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Changes in Earnings Inequality -- An International Perspective

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Changes in Earnings Inequality-- an International Perspective

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I. Introduction

The United States has experienced substantial increases in inequality of wage rates and family income during the 1970's and 1980's. Highly educated workers, who were already receiving above average wages in the 1970's, received substantial raises during the 1980's. At the other end of the spectrum, high school dropouts and high school graduates experienced actual declines in pay during the recent recovery.

Inequality increased not only between skill groups, but also among persons of the same age and with the same education. The increase in dispersion of wages among workers with the same characteristics has further exacerbated the problem for those at the bottom of the distribution-- young low wage high school dropouts lost ground not only to college graduates but they also lost ground relative to the average high school dropout.

This deterioration in the absolute and relative position of persons with low skills has had a substantial impact on poverty. While the increase in average income during the 1983-1990 recovery should have led to substantial declines in poverty rates, the increase in inequality has kept poverty rates well above the levels achieved during the late 1970's. In fact, changes in the distribution of income have had a larger impact on poverty than changes in economic growth.[1]

While the trends in inequality in the US are by now well known their cause is much less well understood.[2] This is largely a result of having many competing explanations-- deindustrialization, shifts in technology, demographic shifts, increased international

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[1] See Gottschalk and Danziger (1985)

[2] See Danziger and Gottschalk (1989).

competition, increased generosity of welfare programs-- but relatively few observations that can be used to distinguish between explanations. Some progress has been made in eliminating theories. For example, Moffitt (1990) rules out increases in welfare programs as an explanation for the increase in inequality by pointing out that inequality increased among persons not covered by public assistance programs and that inequality continued to grow during a period when welfare declined. Likewise, Murphy and Welch (1988) conclude that while cohort size explanations were consistent with the data for the 1970's, this supply side story is not sufficient to explain the continued increase in inequality during the 1980's when cohorts were getting smaller. While some theories can be eliminated, many of the remaining theories continue to be consistent with the data.

Progress in this field has not been characterized by identifying the "smoking gun" that fully explains the changes but rather by chipping away at existing explanations. By identifying theories that are no longer consistent with the data researchers have narrowed the range of possible explanations. This paper continues in that tradition.

By using a new source of data that includes information on several developed economies we hope to shed light on the relative importance of changes in country specific factors versus the importance of changes in structural factors that alter the economic environment common to all these countries. The latter focuses on two phenomenon-- technological change and deindustrialization-- that may have affected inequality.

One often heard hypothesis is that technology (or automation) has changed throughout the world in such a way as to devalue the skills of workers with low levels of education. According to this hypothesis, new production technologies have increased the demand for more educated workers, thereby raising their wages relative to less skilled workers. The second structural explanation also focuses on shifts in demand, but these shifts are not technologically driven. Rather, they are driven by shifts in demand for final goods. The increase in openness to foreign competition is said to be largely responsible for the shift in industrialized countries away from production of goods that require unskilled workers towards service oriented production that requires skilled workers. The globalization of the western economies is said to have led to a sharp increase in demand for high skilled workers. At the same time, competition eroded the position of low skilled workers, who had to compete with low skilled workers in the rest of the world.

Thus, according to this argument, increased openness is to blame for "deindustrialization", which in turn is to blame for the increase in inequality.

Changes in institutional and structural factors have potentially different empirical implications. If the change in the wage distribution reflects country specific institutional factors, such as the decline in the power of unions, then one would expect a good deal of diversity in the extent to which the western economies experienced rising inequality. On the other hand, if the distributional changes reflect structural shifts that are widely shared then the western economies we study should follow relatively similar patterns.

We focus on two possible causes of structural change-- changes in technology and changes in industrial structure. Since innovations, such as computer technologies, have wide applicability, we would expect to see educational upgrading in a wide variety of countries and industries. Therefore, if technological change is an important cause of the increase in the demand for skilled workers, we would expect to see a general upgrading of the the skill level used in all industries in the advanced industrialized countries we study-- both the skill mix and the skill premium would contribute to an increase in inequality within each industry.[3] On the other hand, different countries may have experienced different changes in industrial structure, leaving open the possibility that "deindustrialization " was important for some but not all countries. Thus, if countries differ in the shifts in industrial structure they experienced then cross country comparisons may be useful in determining the relative importance of these two structural factors.

