CHANGES IN THE STRUCTURE OF WAGES: THE U.S. VERSUS JAPAN

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ABSTRACT

This paper examines changes in wage differentials by educational attainment and experience in the U.S. and Japan since the early 1970s. While educational earnings differentials have expanded dramatically in the U.S. in the 1980s, the college wage premium has increased only slightly in Japan. In contrast to the large expansion in experience differentials for high school males in the U.S., the wages of male new entrants have risen relative to more experienced workers for both high school and college graduates in Japan from 1979 to 1987. Macroeconomic factors (increased openness, trade deficits, and labor market slack) and changes in institutional structures (the decline in unionization) are likely to have amplified each other in contributing to an unprecedented decline in real and relative earnings of young less-skilled males in the U.S. in the 1980s. We further find that a sharp deceleration in the rate of growth of college graduates as a fraction of the labor force in the U.S. helps account for the much larger increase in the college wage premium in the U.S. than in Japan in the 1980s.

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I.   Introduction

The 1980s have witnessed a sharp change in the relative wages of skilled and unskilled American workers. Educational wage differentials have increased dramatically.[1] Holding other characteristics constant, the average wage of college graduates has increased by approximately 13 percent relative to the wages of high school graduates in the 1980s. The changes in the return to education have been particularly pronounced for those just entering the labor force. Between 1979 and 1987 the earnings of young male college graduates increased by over twenty percent relative to those of young male high school graduates. Wage differentials by experience have expanded substantially for workers with relatively low education. Because growth in average standards of living has been relatively slow in the United States, the relative decline in the wages of unskilled young people has meant large absolute declines of as much as 20 percent in the real wages of less-educated male new entrants since the start of the decade.

The dramatic deterioration in the absolute and relative economic positions of less-educated Americans in the 1980s has generated much attention among academics, the press, policymakers, and politicians. Arguments over whether these changes were caused by the Carter administration, the Reagan administration, or "foreign villains" were among the "highlights" of the "good jobs, bad jobs" debate in the 1988 U.S. Presidential election.

Many of the proposed explanations for the widening of skill differentials in the U.S. have focused on international economic developments. Some have

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[1]Blackburn, Bloom and Freeman (1989) document that occupational earnings differentials have also expanded tremendously in the U.S. since the late 1970s. Handlers, service workers, and factory operatives have lost substantial ground relative to managers, professionals, and technical workers over the last decade.

argued that the strong dollar of the early 1980s and the associated large trade deficit and "deindustrialization" of America have sharply reduced the demand for less-educated workers as the manufacturing sector that intensively employs these workers has declined.[2]   Others posit that the increased integration of the world economy has sharply reduced the demand for less-educated workers through an effective increase in the supply of unskilled workers embodied in imports from newly industrializing nations and from the increased ability of capital to move to where less-skilled labor is cheap (Bluestone and Harrison, 1988). A third view is that technological changes (e.g. the microcomputer revolution) that favor intellectual over physical attributes of workers have raised the return to working with the mind rather than the hands.

Distinguishing between these hypotheses is important. In all likelihood, the US trade deficit will decline sharply in the 1990s if only because foreigners will stop lending to the United States, and as a result the manufacturing sector which has traditionally accounted for a lion's share of American trade will almost certainly grow rapidly. If it is these macroeconomic developments that account for the changing wage structure, recent trends are likely to be reversed without policy interventions. On the other hand, if recent changes in the earnings distribution are a consequence of either a secular increase in the openness of the world economy or of technological innovations favoring highly skilled workers, these changes are likely to persist. In this case, the importance of formulating policies that raise the skilled fraction of the labor force is increased.

American time series information alone is likely to prove insufficient

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[2]Murphy and Welch (1988a,b) provide suggestive evidence for this view.

to distinguish between various explanations for changing skill differentials.
This paper brings to bear information on changes in the Japanese wage
structure in an effort to illuminate the causes of changing wage structures.[3]
While broad technological developments may be quite similar in Japan and the
United States, the two countries are mirror images in terms of their trade
performance during the 1980s.

In this paper, we first set out the basic facts of how wage
differentials by educational attainment and experience have changed in the
U.S. and Japan since the early 1970s. While both countries exhibit a decline
in the relative earnings of college graduates and moderate increases in wage
differentials by experience in the 1970s, we find that the two countries
differ sharply with respect to changes in the structure of wages in the
1980s. In contrast to the sharp expansion of educational earnings
differentials in the U.S. in the 1980s, the college wage premium has
increased only slightly in Japan. In contrast to the large expansion in
experience differentials for high school males in the U.S., the wages of male
new entrants have risen relative to more experienced workers for both high
school and college graduates in Japan from 1979 to 1987. Furthermore, real
wages increased moderately for new entrants at all levels of schooling in
Japan in the 1980s.

The sharp difference between the U.S. and Japan in the change in the
economic performance of young, high-school males is suggestive of an

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[3]This paper differs from other recent literature on changes in the wage
structure in the 1980s in that it compares both changes between two countries
and across time periods (the 1970s vs. the 1980s). Recent studies
exclusively examining changes in the U.S. wage structure include Blackburn,
Bloom, and Freeman (1989), Bound and Johnson (1989), Levy (1989), and Murphy
and Welch (1988a,b).

important role for macroeconomic factors associated with trade performance and the health of the manufacturing sector in shaping changes in the distribution of earnings. If broad global changes, such as increased international economic integration or technological changes, are the key elements in affecting recent labor market developments, then the differences in the U.S. and Japanese experiences suggest that differences in labor market institutions (e.g. the role and strength of unions, training institutions, minimum wages) are crucial in determining how these factors translate into changes in the wage structure.

We present a collage of evidence designed to help make a preliminary assessment of these interpretations of changes in the wage structure as well as to determine the importance of demographic factors (changes in the relative number of workers by education and age). Our broad conclusion is that there is no monocausal explanation for recent changes in wage structure. There are elements of truth in each of several proposed hypotheses.

More specifically, we find that:

1. The rate of growth of college graduates as a fraction of the labor force decreased dramatically in the U.S. and did not decrease as much in Japan in the 1980s. This sharp deceleration in the U.S. helps account for the much larger increase in the college wage premium in the U.S. than in Japan in the 1980s. Relative supply factors do not appear to be able to account for the sharp decline in the earnings of young less-educated Americans relative to the more experienced workers with similar educational attainment.

2. Macroeconomic factors (increased openess, trade deficits, and labor market slack) and changes in institutional structures (the decline in

unionization) are likely to have amplified each other in contributing to an unprecedented decline in real and relative earnings of young less-skilled males in the U.S. in the 1980s.

The remainder of the paper is organized as follows. Section II documents in detail the quantitative dimensions of changes in wage differentials by educational attainment and by experience in the United States and Japan. Section III considers the role of demographic factors, macroeconomic conditions, structural demand shifts, and deunionization in explaining movements in the structure of wages. Section IV concludes.

II. Changes in the Structure of Wages in the U.S. and Japan

In this section, we lay out the basic facts concerning recent changes in the structure of wages in the U.S. and Japan. We first present a brief comparative overview of changes in educational wage differentials and then turn to detailed examinations of movements in the pattern of earnings in each country.

Figure 1 presents the time pattern of changes in the college wage premium in both countries. It compares changes in the ratio of the income of 25-34 year old male college graduates to those of similarly aged male high school graduates for the U.S. and Japan from 1967 to 1987.[4] The figure illustrates that the college wage premium has been substantially higher in the U.S. than in Japan throughout the last twenty years. It further shows

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[4]For the U.S., we the median annual money income of full-time, year-round workers. For Japan, we use average monthly wages (total monthly contractual earnings plus one-twelfth of annual special payments). College graduates are those with 4 or more years of college, and high school graduates are those with 12 years of schooling.

Figure 1

□ U.S. Median Income, Year-Round Full-Time Workers
+ Japan, Average Monthly Wages, Regular Workers

Earnings of College Relative to High School

Males, 25-34 Years Old
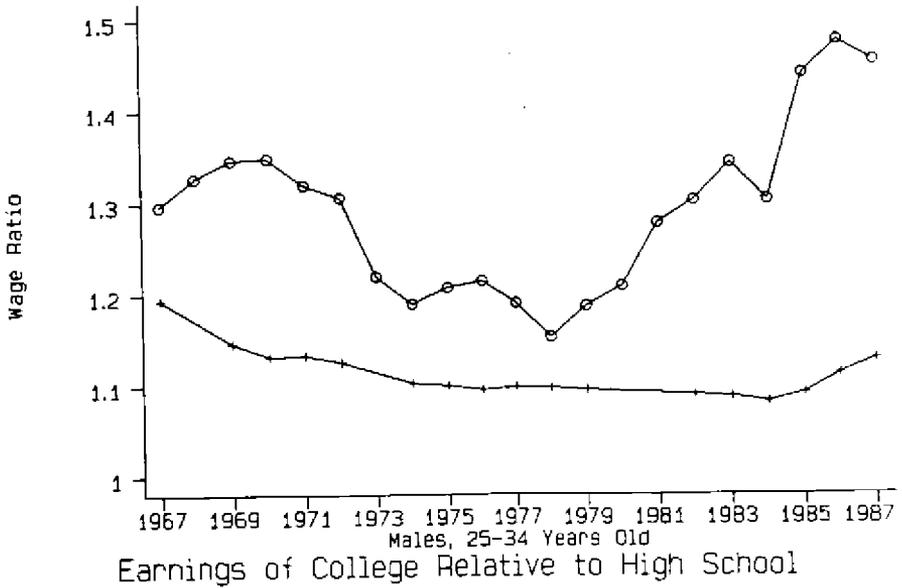
SOURCE: U.S. data are from U.S. Bureau of the Census,
         Current Population Reports, Series P-60, Consumer Income,
         various issues.
         Japanese data are from Basic Survey on Wage Structure,
         tables for regular workers in establishments with 10 or
         more regular workers.

that the earnings of college graduates relative to less-educated workers declined significantly in both the U.S. and Japan from the late-1960s to the late 1970s.[5] This pattern has reversed sharply in the U.S. with the college/high school earnings ratio for 25-34 year old males increasing from a trough of 1.15 in 1978 to 1.48 in 1986. On the other hand, the analogous ratio for Japan fell fairly continuously until 1984 and increased moderately from 1984 to 1987. As we illustrate below, the contrasts between the U.S. and Japanese experiences are even greater when one compares the relative earnings of less-educated new entrants to college new entrants.

