

The present paper argues that the growth of the capital stock and of the supply and relative skill of skilled workers contributed to the decline in the relative demand for unskilled labor. Technology and international trade are not discussed here. The relative demand for unskilled labor fell as a result of the wartime rise in the relative cost of such labor. The analysis of the growth of inequality since the 1960s should begin with an examination of the preceding period. Wartime egalitarian wage policies increased the relative wages of unskilled workers. Let \( w_s \) represent the average wage of unskilled workers, \( w_m \) the average wage of skilled workers, and \( w_c \) the cost of capital. The policies raised \( w_s/w_m \) and \( w_s/w_c \), inducing the substitution of skilled labor and capital for unskilled labor after the war. Extraordinary wartime demand also raised \( w_s/w_m \) and \( w_s/w_c \). The relative cost of employing unskilled labor rose both because of an upward shift in the relative demand for unskilled labor and a rise in \( w_s \) imposed by
government policies. The end of hostilities brought with it a fall in the relative demand for unskilled labor. But ω_r/ω and ω_r/ω_r did not fall immediately. It took time for factor prices to adjust to the changed economic conditions. In addition, increases in the minimum wage and in the coverage of the minimum-wage laws, an increase in the supply of skilled workers, and an inflationary monetary policy tended to raise ω_r/ω and ω_r/ω_r, which reduced the demand for unskilled labor by inducing the substitution of capital and skilled labor.

Moreover, the increase in the stock of capital raised the demand for skilled labor relative to that for unskilled labor. Capital goods are a closer substitute for unskilled than for skilled labor (Hamermesh and Grant, 1979, 537). Indeed, some studies show that capital and skill are complements (Rosen, 1968, 511-8; Griliches, 1968, 465-68).

Improved relative skill also raised the relative demand for skilled workers measured in hours. The improvement reduced the relative wages of skilled workers per efficiency unit. While the relative hourly wages of skilled workers (ω_r/ω) rose, the relative cost of their labor measured in efficiency units may not have risen.

THE RELATIVE COSTS OF EMPLOYING UNSKILLED AND SKILLED LABOR

The Wartime Increase in Unskilled Workers’ Wages

Not only did the great demand for unskilled workers during World War II raise ω, but the implementation of anti-inflationary wage controls reduced wage inequality [Goldin and Margo, 1992]. "The administration's efforts to correct farm workers and other low-wage workers from the 15 percent limit on wage increases after January 1941. Employers could raise hourly wages to $0.40 without permission by the National War Labor Board (NWLB), and the regional NWLBs allowed increases to $0.60. It should be noted that in 1941 the average hourly earnings of manufacturing production workers was $0.76 [Handbook of Labor Statistics 1975, 252]. The NWLB also allowed wages to be raised to the lower end of a range of earnings set for each occupation in each region, and it permitted raises for low-wage occupations within plants.

Between 1939 and 1950 manufacturing workers’ wages rose over 70 percent relative to the earnings of engineers and college teachers [Blank and Stigler, 1957, 25]. Also, college graduates with 11 to 15 years of experience, who in 1940 had earned on the average 78 percent more than high-school graduates with the same years of experience, in 1950 earned only 46 percent more [Goldin and Margo, 1982, 7].

In addition, occupational earnings converged. Between 1939 and 1945 operatives’ and laborers’ earnings rose relative to those of professionals and managers (Table 3). Between 1940 and 1948 farm workers’ wage rates rose between 43 and 61 percent relative to the average hourly earnings of manufacturing production workers [Historical Statistics, ser. K352, K708, K710, D902]. After the war the skill wage differential did not continue to fall, but unskilled workers kept much of their wartime gains until the 1960s (Table 3).

Increases in the minimum wage helped maintain ω_r/ω to the 1970s. The rate of the minimum wage to average hourly earnings in the nonfarm sector was 0.536 in 1950 and 0.535 in 1969. The ratio varied considerably over this period, but only in the

1970s it began to decline continuously [Peterson, 1981, 79-81]. Moreover, in 1986 the minimum-wage law’s coverage was extended to large farms, retail trade, construction, and the service industries. One result was that between 1965 and 1970 wage rates increased 16 percent relative to average hourly earnings in manufacturing [Historical Statistics, ser. K351, D962].