If, on the other hand, changes in industrial structure were similar across countries, then it is considerably more difficult to access the relative importance of technological change and deindustrialization, since both have similar empirical implications. We, however, argue that deindustrialization could not be the whole story. The observed decline in the wages of less educated workers (relative to more educated workers) could be the result of the decline in industrial jobs or changes in technology. Both are consistent with the increase in the "skill premium". However, this rise in the "skill premium" was accompanied by an increase in the "skill mix" (ratio of the number of skilled to unskilled workers hired) within each sector. We argue that this increase in demand for skilled workers in the face of rising relative prices cannot be explained solely by changes in

[3]Inequality measures reflect both changes in prices (the wage rates paid to workers of different types) and quantities (the proportion of workers of each type.) In the case of technological change both prices and quantities contribute to the change in within industry inequality.

industrial structure. Technological change must have increased the relative productivity of skilled workers sufficiently to offset the rise in their relative price.

The shift in industrial structure may, however, have reinforced the rise in the demand for skilled workers. If the more skill intensive sectors were the ones that expanded, then the change in industrial structure would have reinforced the effects of changing technology. We offer a way of decomposing the change in the skill mix into the portion associated with changes in industrial structure and the proportion associated with all other factors. This serves to bound the possible effects of "deindustrialization".

In summary, if the countries we study had very similar changes in technology and industrial structure, but very different changes in inequality, then this suggests that country specific institutions were important in mediating the effects of these structural changes on inequality. On the other hand, if these industrialized countries experienced similar changes in inequality, then this suggests that institutional differences across countries were not sufficiently strong to offset the common structural changes. While we recognize that technological change and deindustrialization are not the only two possible structural factors that can affect inequality, we believe that these two factors have received sufficient attention in both the popular and academic literature to be at the center of this study of international differences. Again we do not pretend to be able to isolate "the smoking gun", rather we hope to be able to use international comparisons to continue to narrow the range of possible explanations.

The paper is divided into six parts. The next section discusses the usefulness and limitations of cross-national comparisons in studying inequality. Part 3 reviews the literature on inequality in the US and the emerging literature on international comparisons of inequality. This is followed in section 4 by a detailed discussion of the links between technological change, industrial restructuring and inequality. With this as background, we turn to the empirical evidence on these three factors in the industrialized countries we study . The final section draws conclusions from the data presented.

II. What Can Be Learned from Cross-national Data?

Cross-national comparisons can be useful in two different ways. First, a cross national data set gives multiple observations both on outcomes (changes in inequality) and explanatory variables (changes in industrial structure, technology, or other wage setting

factors). While observations on only a few countries cannot fully sort out the causal mechanism, additional observations can only improve our understanding of the mechanism leading to increased inequality. For example, the increase in inequality in the US is often ascribed to industrial restructuring. If we find that countries that experienced more restructuring were the countries that also experienced greater increases in inequality then this international data would buttress the case for industrial restructuring as an important part of the story. Second, cross-national data allows us to replicate within country tests. For example, the fact that the US lost much of its manufacturing base during the same period that inequality rose has been used to argue that the former caused the latter. If all countries experienced very similar changes in industrial structure and inequality this buttress the case for a causal link. Thus, cross-national data offers added information that can be used to see whether conclusions based on within country analysis are robust.

III. Review of Literature

Rising earnings and wage inequality among male workers in the United States has led to a substantial literature documenting the trends and to a smaller literature attempting to identify the causes of the rising inequality. Changes in the dispersion in the overall wage distribution can be usefully decomposed into changes in between group inequality and within group inequality. The former usually focuses on increases in wage differentials between high school and college graduates and between new entrants and older workers. Within group inequality focuses on increased dispersion in the wage distributions within education and experience groups.