A. Changes in the Structure of Wages in the U.S., 1973-87

We focus our detailed analysis of changes in the U.S. wage structure on the period since 1973 because this year marks the start of a period of stagnation of real earnings growth in the U.S. that represents a strong break from the historical pattern. To perform this analysis, we use data on individuals from the May 1973 Current Population Survey (CPS) and from the outgoing rotation groups of the 1979, 1984 and 1987 Full-Year CPSs.[6] The basic samples used for each year consist of individuals 18 to 65 years old

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[5]Freeman (1981) documents that a similar pattern of the deterioration in the relative earnings of highly-educated workers occurred in almost all OECD economies during the 1970s.

[6]A potentially important problem with earnings data from the CPS outgoing rotation groups is that the edited usual weekly earnings variable is top coded at $999. This top code is relevant for a substantial fraction of highly educated males in recent years. We conclude from a detailed analysis of alternative treatments of the top code that a reasonable approximation is to recode the weekly earnings of those at the cap as $1450. This adjustment yields results for changes in real and relative earnings of different groups of workers in the 1979 to 1987 period that are similar to those found when one compares changes in group median earnings and when one uses a tobit procedure (that explicitly treats the observations with top coded earnings as censored) to estimate mean earnings for each group.

who satisfied the following conditions: (1) listed working as major activity;
(2) were not self-employed; and (3) had usual hourly earnings (usual weekly
earnings divided by usual weekly hours) of at least one-half the prevailing
minimum wage and less than or equal to $50 an hour.[7]

We first provide a summary of changes in the structure of earnings in
the U.S. since 1973 for young workers (those with less than 10 years of
potential experience) and for peak earners (those with 20 to 29 years of
potential experience).[8] We focus on 12 separate groups for each year: three
educational splits (0-11, 12, and 16+ years of schooling), 2 potential
experience splits (0-9 and 20-29 years), and 2 gender groups. For each of
the 12 separate groups in 1973, 1979, and 1987, we regress the log of usual
hourly earnings on potential experience, dummy variables for years of
schooling (where appropriate), and dummy variables for nonwhite, part-time,
and metropolitan area status. The resulting estimated mean log wage rates
and their estimated standard errors are reported in the top panel of Table
1.[9] The estimates are predicted values from the regressions for white, full-
time, workers, residing in a metropolitan area at three educational levels
(8-11, 12, and 16 years) and two experience levels (5 and 25 years). These
adjusted means of log hourly earnings for each group allow us to control for
changes in observed measures of group composition in making inferences

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[7]Our basic samples contain the following numbers of observations:
34,806 for 1973; 148,683 for 1979; 155,172 for 1984; and 158,466 for 1987.

[8]We define potential experience as min(Age - education - 6, age - 18).

[9]All earnings figures in Table 2 are reported in 1987 dollars. We
deflated converted earnings from 1973 and 1979 into 1987 dollars using the
personal consumption expenditures implicit price deflator for GNP.

(a) Estimated Mean Log Real Hourly Earnings by Education, Experience and Gender

Education	Dropouts (8-11 yrs)			High School (12 yrs)			College Grads (16 yrs)		
Experience	1973	1979	1987	1973	1979	1987	1973	1979	1987
Males									
5 yrs	2.070	2.031	1.810	2.170	2.119	1.950	2.462	2.387	2.409
	(0.017)	(0.008)	(0.009)	(0.009)	(0.005)	(0.005)	(0.016)	(0.007)	(0.008)
25 yrs	2.388	2.351	2.241	2.523	2.484	2.437	2.900	2.828	2.871
	(0.015)	(0.010)	(0.013)	(0.012)	(0.007)	(0.007)	(0.027)	(0.014)	(0.012)
Females									
5 yrs	1.743	1.710	1.589	1.896	1.866	1.775	2.257	2.166	2.261
	(0.237)	(0.010)	(0.013)	(0.009)	(0.004)	(0.005)	(0.020)	(0.008)	(0.008)
25 yrs	1.822	1.859	1.789	2.034	2.028	2.046	2.324	2.280	2.368
	(0.019)	(0.011)	(0.013)	(0.014)	(0.007)	(0.006)	(0.037)	(0.018)	(0.014)

(b) Changes in Estimated Mean Log Real Hourly Earnings

Education	Dropouts (8-11 yrs)			High School (12 yrs)			College Grads (16 yrs)		
Experience	73-79	79-87	73-87	73-79	79-87	73-87	73-79	79-87	73-87
Males									
5 yrs	-0.039	-0.221	-0.260	-0.051	-0.169	-0.220	-0.075	0.022	-0.053
25 yrs	-0.037	-0.110	-0.147	-0.039	-0.047	-0.086	-0.072	0.043	-0.029
Females									
5 yrs	-0.033	-0.121	-0.154	-0.030	-0.091	-0.121	-0.091	0.095	0.004
25 yrs	0.037	-0.070	-0.033	-0.006	0.018	0.012	-0.044	0.088	0.044

Each estimate is from a separate cross-section regression for an education-experience-gender group of log real hourly earnings on years of potential experience, a set of schooling dummies, and dummy variables for black, part-time and metropolitan area status. The education classes used are 0-11, 12, and 16+ years of schooling; the experience classes used are 0-9 and 20-29 years of potential experience. The estimates for each education-experience-gender group are the predicted values for the log hourly earnings regression for that group evaluated at the indicated experience and schooling levels for a full-time, white employee, living in a metropolitan area. The numbers in parentheses are the standard errors. The data used are from the May 1973 Current Population Survey and from the Full-Year 1979 and 1987 Current Population Surveys (Outgoing Rotation Groups). Earnings are deflated by the personal consumption expenditure implicit price deflator for GNP and are in 1987 dollars.

concerning changes in real and relative wages.[10] Changes in real log hourly

earnings for each group from 1973-79, 1979-87, and 1973-87 are presented in

the bottom panel of the table.

Several basic stylized facts concerning changes in the structure of wage

emerge from the numbers presented in the table. First, movements in relative

wages by educational attainment differ substantially in the two subperiods.

Less-educated workers gained slightly against college graduates in all age-

gender groups during the 1973 to 1979 period. This trend more than

completely reversed between 1979 and 1987 as educational wage differentials

for all groups expanded with a vengeance. For example, from 1979 to 1987,

the mean log wage of male college graduates with five years of experience

increased by 0.022 - (-0.169) - 0.191 (relative to the mean log wages of male

high school graduates with the same experience, and by 0.243 relative to the

mean log wages of high school dropouts. Thus the earnings of young college

graduates increased by over 20 percent relative to those of less-educated

males during this period. Overall, the college/high school wage differential

increased by 14 percent for men and by 12 percent for women from 1979 to 1987

after having declined by 5 percent for men and 9 percent for women from 1973

to 1979.[11]

Table 1 clearly indicates that increases in educational differentials

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[10]A similar methodology is used by Bound and Johnson (1989) in an
examination of changes in relative wages over the 1979-87 period.

[11]These summary changes are based on separate log hourly earnings
regressions for our entire samples of 18 to 65 year males and females
respectively for 1973, 1979, and 1987. The regressions included 8 schooling
dummies, a spline in potential experience, 8 region dummies, a race dummy, a
metropolitan area status dummy, and a part-time work dummy. The estimated
college/high school log hourly wage differential for males (females) declined
from 0.32 (0.39) in 1973 to 0.27 (0.30) in 1979 and then increased to 0.40
(0.49) in 1987.

since 1979 are much larger for younger workers than for peak earners. This is consistent with the similar larger decreases in relative earnings of younger college workers in 1969-73 period documented by Freeman (1977). Because of internal labor markets and firm-specific skills, younger and older workers are likely to be imperfect substitutes in production, and young workers are more likely to bear the brunt of shifts in demand and supply conditions in the external labor market.

Second, the table highlights the stagnation of real earnings growth in the U.S. since 1973. Most dramatically, the real earnings of young males with 12 or fewer years of schooling and of female high school dropouts fell by tremendous amounts in a relatively short period from 1979 to 1987. In fact, the real hourly earnings of male dropouts with 5 years of experience fell by approximately twenty percent in this period of just eight years.