Most studies agree that increases in the minimum wage reduced low-wage employment [Brown, Gilroy, and Cohen, 1982; Card and Krueger, 1995]. On the basis of their study of fast-food restaurants and methodological criticisms of earlier studies, Card and Krueger argue that the evidence is inconclusive. They find that between February and November 1992 employment in fast-food restaurants increased in New Jersey, where the minimum wage was raised, while it did not in such restaurants in the neighboring part of Pennsylvania, where the minimum wage was not raised. They say that other studies do not control for other influences on unskilled unemployment.

However, the Card-Krueger study fails to examine long-run effects. Moreover, the Card-Krueger point about other influences does not apply to the present study’s conclusion that the changes in the minimum-wage law contributed to unskilled workers’ unemployment along with other factors.

The wartime wage policy and the changes in the minimum-wage law tended to reduce unskilled employment. Changes in the minimum-wage law helped to maintain the wartime wage gains up to the 1970s, and the increase in the supply of skilled workers, to which we now turn, also helped.

The Supply and Skill of Skilled Labor

The rise in the number of college graduates and thus in the supply of skilled workers reduced ω, which shifted the demand curve for unskilled workers to the left. The usual explanation of the burgeoning number of college students in the 1940s and 1950s points to the high return to a college education [Becker, 1964, 78], suggesting that the increase was a response to above-equilibrium college graduates' earn-
ings. But the college premium was due to the unavailability of student loans, and it was the GI Bill and the growth of state and local government subsidies that increased the number of students. Between 1942 and 1950 the average annual rate of growth of constant-dollar government subsidies for higher education was 11.9 percent, compared to 7.9 percent real GDP growth, and between 1950 and 1970 the rates of growth were 8.7 percent and 3.5 percent respectively [Historical Statistics, ser. H270-22].

Because the proportion of college graduates in the labor force grew, the supply of managers and professionals increased. In 1994 as many as 57.7 percent of male college graduates were so employed [Statistical Abstracts of the United States, 1995, 416]. New workers came into the technical, sales and administrative occupations, which employed 22.5 percent of male graduates. Of the nongraduates who had some college education, as many as 49.9 percent took white-collar jobs. As the number at the other end of the educational attainment scale — the high-school dropouts — dwindled, the supply of operators, fabricators, laborers, and service workers shrank. These occupations employed 50.7 percent of high-school dropouts.

With the female share of the labor force rising between 1950 and 1990, the number of employed women workers grew from 19.9 percent of all employment in 1950 to 60.7 percent in 1990, and the female proportion of clerical workers increased from 62.1 percent to 77.3 percent (U.S. Bureau of the Census, Census of Population 1990). The increase in the relative supply of skilled workers tended to reduce the skill wage differential, but the effect evidently was offset by other changes.

Among these changes was the increase in the relative skill of skilled workers. The enhanced skill of skilled workers added to the supply of skilled workers measured in efficiency units, tending to reduce wage inequality among efficiency units. But the gain in the relative skill of skilled workers increased inequality among workers. The number of college graduates among male professional and technical workers increased from 54.6 percent in 1950 to 71.7 percent in 1982, and other skilled occupations also saw increases [Statistical Abstracts of the United States, 1984, 416]. In addition, advances in knowledge improved the skills of cohorts of college graduates.

While the educational attainment of unskilled workers also rose, their relative skill probably fell. Machine operators, dish washers, farm workers, laborers, factory helpers, floor cleaners, and hospital orderlies need such nonschool qualities as endurance, manual dexterity, strength, and energy. True, the association of earnings with educational attainment within unskilled occupations indicates that secondary schools improve the skills of some unskilled workers. However, such nonschool characteristics as intelligence, reliability, and discipline, coincide with more schooling, may be responsible for the higher earnings. As Hanushek [1986, 116] suggests, the average high school graduate is more dependable than the average dropout. Further, since unskilled workers' nonschool qualities may have deteriorated, the cross-sectional association does not imply a historical association. In 1940 24 percent of the male population 25 years and over had graduated from high school, compared to 81 percent in 1994 [Digest of Educational Statistics, 1995, 17, Table 8]. Inasmuch as poverty forces far fewer students to drop out now than before World War II, more of today's dropouts are likely to have job problems. Moreover, the dropout percentage among unskilled workers remains high: in 1989 as many as 30 percent of operatives were dropouts.

THE GROWTH OF INEQUALITY

In addition, as we have seen, the relative increase in unskilled unemployment also increased inequality of incomes.