Studies of the US

Changes in the Overall Distribution

Using the Current Population Survey (CPS), several studies examine the distribution of weekly wages for males (For recent studies see Juhn, Murphy, Pierce (1989) and Karoly (1990)). In order to concentrate on changes in wages and not changes in hours worked, the studies select only persons working full-time/ full-year. Since the large changes in laborforce participation of women confound labor supply and wage effects, most studies focus on the distribution of earnings of males. These studies find that wage growth varied dramatically between the upper, middle and lower ends of the distribution[4]. For

[4]Throughout this paper all values are in real terms (they are adjusted for inflation.)

example, the median wage of males working full-time full-year increased by 25 percent between 1963 to 1973 and declined slightly from 1973 to 1987 (5 percent). In contrast, the wages of similar workers at the tenth percentile declined by 21 percent between 1970 to 1987[5]. Thus, the wages of those at the bottom of the distribution fell both absolutely and relatively. In contrast, the real wages of the ninetieth percentile rose steadily since 1963 and increased considerably (12 percent) from 1970 to 1987 (Juhn-Murphy-Pierce,1989). Thus, growth in real wages was not shared equally among the labor force. Rather, large wage growth was experienced by those in the upper ends of the distribution and small or no wage growth was experienced by those in the lower tail.

Karoly (1990) finds a similar relationship by tracking wages of males in the 90th, 75th , 25th and 10th percentiles relative to the median. Since 1975, the real wages for the 90th and 75th percentiles increased 10 percent faster than the median while real wages for the 25th and 10th percentiles declined sharply relative to the median. In addition, overall measures of inequality such as the Gini coefficient, the variance of the log of wages, and the coefficient of variation were all relatively stable until 1979 when they increased sharply (Karoly,1988).

Changes in Between Group Inequality

Part of the observed change in the overall distribution was caused by the large increase in the returns to education. During the 1980s, the returns to education increased dramatically.[6] This is in sharp contrast to the decline in the returns to education during the 1970's. (Katz and Revenga,1989, Juhn, Murphy, Pierce,1989 , Murphy and Welch, 1988). The increase in returns to education are largest for the young. Murphy and Welch show that the ratio of college to high school weekly wages for white males with 1 to 5 years experience increased 50 percent since 1979. A similar but less pronounced increase in the college-high school wage ratio occurred for workers with 26 to 35 years experience.

Young workers also lost ground relative to older workers. Thus, the returns to experience increased sharply since 1979, especially for high school educated workers.

The result of these trends has been a dramatic decline in the relative position of young, high school graduates. Juhn-Murphy-Pierce illustrate this decline by noting that real

[5]A male at the tenth percentile has a wage that exceeds the wages of ten percent of male workers.
[6]The return to education is the percentage increase in wages that is associated with an extra year of education.

wages for 10th percentile high school graduates with 1 to 10 years of experience are roughly 18 percent lower today than wages for the same group in 1963. The least skilled workers are rapidly falling away from the rest of the distribution.

Changes in Within Group Inequality

In addition to the increased inequality between education and experience groups, recent studies find a striking increase in wage dispersion within these groups. The increase in within group inequality, however, seems to have started earlier, beginning in the early 1970's. The wage differential between the ninetieth and tenth percentile has increased within the distribution of wages of young and old workers and within the distribution wages of high school and college graduates. In all cases, persons in the upper percentiles have experienced significant growth in real wages while those in the lower percentiles have experienced slight growth or, in most cases, declines in real wages.

Cross-national Studies

With the recent availability of cross country data, researchers are just beginning to make cross-national comparisons of earnings and income inequality. Green, Coder, and Ryscavage (1990) examine earnings inequality in eight industrial countries using data from the Luxembourg Income Study . Their primary emphasis is on ranking the countries in terms of overall levels of inequality and seeing how the ranking varies with different inequality measures. While they take a cursory look at changes in inequality, this is not their primary focus.[7] Two other international studies, one by Katz and Loveman (1990) comparing changes in the structure of wages in the U.K. and France and another by Katz and Revenga (1989) comparing the United States and Japan take very similar approach as this paper.