Third, experience differentials for both males and females with 12 or fewer years of schooling increased substantially between 1979 and 1987. These increases in experience differentials for high school graduates occurred despite a decline in the fraction of high school graduates with 1-5 years of experience (Murphy and Welch, 1988b). This suggests that these changes reflect a relative demand shift against young, less-educated workers rather than the impact of generational crowding. The increases in experience differentials for less-educated workers reflected the tremendous real earnings losses of young, less-educated workers rather than real earnings growth for peak earners. In contrast, the relative earnings of peak earners to new entrants for both male and female college graduates have remained fairly stable since 1979.

Finally, while gender differentials are not a focus of the current

study, it is of interest to note that between 1979 and 1987 male/female earnings differential narrowed substantially (from 4 to 10 percent) between 1979 and 1987 for every education-experience category represented in the Table 1. This contrasts with the small amount of change in gender differentials apparent in the 1973-79 period.

Table 2 provides more details on the pattern of changes in college/high school and experience differentials for males. The table presents ratios of relative usual weekly earning by education and experience groups for male, full-time workers. A focus on full-time workers and weekly earnings is useful for a comparison with changes in the wage structure in Japan since the available data on earnings for detailed groups in Japan represent monthly wages for regular workers. The table indicates that, after slight declines for most groups in the 1973-79 period, college/high school wage ratios increased dramatically for males in all experience groups from 1979 to 1984 and continued to expand through 1987. The college/high school mean weekly wage ratio for males with less than five years of experience more than doubled, increasing from 1.42 in 1979 to 1.86 in 1987. The table further suggests that the growth of the college/high school wage differential cannot be related entirely to a recent decline in the "quality" of those who do not go on to college (perhaps from a worsening of American high school education). Older cohorts of high school graduates also experienced substantial earnings reductions relative to college graduates in the 1979 to 1984 period as compared to analogous changes in differentials for same aged cohorts from 1973 to 1979. [12]

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[12] See Blackburn, Bloom and Freeman (1989) and Murphy and Welch (1988a) for a more detailed analysis of changes in relative earnings over time for different age and experience cohorts.

Table 2: Relative Usual Weekly Earnings by Education and Experience
U.S., Male, Full-Time Workers, 1973-87

A. Average Weekly Wages of College Graduates Relative to High School
   Graduates by Experience Group

Years of Experience	1973	1979	1984	1987
0-4	1.42	1.42	1.78	1.86
5-9	1.49	1.42	1.64	1.81
10-14	1.55	1.51	1.65	1.76
15-19	1.59	1.51	1.65	1.77
20-24	1.65	1.56	1.66	1.77
25-29	1.52	1.56	1.67	1.73

B. Average Weekly Wages of Experienced Workers Relative to New Entrants
   (0-4 Years of Experience) by Schooling Group

Years of Schooling	1973	1979	1984	1987

Average Weekly Wages of Peak Earners (25-29 Years of Experience) Relative
to New Entrants

	1973	1979	1984	1987
8-11	1.52	1.56	1.70	1.87
12	1.66	1.65	1.98	2.00
16 or more	1.78	1.80	1.85	1.86

Average Weekly Wages of Those with 10 to 14 Years of Experience Relative
to New Entrants

	1973	1979	1984	1987
8-11	1.39	1.40	1.45	1.51
12	1.47	1.46	1.60	1.60
16 or more	1.61	1.55	1.48	1.51

The numbers in panel A are the ratios of the average usual weekly
earnings for college graduates (4 or more years of college) relative to
the corresponding average for high school graduates (12 years of
schooling) within an experience group. The numbers in panel B are the
ratios of the average usual weekly earnings of experienced workers
relative to the corresponding average for those of new entrants within a
schooling group. Experience is defined as min(Age - 18, age - years of
schooling - 6).

Source: Authors' calculations using the May 1973 Current Population
Survey and the Full-Year 1979, 1984, and 1987 Current Population Surveys
(Outgoing Rotation Groups).

Panel B of Table 2 shows that earnings of less-educated male new entrants fell dramatically relative to both peak earners and workers with 10-14 years of experience from 1979 to 1987. The ratios also indicate that less-educated peak earners gained substantially relative to males with the same educational attainment and 10-14 years of experience in the 1980s. Furthermore, the table shows that the well-known historical pattern of a steeper cross-section age-earnings profile for college than for high school workers has sharply reversed in the 1980s with the massive declines in the earnings of younger high school graduates.

A final major change in the structure of wages in the U.S. is a sharp increase in the inequality of earnings within education-experience-gender groups. From 1973 to 1987, increases within groups in the earnings of workers in the upper part of the earnings distribution relative to those in the lower part have been of similar magnitude to increases in educational differentials. For example, the log weekly wage differential between the ninetieth and the tenth percentile male high school graduate with less than ten years of experience increased from by 0.12 between 1972-4 and 1978-80 and increased by 0.10 from 1978-80 to 1985-7.[13] Although changes in within group and between group earnings differentials have been of similar magnitude for the period since the early 1970s, the time patterns of the changes differ substantially. While educational differentials fell in the 1970s and increased sharply in the 1980s, within group inequality (whether measured by the standard deviation of log earnings, the interquartile range, or the

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[13] These figures are for full-time workers and are based on a data from March CPSs. Similar increases in inequality are apparent within almost all education-experience-gender groups. More detailed analyses of within group changes in inequality and descriptions of this data set can be found in Juhn, Murphy, and Pierce (1989) and Katz and Murphy (1989).

differential between the ninetieth and tenth percentile worker in a group)
has increased rather steadily throughout the period since the early 1970s
after remaining fairly stable in the 1960s (Juhn, Murphy and Pierce, 1989).

The time pattern of increases in within group inequality suggests that
changes in the structure of the U.S. economy mitigating in favor of
increased returns to "ability" (or maybe to luck and connections) have
operated since the early 1970s. The different time pattern of changes in
educational wage differentials suggests that the rapid increase in the supply
of college graduates in the early to mid-1970s may have offset factors
tending towards increased skill differentials.

B. Changes in the Structure of Wages in Japan

This section documents changes in relative wages by education and
experience in Japan since the late 1960s. We concentrate exclusively on
changes in earnings differentials for males because of data availability and
the strong segmentation between males and females in the Japanese labor
market.

In contrast to the U.S. experience of the 1980s, educational wage
differentials have increased only moderately in Japan since the late 1970s,
and experience differentials for both high school and college males have
narrowed. The moderate increase in educational differentials does reflect a
change from the pattern of the mid-1950s to the 1970s, in which the earnings
differential between those with and without college degrees narrowed
substantially for males. Figure 2 presents movements in the monthly regular
earnings of new college graduates relative to those of new high school

Figure 2

New College Graduates Relative to New Upper Secondary Graduates

Starting Pay For New Graduates By Education

Japan, Male Regular Employees
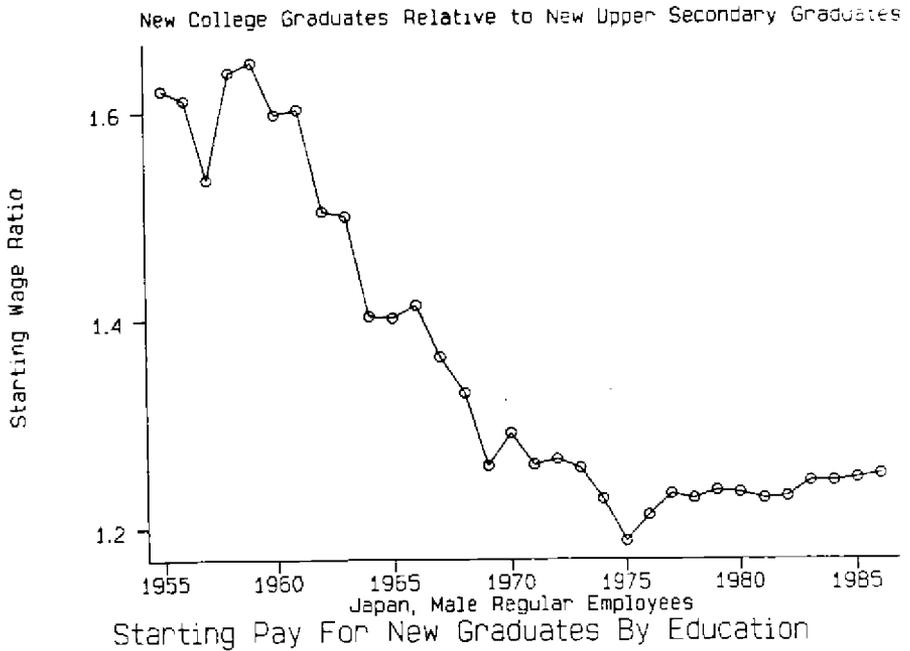
SOURCE: Basic Survey on Wage Structure, various years;
          Japan Productivity Center, Practical Handbook of
          Productivity and Labor Statistics, 1985, Table 3, p.19.
          Starting pay is the monthly regular earnings of new
          graduates.

graduates from 1955-86.[14] The ratio of the starting wage of new college

graduates relative to high school graduates declined precipitously from 1.65

in 1959 to 1.19 in 1975. This was a period of steady expansion in the

fraction of new labor market entrants with college degrees.[15] This trend has

reversed and the ratio has increased slightly in the 1980s.