THE SUBSTITUTION OF CAPITAL GOODS FOR UNSKILLED LABOR

Since 1930, except for the decades between 1930 and 1950, savings and therefore the supply of capital have enabled the growth rate of the capital stock to exceed that of employment. Although the savings rate has fallen since the 1920s, the growth of GDP has raised savings per person employed. In the 1980s the savings rate was 5.8 percent compared to 9.0 percent in 1929. GDP and employment were respectively 5.9 times and 3.8 times as great. Thus, savings per person employed was 1.5 times as high in the 1980s as in 1929. The continuing growth of the supply of capital at a rate exceeding the growth rate of the supply of labor raised wages and thus cost of employing labor relative to that of employing capital. Moreover, the growth of the capital stock per labor hour fed on itself. As productivity increased, the cost of labor increased relative to the cost of capital, inducing further substitution of capital for labor, more particularly for unskilled labor. The demand for unskilled labor fell. As we saw earlier, capital is a closer substitute for unskilled than for skilled labor. In addition, the cost of unskilled labor, measured in efficiency units, relative to that of skilled labor may have increased.

Three developments in the period after World War II accelerated the growth of the capital stock per labor hour. The preceding section discussed the wartime growth in demand and the government policies that raised the cost of employing unskilled labor and therefore the demand for capital goods.

Another development was inflation, which drove down real interest rates, raising w, R. Between 1950 and 1990 the average annual inflation rate was 4.1 percent, and before 1980 the nominal interest rate lagged behind inflation; real interest rates were much lower than before the war (see Appendix A). Subtracting the inflation rate from the nominal interest rate leaves an average real interest rate in the 1960s of 0.8 percent. Between 1950 and 1970 the decade average real interest rates were well below the averages for the 1980s and 1990s. Only in the 1980s did real interest rates reach high levels.

Table 4 reports an index of the real wages of manufacturing production workers, most of whom are unskilled, an index of the real long-term interest rates for high-grade corporate bonds, and an index of the ratio of real wages to the real interest rate. The index of the relative cost of unskilled labor based on 1929 for the 1950s is 12.22. The indexes for the 1960s, 1970s, and 1980s also reveal much higher relative costs than in 1929.

The third development was the fall in the prices of capital goods relative to the cost of unskilled labor. In the 1980s the index of wages relative to investment goods prices was more than twice as high as in 1929.
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Table 4
Indexes of \( w_n \), \( i \), and \( p_s \), and of \( w_n/p_s \) and \( w_n/i \) (1929 = 100), by Decade, 1900-1989 and for 1990-1995

<table>
<thead>
<tr>
<th>Decade</th>
<th>( w_n )</th>
<th>( i )</th>
<th>( p_s )</th>
<th>( w_n/i )</th>
<th>( w_n/p_s )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900-09</td>
<td>93</td>
<td>69</td>
<td>NA</td>
<td>134</td>
<td>NA</td>
</tr>
<tr>
<td>1910-19</td>
<td>58</td>
<td>63</td>
<td>NA</td>
<td>6</td>
<td>NA</td>
</tr>
<tr>
<td>1920-29</td>
<td>92</td>
<td>118</td>
<td>NA</td>
<td>78</td>
<td>NA</td>
</tr>
<tr>
<td>1930-39</td>
<td>113</td>
<td>104</td>
<td>100</td>
<td>100</td>
<td>107</td>
</tr>
<tr>
<td>1940-49</td>
<td>119</td>
<td>70</td>
<td>112</td>
<td>6</td>
<td>163</td>
</tr>
<tr>
<td>1950-59</td>
<td>180</td>
<td>15</td>
<td>122</td>
<td>1222</td>
<td>147</td>
</tr>
<tr>
<td>1960-69</td>
<td>211</td>
<td>51</td>
<td>129</td>
<td>419</td>
<td>178</td>
</tr>
<tr>
<td>1970-79</td>
<td>236</td>
<td>90</td>
<td>115</td>
<td>781</td>
<td>205</td>
</tr>
<tr>
<td>1980-89</td>
<td>245</td>
<td>124</td>
<td>108</td>
<td>107</td>
<td>297</td>
</tr>
<tr>
<td>1990-95</td>
<td>204</td>
<td>100</td>
<td>53</td>
<td>208</td>
<td>293</td>
</tr>
</tbody>
</table>

Note: Not shown because average real interest rate negative in this period.