Katz and Loveman examine trends in weekly and hourly gross wage distributions based on age, gender, occupation, and industry for the United Kingdom. For full-time male workers, they find the wage differentials between manual and nonmanual workers were stable over the 1974-1979 period and increased from 1979 to 1989. Wage differentials between experience groups expanded moderately in the later 1970s and substantially in first part of the 1980s. Wage inequality within distributions based on detailed occupations and detailed occupation-industry breakdowns narrowed in 1970s and

[7]Blackburn and Bloom (1990) use the LIS data to compare changes in family income inequality (not wage inequality) between the United States, Canada and Australia in the 1980s.

increased greatly in the 1980s. Thus, the United Kingdom's experience is similar to the United States.

As for France, Katz and Loveman find the nonmanual/manual differential for full-time male workers narrowed from the mid 1970s through mid 1980s and picked up slightly at the end of the sample period. Thus, unlike the U.S. and U.K. there is little evidence of a sharp deterioration in the relative wages of young unskilled workers. Data on within-occupation inequality shows relatively little change until 1984 when it begins to increase.

Katz and Revenga examine the changes in between group wage inequality in the United States and Japan. For the U.S., their findings support other studies which show a substantial increase in the returns to education and a large increase in the returns to experience among high school graduates since 1979. The plight of young low-educated males in Japan to contrasts sharply with that of the U.S. They find the college wage premium within all experience groups in Japan increased only moderately in the 1980s, whereas much larger increases were found in the U.S. During the 1980s, returns to experience did not increase in Japan as they did in the U.S. In fact, Japanese new entrants in all education groups gained ground on more experienced workers in the 1980s. Moreover, high school educated new entrants in Japan actually experienced bigger increases in monthly wages in the 1980s than in the 1970s. This contrasts sharply with the decline in real and relative wages for young high school workers in the U.S. in the 1980s.

Katz and Revenga examine supply-side explanations of the observed trends. They show that the growth rate of college graduates from 1979 to 1987 declined in the U.S. and increased slightly in Japan . This difference partly explains the contrasting changes in the college wage premiums in the two countries. On the other hand, the fraction of new entrants with high school educations declined in the U.S. in the 1980s. This cohort effect would predict an improvement in high school new entrants wages yet their wages fell dramatically. In Japan, the fraction of new entrants with high school and college educations declined which is consistent with the improved position of new entrants in the Japanese labor market.

IV. Changes in Economic Structure

In this section we start by laying out the analytical links between changes in inequality and several structural changes that may have occurred in the economies of the countries we study. The first set of factors focus on the causes and consequences of the shift away from manufacturing toward services. The second set of factors focus on the implications of technological change on the demand for more skilled workers.

After having established the conceptual links between changes in inequality and these changes in economic structure we examine three key indicators that may be useful in measuring the relative importance of these factors: (1) changes in the international competition, (2) changes in the industrial structure and (3) changes in the skill mix within industries. While these three indicators offer only a partial picture of the changes that have occurred in each country, they provide some useful information which can be used to narrow the range of possible causes of the increase in inequality.

Some Analytical Links between Economic Structure and Inequality

In this section we develop the conceptual links between distributional changes and two commonly cited causes of the trend in inequality: changes in the industrial structure and changes in technology. Our choice to focus on these factors is motivated largely by the attention that they have received in the popular and academic literature.

Changes in Industrial Structure and International Competition

The 1980's was marked by substantial shifts in the industrial structure of developed economies. This led to two related hypotheses which predict that changes in inequality were caused by this restructuring. The first hypothesis focuses on "deindustrialization" per se, independent of its cause. The second focuses on changes in industrial structure caused by changes in international competition. Each is considered in turn.

"Deindustrialization"

The hypothesis that changes in industrial structure may have caused distributional changes has been prompted by the observation that manufacturing declined and the service sector expanded in the US during the same period during which inequality increased. This "deindustrialization" led to the popular vision that auto workers were being transformed into "hamburger flippers".