Since age-earnings profiles appear to be steeper in large firms than in

small firms in Japan, and since company status and working conditions are

better in large firms, differences in starting pay for new college and high

school graduates may not adequately measure differences in their employment

packages. An alternative measure of changes in the entry-level educational

market in Japan -- suggested by Nakata and Mosk (1985) -- is the fraction

of entering workers in different educational groups attaining jobs in large

firms (enterprises with a thousand or more employees). Nakata and Mosk find

that the fraction of college graduates entering large firms declined from the

mid-1960s to 1980. We have used data from the Prime Minister's Office,

Statistic Bureau, Employment Status Survey to calculate changes in the

fraction of 20-24 year old male college graduates and 15-24 year old male

high school graduates working in large firms in the 1980s. We find that the

fraction of new male college graduates working in large firms increased from

0.281 in 1982 to 0.346 in 1987, while the corresponding fraction for young

male high school graduates fell slightly from 0.234 to 0.221. This indicates

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[14]Monthly regular earnings are monthly contract cash earnings excluding
overtime pay. The wage ratios in Figure 2 are for regular workers in private
establishments with 10 or more regular workers.

[15]Nakota and Mosk (1987) report that university enrollment rates for
males in Japan increased from 10.5 percent in 1950 to 45.9 percent in 1980.
See Umetani (1973) for a study of the impact of the rapid expansion of the
college-educated labor force from the 1950s to the early 1970s on the
relative earnings of college graduates.

an improvement in future career prospects for college graduates relative to high school graduates in the 1980s that might not show up in wages for several years.

For our more detailed analysis of wage differentials in Japan we use data from the published tables for private industries of the <u>Chingin Kozo Kihon Tokei Chosa</u> (Basic Survey on Wage Structure).[16] These wage data are compiled from surveys of individuals in about 70,000 non-government establishments with ten or more regular workers taken in June of each year.[17] These wage statistics provide us with data on mean wages for male regular workers in reasonably detailed age-educational attainment categories. In our analysis of wage differentials, we use a reasonably comprehensive measure of total monthly earnings: the sum of total monthly contract earnings (regular earnings plus overtime payments) and one-twelfth of annual special earnings (bonus payments).

Changes in real monthly wages for male regular workers in selected educational attainment-experience groups from 1974-9 and 1979-87 are presented in Table 3. The pattern of real wage changes contrast sharply with the pattern in the United States. In particular, less-educated male new entrants have experienced more robust real earnings growth in the 1980s than in the 1974-9 period. Less-educated male new entrants have gained ground against workers with about 10 years of labor market experience in the 1980s.

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[16] These data have been compiled and maintained by the Ministry of Labour on an annual basis since 1954. The survey design is described in detail in Japan Ministry of Labour (1986, pp. 306-9).

[17] The survey excludes the agriculture, fishing and forestry sector. In addition, the all-industry aggregates that we use exclude employees of public enterprises. Separate industry data does include employees of public enterprises in transportation, communications, and public utilities.

Table 3: Real Monthly Wages by Educational Attainment and Experience
Japan, 1974-1987

Male, Regular Workers

Group of Workers	Mean Monthly Wages[a] 1987 Yen (in 1000s)			Compound Annual Percent Change	
	1974	1979	1987	74-79	79-87
New Entrants[b]					
Lower Secondary	109.8	111.7	121.6	0.3	1.1
Upper Secondary	137.1	142.3	161.0	0.8	1.6
College Graduates	177.1	184.1	212.1	0.8	1.9
Young Experienced Workers[c]					
Lower Secondary	193.5	203.4	208.3	1.0	0.3
Upper Secondary	237.9	260.4	266.3	1.9	0.3
College Graduates	344.6	363.0	380.1	1.1	0.6
Peak Earners, 45-49 Years Old					
Lower Secondary	304.3	325.0	375.6	1.4	1.9
Upper Secondary	367.2	412.2	464.1	2.4	1.6
College	566.6	622.7	680.9	2.0	1.2

[a] Monthly wages are the sum of total monthly contractual earnings and one-twelfth of annual special earnings (bonus payments). Earnings are deflated by the consumer price index.

[b] New entrants are workers from 15 to 17 years old for lower secondary graduates (9 years of schooling), workers from 18 to 20 years old for high school graduates (12 years of schooling), and workers from 20 to 24 years old for college graduates (16+ years of schooling).

[c] Young experienced workers are workers from 20 to 24 years old for lower secondary graduates, workers from 25 to 29 years old for high school graduates, and workers from 30 to 34 years old for college graduates.

Source: Basic Survey on Wage Structure, tables for regular workers in establishments with 10 or more regular workers in private enterprises.

In contrast to the depressed market for inexperienced high school males in the U.S., the changes illustrated in Table 3 suggest a reasonably strong market for high school new entrants in Japan in the 1980s. The table also illustrates that young college graduates have gained moderately on young high school graduates in the 1980s. The changes in relative earnings by education within experience groups are much less dramatic in Japan than in the United States.

Movements in educational differentials for males in Japan since 1967 are summarized in Table 4. Panel (a) presents college/high school wage ratios for males in the same age category. These ratios compare the earnings of persons from a given high school class who went on to attain a college degree to those who entered the labor market after high school. Panel (b) compares the earnings of college and high school workers with the same amount of labor market experience (i.e. those who entered the labor market at the same time). College/high school earnings differentials fell moderately from 1967 to 1979 in both age and experience group comparisons. The decline is most dramatic in comparisons of new entrants and represents the continuation of the secular decline in the entry-level differential illustrated in Figure 2. A comparison of Tables 2 and 4 shows that, in 1979, the college/high school wage differential was larger for young males in the U.S. but quite similar for peak earners (those with 20 to 30 years of experience) in the two countries. This difference reflects a greater disparity in the steepness of the age-earnings profile for college versus high school workers in Japan.

The comparison of college and high school workers of the same age reveals that the college wage premium in Japan has increased substantially since 1979 for young workers. Yet within experience groups, the increase in

Table 4: Average Monthly Wages of College Graduates
Relative to High School Graduates

Japan, Male Regular Employees, 1967-1987

(a) By Age Group

Age Group	Year 1967	1969	1974	1979	1984	1987
20-24 yrs old	0.97	0.98	0.93	0.92	0.96	0.98
25-29 yrs old	1.10	1.07	1.07	1.04	1.05	1.11
30-34 yrs old	1.21	1.23	1.16	1.15	1.15	1.16
35-39 yrs old	1.35	1.34	1.29	1.24	1.25	1.27
40-44 yrs old	-	-	1.38	1.39	1.32	1.31
45-49 yrs old	-	-	1.54	1.51	1.48	1.47

(b) By Experience Group

Experience Group	Year 1967	1969	1974	1979	1984	1987
0-1 years	1.48	1.35	1.29	1.29	1.31	1.32
2-6 years	1.46	1.47	1.33	1.36	1.34	1.37
7-11 years	1.50	1.50	1.45	1.39	1.40	1.43
12-16 years	1.56	1.52	1.45	1.46	1.43	1.47
17-21 years	-	-	1.47	1.49	1.51	1.51
22-26 years	-	-	1.60	1.57	1.53	1.56

The numbers are the ratios of average monthly wages (total monthly
contractual earnings plus one-twelfth of annual special earnings) for college
graduates relative to corresponding averages for high school graduates.
Experience is defined as Age minus 18 for high school graduates and as Age
minus 23 for college graduates.

Source: Basic Survey on Wage Structure, tables for regular workers in
establishments with 10 or more regular workers in private enterprises,
various years. Service industries are not included in 1967 and 1969.

the premium in the 1980s is quite small. Furthermore, the changes are small relative to those in the same period for the United States. By 1987, the college wage premium is much larger at all experience levels in the U.S. than in Japan.

The smaller increases in the college wage premium for experience groups than for age groups in Japan is the exact opposite of the pattern in the United States. The reason that the earnings of new entrants in Japan have improved relative to those of young experienced workers for both high school and college workers, while the earnings of high school new entrants have fallen relative to those of slightly more experienced workers in the United States. Table 5 and Figure 3 illustrate in detail changes experience differentials for males in Japan. In the 1980s, high school new entrants have gained against workers with 5 to 20 years of experience, and college new entrants have gained against all groups of more experienced workers.

Thus educational wage differentials have not increased nearly as dramatically in Japan as in the United States since 1979, and experience differentials for high school males have moved in opposite directions. The next section examines alternative explanations for this contrast in changes in the structure of wages in the U.S. and Japan.

III. Causes of Changes in the Structure of Wages

In this section, we provide an exploratory investigation of four potentially complementary hypotheses for recent changes in the structure of wages in the U.S. and Japan: changes in relative numbers of workers by age and education; trade performance and macroeconomic conditions; broader

Table 5: Relative Wages by Age
Japan, Male Regular Employees, 1969-1987

Schooling Group	1969	1974	1979	1984	1987
A. Average Monthly Wages of Peak Earners Relative to New Entrants[a]					
Lower Secondary (9 yrs schooling)	-	2.77	2.91	3.04	3.09
Upper Secondary (12 yrs schooling)	-	2.68	2.90	2.90	2.88
College (16+ yrs schooling)	-	3.20	3.38	3.28	3.21
B. Average Monthly Wages of Peak Earners Relative to Young Workers[b]					
Lower Secondary (9 yrs schooling)	-	1.57	1.60	1.73	1.80
Upper Secondary (12 yrs schooling)	-	1.54	1.58	1.67	1.74
College (16+ yrs schooling)	-	1.64	1.71	1.76	1.79
C. Average Monthly Wages of Young Workers Relative to New Entrants					
Lower Secondary (9 yrs schooling)	1.85[c]	1.76	1.82	1.75	1.71
Upper Secondary (12 yrs schooling)	1.89	1.73	1.83	1.73	1.65
College (16+ yrs schooling)	2.10	1.95	1.97	1.86	1.79

[a] Peak earners are defined as workers from 45 to 49 years old. New entrants are workers from 15 to 17 years old for lower secondary graduates, workers from 18 to 20 years old for high school graduates, and workers from 20 to 24 years old for college graduates.