\( w_n \) = real manufacturing production workers’ wages; \( i \) = real long-term interest rate; \( p_s \) = real price of investment goods. See Appendix A for sources and methods.

Table 5
Private Domestic Economy: Average Annual Rates of Growth of Labor Hours, Capital, and Capital per Labor Hour by Decades, 1900-90

<table>
<thead>
<tr>
<th>Decade</th>
<th>Labor Hours</th>
<th>Capital</th>
<th>Capital/Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900-10</td>
<td>2.4 %</td>
<td>3.0 %</td>
<td>1.5 %</td>
</tr>
<tr>
<td>1910-20</td>
<td>0.9</td>
<td>5.8</td>
<td>4.8</td>
</tr>
<tr>
<td>1920-30</td>
<td>0.4</td>
<td>2.2</td>
<td>1.8</td>
</tr>
<tr>
<td>1930-40</td>
<td>1.3</td>
<td>1.4</td>
<td>1.4</td>
</tr>
<tr>
<td>1940-50</td>
<td>-0.5</td>
<td>-0.6</td>
<td>-0.2</td>
</tr>
<tr>
<td>1950-60</td>
<td>1.4</td>
<td>0.6</td>
<td>0.7</td>
</tr>
<tr>
<td>1960-70</td>
<td>0.2</td>
<td>3.3</td>
<td>1.6</td>
</tr>
<tr>
<td>1970-80</td>
<td>0.8</td>
<td>4.3</td>
<td>2.5</td>
</tr>
<tr>
<td>1980-90</td>
<td>1.7</td>
<td>3.6</td>
<td>1.9</td>
</tr>
<tr>
<td>1990-95</td>
<td>2.3</td>
<td>1.9</td>
<td>0.3</td>
</tr>
</tbody>
</table>


THE GROWTH OF INEQUALITY

Table 5 reports that the capital stock in the private domestic economy grew at a much faster rate between 1950 and 1990 than it did between 1900 and 1930. For obvious reasons, I exclude the period between 1930 and 1950. The 1950s may have seen some catching up after the Great Depression and the war, but rapid growth continued in the 1960s, 1970s, and even in the 1980s.

CONCLUSION

The growth of inequality reflected the increase in the demand for skilled labor and for capital induced by the increase in the relative cost of employing unskilled labor caused by the wartime demand and egalitarian wage policies. The increase in the supply of skilled workers and in their relative skill also reduced the demand for unskilled labor. The narrowing of the wage gap due to the growing number of skilled workers was more than offset by the influences raising the relative demand for skilled workers.

Savings were large enough to permit the growth rate of the capital stock to exceed that of labor hours, enabling wages to rise relative to the real interest rate. By reducing the real interest rate, the postwar inflation induced the substitution of capital for unskilled labor. Further, the prices of capital goods fell relative to wages. With capital goods a closer substitute for unskilled than for skilled labor, the decline in the cost of capital goods relative to wages reduced the demand for unskilled labor more than that of skilled labor.
Appendix A
Sources and Methods

Employment and unemployment by occupations: Data for 1950 to 1959 were from Manpower Report of the President, April 1967, after 1959 from Employment and Earnings, January issues. The data for the 1950s were for members of the labor force 14 years and over. For later decades they are for these 16 years and over. The Bureau of Labor Statistics changed the occupational classification in 1983. The data for 1983 and later years were linked at 1982, for which the BLS supplied data under both classifications.


Analysis

1. Employing the criteria of the ratio of unemployment rates rather than the differences, the EOCRC Jobs Study (1994) concludes that the relative demand for unskilled labor did not fall. In the 1960s the unskilled unemployment rate 2.1 times as large as the skilled unemployment rate compared to 2.0 in the 1950s. However, if the demand had fallen equally for both types of labor, then the ratio would have dropped. Since a higher proportion of skilled workers were employed at the beginning, the same fall in the percentage employed in both groups would have reduced the ratio.

2. A fall in relative employment associated with a rise in earnings would signify a fall in relative supply. The combination of a rise in relative employment and a fall in relative earnings would signify an increase in relative supply. Increases in both relative employment and earnings would signify a rise in relative demand.


REFERENCES


U.S. Department of Education. Digest of Educational Statistics, various years.