Expansion of the skill intensive sectors would, by itself, tend to increase the demand for more skilled workers. As a result , this would drive up the skill differential (i.e. wages of more skilled workers relative to less skilled workers.) With the resulting increase in the cost of hiring more skilled workers, firms would want to substitute less skilled workers for the now more expensive skilled labor.[8] As summarized in the top row of Figure 1, the net result of deindustrialization would, therefore, be an increase in the skill differential and a decline in skill intensity within each sector[9].

Figure 1

Implications of Alternative Theories

Causal Mechanism	Implication	
	Change in Skill Premium	Change in Skill Intensity within an Industry
Changes in Industrial Structure	Increase	Decline
Changes in Technology	Increase	Increase

Institutions, such as unions and governments, can partially mediate the effects of these industrial shifts. For example, union negotiated wages or social contracts can limit the extent to which these market forces alter wages. If all countries lost manufacturing and gained service sector jobs but these same countries experienced different patterns in

[8] This is a movement along the demand function.

[9]The aggregate skill intensity would still have risen, even though each industry became less skill intensive. The reweighting toward the more skill intensive sector would more than offset the decline in skill intensity within each sector since demand for more skilled workers must have gone up if their wages rose.

inequality then this would call into question the primacy of changes in industrial structure as an explanation for the growth in inequality--deindustrialization either had little impact on inequality or its effects could be countered by institutional factors.

International Competition

The change in industrial structure is often attributed to increases in international competition. At the heart of this argument is the hypothesis that foreign competition has its biggest impact on the wages of low skilled workers-- when international trade increases, firms producing goods which require little skill face the largest increase in competition from abroad. This puts downward pressure on the wages of low skilled workers. At the same time, firms producing skill intensive goods are able to increase exports. This increases the demand for skilled workers. The result of the decline in demand for less educated workers and the increase in demand for more highly trained workers raises the gap between the wages of low and high skilled workers.[10]

These conceptual links between openness and inequality suggest that changes in inequality should be related to changes in openness-- if countries that experienced substantial increases in inequality did not experience a concurrent increase in international trade then this is evidence against the international trade interpretation of rising inequality.

Changes in Technology

Changes in technology are often cited as an alternative underlying cause of the increase in inequality. According to this argument, the widespread application of computers and automated technologies reduced the demand for less skilled workers whose jobs were automated out of existence. At the same time there was an increased demand for high skilled workers to run the automated systems.

This explanation for the increase in inequality has similar empirical implications for the skill differential but different implications for the skill mix within sectors. Both deindustrialization and technological change predict that the wage differential will widen as the demand for less skilled workers falls. While the cause of the decline in demand for less skilled workers is different the prediction for a rising wage differential is identical for the two theories.

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[10]The wage gap widens in in skill rich countries and narrows in skill poor countries.

Where the theories do differ is in their predictions about changes in the skill mix within each industry. As we argued earlier, the deindustrialization argument implies that each sector will become less skill intensive-- the increase in the cost of skilled workers with no offsetting increase in their productivity will induce firms to substitute less skilled workers for their now more expensive counter parts. If, however, the increase in demand for more skilled workers came from technological change that made more educated workers more productive, then one should observe an increase in the skill intensity accompanying the increase in the skill premium. Both reflect the increased productivity of the more highly trained workers. Thus, as Figure 1 shows, the two theories have different implications about changes in the skill mix within industries.

V. Empirical Results

Data

We use two types of cross-national data in this paper. The first is the family survey data from the Luxembourg Income Study (LIS). This data is used to obtain comparable measures of overall inequality, as well as between and within group inequality. The second source of data is published times series on measures of industrial structure and international competition from the United States Bureau of Labor Statistics (BLS) and the Organization for Economic Co-Operation and Development (OECD). This data is used to try to gain insight into the possible causes of changes in inequality

LIS Data

We use LIS data on Australia, Canada, France, Germany, Netherlands, Sweden, United Kingdom, and the United States. The LIS data is a collection of micro data sets obtained from annual income surveys in various countries.[11] The different surveys are similar in form to the Current Population Survey for the United States and the Survey of Consumer Finances for Canada[12]. The advantage of this data set is that extensive effort has been put into making the information on income and household characteristics as comparable as possible across countries.