[b] Young workers are workers from 20 to 24 years old for lower secondary graduates, workers from 25 to 29 years old for high school graduates, and workers from 30 to 34 years old for college graduates.

[c] Figure is for 1970.

Source: Source: Basic Survey on Wage Structure, tables for regular workers in establishments with 10 or more regular workers in private enterprises, various years. Service industries are not included in 1969.

Figure 3

Wages of Experienced Workers Relative to New Entrants
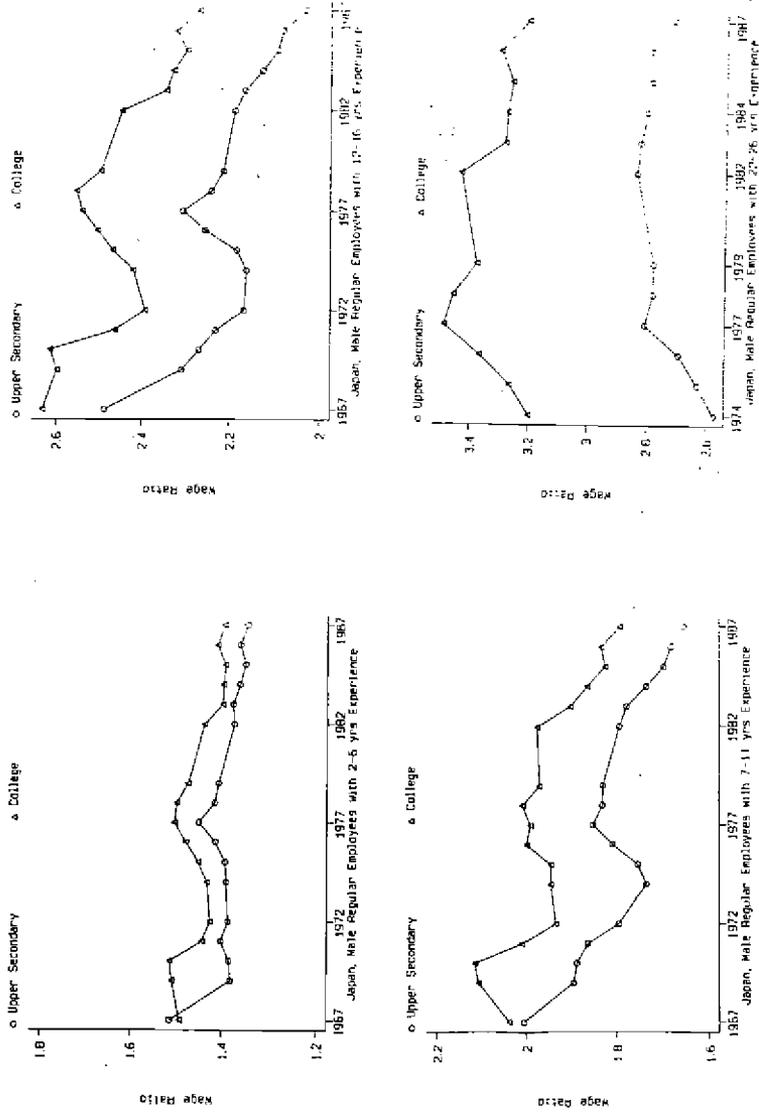
SOURCE: Basic Survey on Wage Structure.

structural changes affecting the relative demand for different skill groups; and changes in union density.

A.   Supply Factors

A first factor that many labor economists have focused on to explain changes in the relative wages by age and education are changes in the demographic structure of the labor force. The assumption of imperfect substitutability between younger and older workers and between more- and less-educated workers implies that changes in the age structure and educational attainment of the population and are likely to affect the structure of wages. The degree of impact of relative numbers on the relative earnings of two groups (in a simple two factor world) depends inversely on the elasticity of factor substitution between the two groups.[18]

Changes in the Relative Supply of College Graduates

A stark version of the relative supply hypothesis for educational differentials makes the simplifying assumption that the relative demand for college graduates grows at a relatively stable trend rate (perhaps becuase of steady technological chagnes favoring more skilled workers). This hypothesis

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[18]When both factors are paid their marginal products, the elasticity of substitution (σ) between two factors can be written as $-d\ln RE/d\ln RW$, where RE measures relative input quantities (employment) and RW measures relative input prices (wages). Relative input demand can then be written:

$$\ln(RE) = \ln(DEM) - \sigma\ln(RW)$$

where DEM is an index of properly measured demand shifts. Under market clearing, RE equals relative supply (RSUP). This yields a wage determination equation of the form

$$\ln RW = -1/\sigma \ \ln(RSUP) + 1/\sigma \ \ln(DEM).$$

suggests that differences in the rate of change of the college wage premium
between two periods should be negatively related to differences in the rate
of growth of college graduates as a share of the labor force.

Table 6 provides summary information on changes in the fraction of the
labor force with college degrees in the U.S. and Japan since the early 1970s.
The table indicates that the rate of growth of college graduates as a
fraction of the labor force was considerably slower in the U.S. in the 1979-
87 period than in the 1973-79 period. In fact, the fraction of males aged
25-34 with college degrees declined from 1979 to 1987. The period of peak
growth for college graduates as a fraction of the U.S. workforce (1970-77)
corresponds with a period of a declining college wage premium, and the more
recent period of slow growth corresponds to a sharply increasing premium.

The combination of a steady increase in the relative demand for college
graduates (perhaps from technical change and shifts in product market demands
related to increasing openness) and a deceleration in the growth rate of
college graduates goes some distance towards explaining increased educational
differentials in the U.S. in the 1980s. The annual rate of growth of college
graduates as a fraction of the male labor force declined by approximately 2
percent from 1973-9 to 1979-87, while the annual rate of growth of the
college/high school wage differential for males aged 18-65 increased by 2.5
percent from -0.8 percent in the earlier period to 1.7 percent in the later
period.[19] If the elasticity of substitution between college males and other
male labor is in Freeman's (1978) preferred range of 1 to 3, then the
observed slowdown in the rate of growth of college graduates could explain an

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[19]These growth rates follow from a decline in the college/high school
wage differential for all males of 5 percent from 1973-9 and an increase in
the differential of 14 percent from 1979-87.

Table 6: Changes in the Fraction of Employees with College Degrees

(a) U.S., 1973-87

Group of Workers, Ages	Percentage of Group with College Degrees			Annual Log Growth Rate	
	1973	1979	1987	73-79	79-87
Males, 18-65	16.1	20.7	24.9	.042	.023
Males and Females, 18-65	15.1	18.9	23.4	.037	.027
Males, 25-34	22.0	28.5	26.2	.043	-.011
Males and Females, 25-34	21.3	27.2	26.7	.041	-.002

(b) Japan, 1974-87

Group of Workers, Ages	Percentage of Group with College Degrees			Annual Log Growth Rate	
	1974	1979	1987	74-79	79-87
Regular Employees in Establishments with 10 or More Employees					
Males, All	16.9	19.5	24.8[a]	.027	.029
Males, 25-34	23.3	27.5	37.7	.033	.039
Persons Mainly Working, All Establishment Sizes[b]					
Males, All	17.5	21.1	26.1	.037	.027

[a] This figure is for 1986.

[b] The figures for males mainly working refer to the sum of the percentage share of college and junior college graduates.

Source: The U.S. data are from the May 1973 and Full-Year 1979 and 1987 Current Population Surveys. The data on Regular employees for Japan are from the Basic Survey on Wage Structure, and the data on persons mainly working are from the Employment Status Survey.

increase in the rate of growth of the college wage premium of 0.67 to 2 percent a year.

Table 6 further indicates a possible reason for the differences in the Japanese and U.S. experiences in the 1980s. The rate of growth of male college graduates, especially as a share of those aged 25 to 34, does not seem to have slowed down as dramatically in Japan as it has in the United States. Data for regular employees in establishments with more than ten employees from the Basic Survey on Wage Structure indicate a slightly faster growth rate in the employment of college graduates in the 1980s than in the 1970s. On the other hand, data from Employment Status Survey for persons working in establishments of all sizes indicate a moderate drop in the rate of growth of employment of male college graduates. Neither data source suggests a slow down as dramatic as the one that occurred for U.S. males.

Cohort Size Effects

Changes in the relative size of entering cohorts of male high school and of male college graduates between 1967 and 1987 for both the U.S. and Japan are illustrated in Figure 4.[20] The figure shows that while the fraction of new entrants among high school graduates in the U.S. increased steadily throughout the 1970s, this fraction has declined sharply in the 1980s. Thus, for the U.S., the wages of young high school graduates fell dramatically relative to those of more experienced high school graduates in exactly the period in which it would appear that the negative impact

[20] The U.S. plots present the share of new entrants in total annual manhours rather than the employment share of new entrants in terms of bodies since we do not have actual employment share for the entire 1967-87 period. The patterns of changes in the share of hours and of employment of new entrants is virtually identical in the years for which we have both.