Since we are interested in changes in inequality, we restrict our study to the countries in the LIS data for which two years of data are available. Although the years used were

[11]The data is stored in Luxembourg under the sponsorship of the Luxembourg government . See Smeeding , et al. (1985) for a detailed description of the data source and methods for accessing the data.
[12]See Appendix A on surveys used in each country

dictated by the years covered for each country in LIS, they represent a roughly similar time period-- the first wave of data for each country is from the early 1980's and the second wave is from the mid or late 1980's[13].

Our measure of earnings is annual gross wages and salaries of family heads. Current dollar values have been inflated into 1988 prices (each in their own currency) using the implicit price deflators from the OECD National Product Accounts. Our sample includes male heads of families, between 25 and 55 years old, working full-time. We exclude females since changes in the distribution of their annual earnings include changes in the hours women work and changes in their wage rates. We use the earnings of male heads of families, rather than all males since data on individuals who are not heads or spouses is not available in LIS for all countries in both years[14]. Studies using the CPS data have found similar results on earnings inequality using heads or individuals. The age cut-offs were chosen to focus on people who are not likely to be in school or retired. Although we selected full-time workers, full-year selection was not available in some countries for the early data sets.[15] When we examined the data for the later years in which the full-year selection was available, we found that 82 to 92 percent of full time workers meeting the age cut also worked full-year.

In order to maintain confidentiality, survey data on income above some upper bound is often recoded to the upper bound. For example, in recent years the CPS data is top-coded at $100,000-- any individual with earnings over this amount is recoded to $100,000. This top coding affects both the mean and measures of dispersion since the real value of the top coding limit changes with inflation. For example, as inflation erodes the top coding limit a greater and greater percent of the people are top coded. To deal with this top-coding problem we exclude the top five percent of the distribution in every year[16].

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[13] For all countries other than Sweden and the Netherlands unemployment rates were higher in the second year than the first year covered by each country survey. See Appendix A3 for country specific unemployment rates. Values in bold face are for years in which surveys were conducted.

[14] We use the family, rather than the household, record.

[15] For both years of Australian data and the later years of the Canadian and German data, full-time refers to the worker's status last week rather than for the reference year . Thus we also excluded workers who reported full-time status but had zero annual earnings. No full-time variable is available for France. For the United States the selection is full-time/full year. The difference in our results on the changes in the log variance from Gordon, Coder, Ryscavage is due to the difference in our sample selection on full-time rather than full-time and full/year.

[16] The top five percent of the age or education specific distribution is trimmed. For example, when looking at high school graduates we trim the top five percent of high school graduates. We also examined data for all male heads, including persons in the top five percent. While our qualitative conclusions were not changed the magnitudes were different in some countries.

To explore changes both between and within education groups, we constructed three education categories corresponding in the United States to roughly less-than 12 years of education, 12 years, and more than 12 years of education. The recoding into the three groups is straight forward for Canada, the Netherlands and Australia. For Germany we combined the education information (on type of high school attended) with occupational information (types of apprenticeships) to determine the education categories.[17] No education information is available for Sweden, France or the United Kingdom.

Published Data

We use published information on the level of trade and the level of employment by sector in each country over time. The published data on imports and exports (as a share of gross domestic product, GDP) is from the OECD National Accounts 1960-1986. Imports, exports and GDP in each country are measured in billions of U.S.dollars at current prices and 1980 exchange rates. The employment by sector data is from two sources: (1) an unpublished study prepared by the U.S. Department of Labor, Bureau of Labor Statistics and (2) the OECD Labour Force Statistics 1967-1987.[18] We include females as well as males in these data since structural changes reflect changes in the employment of all persons.

Changes in Economic Structure in OECD Countries

Changes in Inequality Across Countries

In this section we present information on inequality from the eight countries in the LIS data set. We separate our discussion of changes in inequality across countries into three sections: (1) changes in the overall wage distribution, (2) changes in between group inequality and (3) changes in inequality within groups. Following in the tradition of the existing literature we group by age and education.

Changes in the Overall Distributions

We start by describing changes in the mean and median of the wage distributions in each country. This gives an indication of the underlying rate of growth in each country Table 1 shows the yearly percentage change in two measures of central tendency and

[17] See Appendix A for more detail on education categories.

[18] US Department of Labor, Bureau of Labor Statistics, International Labor Affairs "Comparative Labor Force Statistics, 1959- 1989".

two measures of inequality. The growth rate in the mean or median, shown in columns 1 and 2, are measures of real growth in wages. The growth rate in the coefficient of variation (column 3) and log variance (column 4) are indicators of changes in inequality.

The top row of Table 1 indicates that the mean and median of the wage distribution declined between 1979 and 1986 in the United States. This is consistent with other studies tracking the growth in real wages over the 1980s (Karoly,1988). The lack of growth was, however, not restricted to the United States--the majority of countries experienced negative growth in median real gross annual wages and salaries. Only Germany and Sweden experienced small increases in mean wages and salaries. The outlier is the U.K. which experienced over two percent per year wage growth.[19]

Our summary measures of inequality replicate the results of others for the United States--a falling mean was accompanied by rising inequality during the 1980's. Again this pattern is not isolated to the United States. We find increases in the yearly percentage change in the coefficient of variation and the variance of log wages and salaries for all countries. Furthermore, the increase in inequality in the U.S. was roughly in the middle of the experiences of other countries. The Netherlands experienced almost no increase in inequality, while Canada, Germany and Australia all experienced double-digit yearly increases in the variance of log wages.

Table 1 indicates that the coefficient of variation and the log variance give somewhat different rankings--Sweden experienced the smallest increase in inequality according to the coefficient of variation but was fourth according to the log variance. Since these two measures are sensitive to changes in different parts of the distribution, this reversal of rankings indicates that the action is happening in different parts of the distribution in each country.

In Table II, we look behind the increases in the overall inequality by examining the yearly percentage change in wages of persons in the 10th, 20th, 80th, and 90th percentile. All countries show below average growth or declines in wages for the lower deciles and above average growth (or below average declines) for the higher deciles. The United States, Canada, Netherlands and Germany all experienced negative real wage growth for low deciles and positive real wage growth for the upper deciles. Furthermore, the

[19]Katz and Loveman also find high real wage growth rates for the United Kingdom in the 1980s. They attribute the difference in wage growth between the U.K and the U.S. to the sharp rise in unemployment in Britain relative to the U.S. This suggests that low skilled workers in the U.K. experienced high rates of unemployment rather than wage reductions and thus mean wages actually increased in the U.K.

growth in the wages of those in the top two deciles occurred during a period when the median worker was experiencing no growth. This indicates that the changes in the summary measures of inequality presented in Table 1 are not caused strictly by the low end of the distribution falling behind. Rather, important changes in the upper end of the distribution were also affecting the changes in overall inequality-- the rich were in fact getting richer in every country except France while the poor were getting poorer in every country other than the U.K. and Sweden.[20] Not only was there a pulling apart of the distribution but the change in earnings was positively related to decile rank-- the lower the decile, the larger the decline in earnings (or the smaller the growth).

Changes in Between Group Inequality

Previous studies of the United States found large increases in the returns to education and experience since 1979. In Table III, we compute the mean and median real wage ratios of young to old workers, low to high educated workers, and medium to high educated workers in each year. We examine the percentage change in these ratios for each country for which we have data.

In all countries, we find the mean earnings of young workers falling behind the mean earnings of older workers. The ratio of mean wages for workers 20-30 years old relative to 40-55 years old workers has declined by 1.8 percent per year in the United States and from .2 percent in Sweden to as much as 6.0 percent in Germany. Thus, the increased returns to experience, which has been an important factor in increasing inequality in the US, is a widely experienced phenomenon.

Consistent with other studies, we also find that the returns to education increased in the United States. Germany experienced similar changes, as seen by the decrease in the wage ratio of low to high educated workers and medium to high educated workers, while Canada experienced only a small increase in the education premium. Australia and the Netherlands, on the other hand, have different patterns-- low and medium educated workers actually gained on higher educated workers.[21] Thus, the US is different from other countries in its exceptionally large increase in returns to education --in the U.S, the ratio of mean wages of low to high educated workers declined by 2.3 percent per year.