Figure 4

NEW ENTRANTS AS A PERCENTAGE OF THE WORKFORCE BY EDUCATIONAL ATTAINMENT
U.S. AND JAPAN, 1967-87
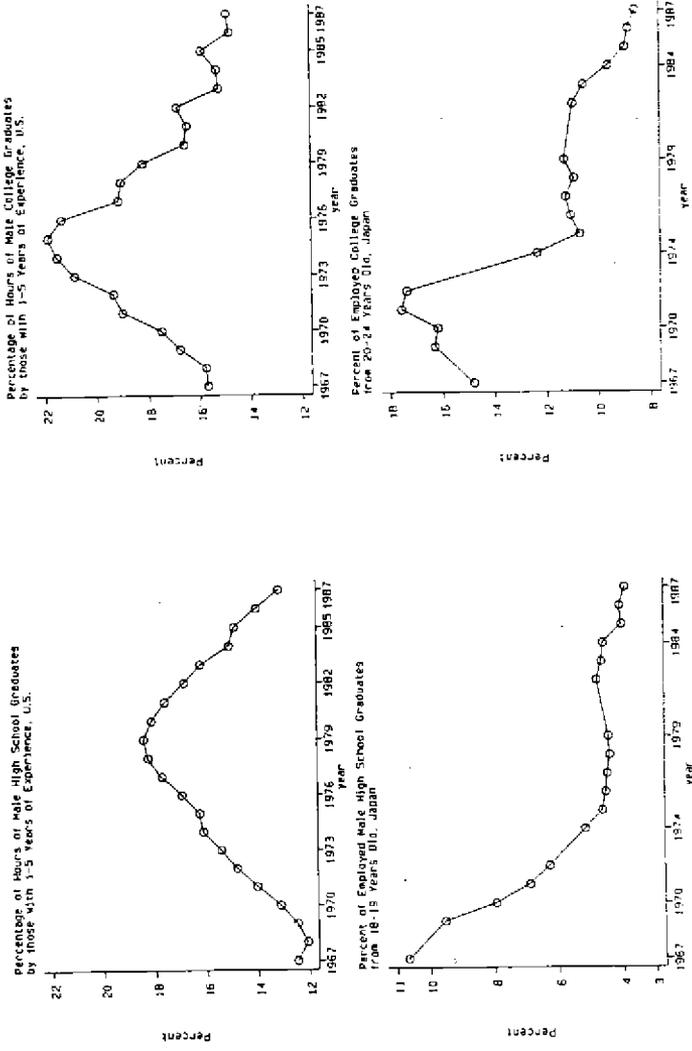
SOURCE: U.S. data are from the Annual Demographic Files on the March CPS, 1968-88.
Japanese data are from the Basic Survey on Wage Structure.

generational crowding on their labor market performance should have been abating. On the hand, the decline in the position of young college graduates relative to older graduates 1970s essentially ceased when the share of new entrants began to decline after 1975. This contrast is strongly suggestive of a sharp demand shift against young high school males in the 1980s that much more than offset the benefits of smaller cohort size.

A comparison of Figures 3 and 4 indicates that movements in the share of new entrants in employment appear to track the earnings of new entrants relative to more experienced workers reasonably closely in Japan. This suggests a possibly important factor in the improved position of new entrants in the Japanese labor market is the rapid ageing of the Japanese labor force. This phenomenon has sharply reduced the supply of new entrants relative to older workers since the 1960s for high school workers and since the mid-1970s for college workers. These relative supply changes create a tendency towards raising the wages of new entrants in the labor force, especially when firms are expanding. The oil shock and slowdown of hiring in the mid-1970s apparently reduced the demand for new entrants enough to offset demographic pressures towards improved earnings of new entrants through the late 1970s (Mosk and Nakota, 1985). More experienced workers were less affected by this slowdown since they were insulated by internal labor markets.

B.   Macroeconomic and Structural Factors

The U.S. and Japanese economies have differed sharply in terms of their trade performances and the health of their manufacturing sectors since the sharp dollar appreciation and yen depreciation of the early 1980s. Between

1979 to 1987 real net exports declined by 3.3 percent as a share of U.S. GNP

and share of U.S. civilian employment in manufacturing fell drastically from

22.7 to 18.6 percent. Over this period, Japan's real net exports increased by

6.5 percent as a share of GNP and the manufacturing's share of employment

remained essentially constant at approximately 24.5 percent.[21]   These

differences may help explain the recent dramatic deterioration in the real

and relative position of young high school males in the U.S. and the moderate

improvement in the position of male high school new entrants in Japan.

Shifts in the U.S. industrial distribution of employment by gender and

educational attainment for workers with less than ten years of experience

from 1973 to 1987 are presented in panels (a) and (b) of Table 7.   The table

illustrates that less-educated young males have tended to be intensively

employed in the durable goods manufacturing sector.   Less-educated females

have tended to be intensively employed in nondurable goods manufacturing.

The share of less-educated workers in U.S. manufacturing fell dramatically in

the 1980s.   Less-educated workers were who in previous generations gained

high-wage manufacturing sector were instead ending up in the low-wage retail

trade sector.   Shifts of similar magnitude are not apparent in the 1973-9

period.   In contrast to the U.S. experience, panel (c) of Table 7 shows that

young Japanese high school males have shifted dramatically into the durables

sector (metals and machinery) and have moved out of (wholesale and retail)

trade during the 1980s.   Japanese high school male new entrants did well

during the period of expanded new hiring in durables in the 1980s and did

poorly during the period of declining manufacturing employment from 1974-9.

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[21]Economic Report of the President, 1989; OECD, Main Economic
Indicators, various issues.

Table 7: Percentage Industry Employment Shares for Young Workers
U.S. and Japan, 1973-1987

Years of Schooling:	8-11			12			College[a]		
Industry	73	79	87	73	79	87	73	79	87

(a) U.S. Males, Wage and Salary Employees, 0-9 Years of Experience[b]

Agric., Mining	7.3	7.9	9.6	3.3	4.6	3.2	1.7	2.4	2.2
Construction	17.4	15.5	17.4	13.7	14.5	15.0	4.1	3.4	3.1
Nondurables	13.2	11.9	9.7	11.3	10.5	9.1	7.8	7.4	7.2
Durables	22.9	22.4	15.8	24.7	23.2	15.1	10.5	12.5	12.9
Trans., Utilities	5.1	6.3	5.5	9.6	7.8	7.3	3.8	5.7	7.2
Wholesale Trade	4.4	4.0	4.3	4.9	5.0	5.5	5.1	5.5	6.0
Retail Trade	16.2	17.3	21.9	15.1	18.3	23.3	7.4	8.9	9.6
FIRE	1.7	1.4	1.1	2.2	1.9	2.7	8.6	7.7	11.3
Educ., Welf.Serv.	1.6	1.8	1.6	1.4	1.7	2.0	28.4	19.4	11.2
Other Services	8.9	10.5	12.6	9.0	9.6	13.3	15.9	19.4	28.4
Public Admin.	1.5	1.0	0.6	4.9	3.0	2.8	6.8	9.1	6.4

(b) U.S. Females, Wage and Salary Employees, 0-9 Years of Experience

Agric., Mining	2.0	2.1	1.6	0.4	1.1	0.9	0.7	0.9	0.8
Construction	0.5	0.6	1.3	1.0	1.2	1.3	0.3	0.5	0.6
Nondurables	25.5	21.0	14.9	11.6	9.7	7.8	3.2	4.2	5.3
Durables	17.6	16.8	8.1	12.3	11.4	7.3	1.8	3.0	5.5
Trans., Utilities	2.4	2.1	2.2	6.1	4.8	3.9	2.6	3.9	4.6
Wholesale Trade	1.9	1.9	2.3	3.7	3.2	2.9	0.8	1.8	2.7
Retail Trade	25.4	28.8	37.9	19.1	24.6	30.8	4.8	7.7	9.9
FIRE	2.3	3.7	3.3	13.3	13.3	12.9	4.1	7.3	10.6
Educ., Welfare Serv.	3.7	3.3	3.5	5.5	5.6	4.4	62.0	40.3	24.0
Other Services	18.2	18.3	23.8	22.7	20.9	19.3	16.3	24.9	32.6
Public Admin.	0.5	1.5	1.0	4.3	4.2	3.0	3.3	5.5	5.4

(c) Japan Males, Mainly Working, 15-24 Years Old

Mining	-	0.4	0.2	-	0.2	0.2	-	0.2	0.0
Construction	-	31.2	27.1	-	12.1	10.3	-	9.3	7.0
Metals, Machinery	-	15.9	15.3	-	16.9	23.8	-	10.6	14.6
Other Manufacturing	-	13.6	12.8	-	13.6	13.4	-	10.0	10.0
Trans., Utilities	-	0.2	0.0	-	1.5	1.3	-	1.1	0.5
Trade	-	20.7	22.9	-	26.5	23.5	-	26.6	22.8
FIRE	-	0.4	0.2	-	2.4	1.6	-	6.4	6.5
Services	-	10.2	11.6	-	12.5	14.0	-	24.1	30.8
Government	-	0.4	0.2	-	4.9	3.2	-	7.3	4.3

[a]16+ years of schooling for the U.S. and 14+ years of schooling for Japan.

[b]Experience equals min(Age - yrs. of schooling - 6, Age - 18).

Source: U.S. data are from the May 1973 CPS, Full Year 1979 CPS (Outgoing Rotation Groups), and Full Year 1987 CPS (Outgoing Rotation Groups). The Japanese data are from the Employment Status Survey, 1979 and 1987. Comparable data for 1973 are not available for Japan.

For the U.S. in the 1980s, the substantial improvement in earnings of women and of college graduates relative to male dropouts and high school workers further suggests that shifts in product demand away from heavy industries, which intensively employ less-educated males, and towards service industries, which tend to employ high school and college females and male college graduates, may be an important factor in changing relative wages. The data (in Tables 1 and 7) suggest a strong negative correlation ($\rho = -0.92$) between the fraction employed in durables at the start of the decade and the wage performance for the different groups of young workers in the 1980s. Overall, the U.S. and Japanese experiences indicate that the availability of employment opportunities in manufacturing for those without college degrees has tended to be a strong indicator of the relative performance of less-educated young workers.

Table 7 also illustrates that despite the overall sharp decline in employment in durables in the 1980s, the share of young college-educated workers employed in durables actually increased from 1979 to 1987. This suggests the possibility of changes in production techniques that has further shifted demand against the unskilled in a period during which many believe the skills of new American high school graduates have been deteriorating (e.g. Murnane, 1988). A "mismatch" between the skills demanded by employers and skills provided by young less-educated Americans may further exacerbate their labor market difficulties. The greater incentives for the attainment of cognitive skills by those not planning to attend college in Japanese than in American high schools suggests that Japanese high school graduates may be better prepared to deal with recent technological innovations emphasizing worker flexibility than are recent American high school graduates (Bishop,

1987). Furthermore, differences in employment and training practices in the
U.S. and Japan, such as the "white collarization" of (largely high-school
educated) production workers in Japan described by Koike (1988), suggest that
similar shifts in production techniques may have quite different impacts on
educational wage differentials in the U.S. and Japan. In particular, the
greater importance of on-the-job skill enhancement in Japan may also make
high school educated workers more adaptable to these changes. It is possible
that the substitutability of high school and college workers is greater in
Japan than in the United States so that educational differentials may be less
responsive to market shifts in Japan.

When the composition of product demand shifts perhaps because of changes
in international competition, it is likely that labor demand will increase in
the sectors where product demand has increased. Shifts in product demand are
likely to raise the relative demand for the labor of the demographic groups
most concentrated in the production of the goods or services in industries
where demand has increased. Murphy and Welch (1988b) find that product
demand shifts associated with the sharp increase in U.S. net imports in the
1980s have shifted labor demand against males with 12 or fewer years of
schooling and against female high school drop outs. Katz and Murphy (1989)
find that overall shifts in the industrial distribution of employment in the
U.S. have worked against less-educated males and in favor of college
graduates in the 1980s although a similar pattern is apparent starting in the
early 1970s. This pattern of demand shifts suggests that structural factors
such as increased openness and technological change have operated in favor of
more skilled and educated workers since the early 1970s. The rapid supply
expansion of college graduates nullified the impact of these changes on the

college wage premium during the 1970s. On the other hand, these demand
shifts showed up in the 1970s through increases in inequality within
educational groups. The slowdown in the growth of college graduates, the
impact of trade, and the continuation of these trend shifts in demand all
operated towards increased skill and educational differentials in the 1980s.

Changes Between and Within Industries

The large variation across industries in wages for workers with the same
observed characteristics suggests that shifts in the industrial composition
of employment, whether caused by product demand shifts or changes in
production technologies, may help explain changes in the wage structure by
affecting the average industry wage premium earned by different groups. A
large body of evidence suggests that a substantial part of these inter-
industry wage differentials reflect "rents."[22] For the U.S. in the 1980s,
the shift of low-educated males from manufacturing jobs with large wage
premiums to low-wage jobs in retail trade and repair services combined with
the shift of college graduates out of low-wage education and welfare services
and into the more lucrative jobs in professional services could play a role
in explaining the increased college wage premium in the 1980s.

To examine the industry rents hypothesis, we compare changes in the
college/high school wage differential estimated in log hourly earnings
equations with and without detailed industry dummies. The results of this
procedure for our U.S. samples are presented in Table 8. Large increases in
the college/high school differential remain even when industry dummies are

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[22]See Katz and Summers (1989) for a recent review of the evidence on the
extent to which inter-industry wage differentials for workers with the same
observable characteristics represent noncompetitive wage differentials (rents).

Table 8: The Impact of Adding Industry Dummy Variables to Estimates of the College/High School Wage Differential in the U.S., 1973-87

Dependent Variable = Log Usual Hourly Earnings

Group of Workers	Changed Differential without Industry Dummy Variables		Differential with 41 Industry Dummy Variables			Changed Differential with 41 Industry Dummy Variables	
	73-79	79-87	1973	1979	1987	73-79	79-87
Males, All	-.05	.13	.35 (.01)	.32 (.01)	.40 (.01)	-.05	.09
Males, 25-34	-.04	.14	.33 (.02)	.28 (.01)	.38 (.01)	-.05	.10
Males, Exp 0-9	-.03	.19	.33 (.02)	.29 (.01)	.42 (.01)	-.04	.13
Females, All	-.09	.11	.40 (.01)	.29 (.01)	.36 (.01)	-.11	.07
Females, 25-34	-.06	.14	.39 (.03)	.30 (.01)	.39 (.01)	-.09	.09
Females, Exp 0-9	-.09	.16	.37 (.02)	.29 (.01)	.39 (.01)	-.09	.10

Sources: The reported wage differentials are the coefficients on a high school dummy (12 years of schooling) from regressions in which the base group includes those with 16 years of schooling. Each regression includes 8 schooling dummies, experience and its square, 8 region dummies, a race dummy, a metropolitan area dummy, and a part-time work dummy. The regressions for all workers include a spline in experience (with break points at 5, 10, 20, and 30 years) rather than a quadratic in experience. Experience is defined as min(Age - 18, Age - years of schooling - 6). The numbers in parentheses are standard errors.

Sources: May 1973 CPS, Full Year 1979 CPS (Outgoing Rotation Groups), and Full Year 1987 CPS (Outgoing Rotation Groups).

included in the earnings regressions. Most of the increase in the college

wage premium in the 1980s occurred within two-digit industries. The pure

impact of movements for low- to high-rent jobs is strongest for young female

college graduates who have shifted dramatically out of education and social

services over the last fifteen years. A large between industry effect (.06)

is also apparent for males with less than ten years of experience. This

effect reflects the shift of young high-school males out of high-rent

sectors. Since the between industry shifts move in favor of college

graduates in both the 1973-9 and 1979-87 periods in which the college wage

premium moved in opposite directions, the between industry effects look more

important when one examines increases in the college wage premium from 1973-

87 rather than focusing on the increase in the 1980s. Still, an explanation

for changes in the structure of wages in the 1980s must focus on the

substantial within industry increases in educational differentials during

this period.

Labor Market Tightness

A final macroeconomic factor affecting the wage structure is the degree

of labor market tightness. A considerable body of evidence suggests that

tight labor markets raise the relative wages of less-educated, less-skilled,

and young workers (e.g. Murphy and Welch, 1988a; and Freeman, 1988). The

high average unemployment rate and sluggish growth in the U.S. economy in the

period since 1973 may play a role in reduced relative earnings of young,

less-educated workers. Furthermore, young workers at all levels of

educational attainment did particularly poorly in Japan in the period from

1975-8 during which the job vacancy rate (vacant jobs over civilian

employment) was at its lowest level over the 1967-87 period.

Differences in changes in the earnings of young, less-skilled workers by region in the U.S. provide further suggestive evidence for a role of overall labor market tightness in affecting the wage structure. The contrast between the experiences of New England and the East North Central region (the Rust Belt) between 1979 and 1987 is quite illustrative.[23] Over this period, the unemployment rate declined from 5.4 to 3.3 percent in New England, while it rose from 6.1 to 7.2 percent in the Rust Belt. The real hourly earnings of male high school new entrants (those with less than 5 years of experience) increased by 2.5 percent in New England and declined by 26 percent in the Rust Belt.[24] Additionally, the college/high school wage differential for new entrants increased by approximately 3 percent in New England as opposed to 30 percent in the Rust Belt. For all nine U.S. census divisions, the correlation in the change in the unemployment rate and the growth in earnings of male high school new entrants for the 1979-87 period is -0.85.

C. Deunionization

A key institutional development, emphasized by Blackburn, Bloom, and Freeman (1989), that is likely to have adversely affected the relative economic position of less-skilled Americans is the sharp decline in unionization in the 1980s. The deunionization of the American private

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[23] The New England census division includes the states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. The East North Central division consists of Ohio, Indiana, Illinois, Michigan, and Wisconsin.

[24] These figures are based on calculations using our samples from the Full Year 1979 and 1987 CPSs. Earnings figures were deflated by the national personal consumption expenditures deflator.

economy potentially removes many jobs from which less-skilled workers earned union wage premia and also reduces the likely positive impact of the threat of unionization on the earnings of less-skilled nonunion workers. Table 9 presents tabulations from the May 1973, May 1979, and Full Year 1987 CPSs of the change in the extent of unionization of U.S. males by educational attainment. The table illustrates the much sharper decline in unionization for the less-educated in the 1979-87 period than in the 1973-79 period. For example, between 1979 and 1987 the extent of unionization fell by over 17 percent for young high school males.

A first cut approach to analyzing the direct impact of deunionization on the earnings of a group is to examine changes in the estimated rents earned by union members as a share of total compensation of the group. We take the estimated union-nonunion wage differential from a log hourly earnings regression with standard controls, industry dummies, and interactions of union membership with educational attainment as our measure of the union wage premium.[25] Since the estimated union-nonunion wage differential increased substantially for males with 12 or fewer years of schooling from 1979 to 1987 (possibly because the lower rent union jobs are the ones that tend to be eliminated by deunionization), deunionization is estimated to have reduced the earnings of the less-educated relative to college graduates by 0.5 to 2.0 percent.[26] For example, the estimated union-nonunion ln wage differential

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[25]Each regression includes 8 dummy variables for years of schooling, a spline in experience, a race dummy, a metropolitan area dummy, 8 region dummies, a part-time work dummy, 41 industry dummies, a union membership dummy, and three education class/union status interaction dummies.

[26]Blackburn, Bloom, and Freeman (1989) estimate larger effects of deunionization (in the range of 3 to 5 percent) on the earnings of the unskilled for the entire 1973-87 period under the assumption that the union wage premium remained unchanged at its 1973 level throughout this period.

Table 9: Changes in Extent of Unionization by Educational Attainment
U.S. Males, 1973-1987

	Percent Union Members			Change	
Group of Workers	1973	1979	1987	73-79	79-87
Males, Aged 18-65					
High School Drop Outs	42.5	37.8	22.5	-4.7	-15.3
High School Graduates	40.6	38.9	27.3	-1.7	-11.6
College Graduates	10.5	18.7	13.3	8.2	-5.4
Males, Aged 25-34					
High School Drop Outs	37.6	31.6	15.5	-6.0	-17.1
High School Graduates	44.5	41.8	24.6	-2.7	-17.2
Males, 0-9 Years of Experience					
High School Drop Outs	19.9	19.2	9.0	-0.7	-10.2
High School Graduates	28.2	32.0	14.6	3.8	-17.4

Source: Authors' calculations using the May 1973, May 1979, and Full Year
1987 Current Population Surveys. The samples includes wage and salary
employees. Experience is defined as min(age-18, age - years of schooling -
6).

for 25-34 year old male high graduates is estimated to have increased from 0.15 to 0.22 from 1979 to 1987. This change combined with a decline in unionization for this group from 41.8 to 24.6 percent implies that unionization changes account for a decrease in earnings of 0.9 percent. This approach ignores the spillover effects of a weakened union threat in the 1980s on the earnings of less-educated nonunion workers. The sharp shift in demand against less-skilled workers associated with macroeconomic conditions and increasing international competition in the early 1980s probably contributed to the further weakening of the union movement in the U.S.. The interaction of a bust market and declining unionization may exacerbated the effects of either change and contributed to the tremendous real and relative losses of young less-educated Americans.

The extent of unionization in Japan has also declined sharply in the 1980s (Freeman and Rebick, 1989). Since Japanese unions have traditionally included both blue and white collar workers (high school and college workers) in an enterprise, they are not likely to have been as important a factor in increasing the relative earnings of less-educated workers as U.S. unions have been. This suggests that deunionization is likely to have been a more important force toward increasing educational differentials in the U.S. than in Japan.

D.   Assessing the Alternative Explanations: Some Time Series Evidence

We conclude this section with the presentation of some simple time series models designed to give a some quantitative assessment of the importance of relative supply, macroeconomic conditions, and structural factors in explaining recent changes in the wage structure. We estimate

models of the form

$$(1) \qquad \ln(w_i/w_j) = \beta_0 + \beta_1 \ln(N_i/N_j) + \beta_2 \text{ Cycle}$$
$$+ \beta_3 \text{ (Real Net Exports/GNP)} + \beta_4 \text{ Time} + \epsilon,$$

where β_1 is an estimate of the elasticity of the response of relative wages to the relative numbers of workers in a group, w_i is a measure of the wage for group i, N_i is a measure of the supply of workers in group i, and cycle is measure of labor market tightness.[27] We examine models for college/high school wage ratios and for the ratio of the earnings of high school new entrants to those of experienced high school workers. These models provide a crude approach to gauging the importance of changes in demographic factors, trade performance, labor market tightness, and trending structural demand shifts on relative wages.

Four estimated models of the form of equation (1) are presented in Table 10. The first line of the table examines movements in the college/high school income ratio for U.S. males aged 25-34 from 1967-87(presented in Figure 1). The estimates indicate that all four factors have significant impacts in the expected direction on the college wage premium. The estimated supply elasticity of -0.35 suggests an elasticity of substitution between young prime aged college and high school graduates of approximately 3. Increases in net exports as a share of GNP improve and increases in the prime age male unemployment rate reduce the relative earnings of high school

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[27] For the U.S., we follow Murphy and Welch (1988a) in using the innovations in the prime age male unemployment rate as our measure of labor market cyclical conditions. We use the job vacancy rate for Japan. See Freeman (1978) for a defense of the usefulness of equations of the form of equation (1).

Dependent Variable	Independent Variables						
Log Relative Earnings by Group	Log Relative Supply	Time	Real Net Exports over GNP	Cycle[a]	Constant	R^2	n
U.S. Males							
1. College Grad / High School Grad 25-34 Yrs. Old 1967-1987	-.351 (.050)	.011 (.002)	-1.59 (.624)	.027 (.006)	-.064 (.042)	.91	21
2. College Grad / High School Grad, 1-5 Years Experience, 1963-87	-.225 (.098)	.005 (.002)	-5.91 (.958)	.039 (.013)	.213 (.071)	.76	25
3. H.S. Grad 1-5 Yrs. Exp./ H.S. Grad 25-30 Yrs. Exp., 1963-87	-.130 (.038)	--	4.24 (.745)	-.028 (.011)	-.456 (.015)	.71	25
Japan Males							
4. H.S. Grad 18-19 Yrs. Old/ H.S. Grad 35-39 Yrs. Old 1967-1987 (missing 1968,1973, 1980,1981)	-.046 (.006)	--	0.04 (.035)	.057 (.011)	-1.31 (.02)	.88	17

[a]For the U.S., the cycle variable is the residual from a regression of the prime age (25-54 year old) unemployment rate on its own lag from 1948-87. For Japan, the cycle variable is the vacancy rate (vacant jobs over civilian employment) and the source is OECD, Main Economic Indicators, data base on DRI.

Source: Line 1: U.S. Bureau of the Census, Current Population Reports, Series P-60, Consumer Income, various issues. The earnings measure is the median annual income of year-round full-time workers. The supply measure is the number of year-round full time workers. Lines 2-3: March CPS Annual Demographic Files, 1964-88. The earnings variable is weekly earnings of full-time employees. The supply measure is total annual manhours. Line 4: Basic Survey on Wage Structure. The earnings measure is monthly contractual earnings plus one-twelfth of special annual payments. The supply measure is regular employees in private establishments with 10 or more employees.

graduates. The trend term indicates that relative demand for college graduates has grown at approximately an annual rate of 1 percent over this period. This suggests that structural factors have indeed been moving against the unskilled. An examination of the fitted values of the equation indicates that it tracks movements in the college/high school wage ratio quite well throughout the sample. The log college wage premium increased by 0.20 from 0.17 in 1979 to 0.37 in 1987. The combination of trend demand shifts in favor of college graduates and a decrease in the log relative supply of college graduates of 0.19 predicts an increase in the college wage differential of approximately 0.15 and the sharp increase in the trade deficit predicts a further increase in the differential of 0.055.

Variations in the growth rate of the supply of college graduates combined with a steady trend increase in the demand for college graduates go a long way toward explaining movements in the college wage premium for 25-34 year old males. In contrast, while the estimated model in line 2 of Table 10 for the college/high school new entrants is similar to that in line 1, the movements in relative supply of college and high school new entrants have a different time pattern from those of 25-34 years old. The labor market entrance of the baby bust cohorts of high school graduates has implied a sharp increase in the ratio of college to high school inexperienced workers in the 1980s. An alternative interpretation of this perverse prediction is that supply factors do matter for the improved position of young college graduates in the 1980s, but that a measure of supply incorporating a broader range of experience groups is appropriate.

The estimates in line 2 suggest that most of the increase in the college wage differential for new entrants in the 1980s is related to the adverse

impact of the increased trade deficit on young high school new entrants.
This is also the case in line 3 for the sharp increase in the experience wage
premium for high school graduates in the 1980s. The net export variable
could be picking up a host of other phenomena occurring in the 1980s (such as
the decline in unionization). Cohort size moves in a perverse direction to
explain the deterioration in the position of young less-educated American
males in the 1980s. On the other hand, the estimates in line 4 of Table 10
indicate that the reduction in entering cohort size and increase in labor
market tightness (as measured by the vacancy rate) in the 1980s have improved
the relative position of young high school males relative to experienced
workers in Japan.

IV. Conclusions

Although we find no simple explanation for recent changes in the
distribution of earnings in the U.S. and Japan, we do find support for some
hypotheses. We find that a reduction in the rate of growth of college
graduates in the U.S. starting in the late 1970s goes a part of the way
towards explaining differences in the U.S. and Japanese experiences.
Macroeconomic factors (labor market slack and trade deficits) and changes in
institutional structures (the decline in unionization of less-educated
workers) appear to have reinforced each other leading to an unprecedented
decline in real and relative earnings of young less-skilled males in the U.S.
in the 1980s.

The role of persistent structural factors such as increased openness,
changes in the international division of labor, and technological changes

favoring the more skilled are much more difficult to evaluate. Comparative research examining the experiences of other developed countries is likely to be a fruitful avenue for future research on changes in the structure of wages.

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