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[20]By poor and rich in this context we mean male heads with low or high earnings, not low or high family incomes.

[21]This result may be due to the difference in the coding of the education variable in the two years of Australian data. See Appendix A for details.

In contrast, the change in Germany and Canada were .5 percent and 2.0 percent, respectively.

Changes in Within Group Inequality

Previous studies of the United States, found that the changes in wage dispersion within experience and education groups were as large as the changes in the overall distribution. In Table IV, we examine the changes in two inequality measures for persons age 25 to 30 (relatively inexperienced workers) and persons 45-55 (relatively experienced workers) to see whether inequality has also increased within these groups in other countries. We also look at changes in inequality for persons classified by education.

Inequality among young workers, as measured by the variance of log earnings, increased considerably in all countries except France. While inequality among older workers also increased in all countries except the Netherlands, the increase in inequality within this group tended to be smaller. Similarly inequality increased in all education groups.Thus, the patterns within age and education groups are generally consistent with the data for the US.

From the data presented in this section, we conclude that the industrialized countries we have studied have strikingly similar patterns of increased wage inequality for every measure other than the rise in returns to education. In the following section we explore the hypothesis that these countries also experienced similar structural changes in trade and industrial structure. If this is the case then this suggests that the wage setting institutions in these countries were relatively ineffective in countering the distributional impacts of these structural changes.

Changes in Trade and Industrial Structures

Changes in Trade

In order to obtain a rough measure of the extent to which these economies were subject to increases in international competition we use OECD data to calculate the proportion of GDP that is directly involved in trade. We use the standard measure of imports plus

exports as a proportion of GDP.[22] The time series between 1960 and 1986 for the US and each country are shown in Chart 1.

The US experienced moderate growth in exports plus imports between 1965 and 1972 and rapid growth between 1973 and 1981. Openness then fell in 1982 thru 1984, stabilizing at roughly its 1974 level. The trade patterns for France are the most similar to the U.S. While Canada, Germany, U.K. and Sweden also show increases during the overall period, openness for these countries increased by less than it did for the U.S. Only Australia shows much smaller rates of growth in openness.[23] We conclude from this data that inequality and openness both increased across countries but that some of the countries with the largest increases in inequality did not experience substantial increases in openness. Thus, the cross country comparison throws doubt on the correlation between inequality and openness.

Did inequality and openness increase together over time? Since we only have long time series on inequality for the US, we are limited to examining a single country. Chart 2 plots the exports plus imports as a percent of GDP against the variance of log earnings in the US. The data in this chart is also not supportive of the hypothesis that increased international competition was the primary driving force behind the increase in inequality. The period of most rapid increase in inequality in the US coincides with the sharp decline in openness. Unless one believes that inequality reacts to international competition only with a five year lag, there is little evidence of a time series correlation between openness and trade.

We conclude that the US was not alone in experiencing an increase in openness during the 1970's. The fact that international trade comprised a growing proportion of GDP in the same countries that experienced a rise in inequality, however, does not seem to reflect a causal link. While the differences across countries are small, those countries experiencing the largest increases in openness were not the countries experiencing the largest growth in inequality. This conclusion is reinforced by the low time series correlation between inequality and openness in the US.

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[22]Very similar patterns emerge when we plot exports as a percentage of GDP.

[23] Though the overall pattern is similar to the US, none of these countries experienced the U.S.'s sharp decline in openness during the early 1980's.

Changes in Industrial Structure

Are there systematic differences between these countries in the degree to which they lost manufacturing and gained service sector jobs? To answer this question we use data from the U. S. Bureau of Labor Statistics (BLS) to examine the distribution of civilian employment across four sectors; agriculture, services, manufacturing and a residual sector to see if the other countries studied have experienced changes in industrial structure that are similar to the US experience. We examine changes in employment by sector between 1970 and 1989. In addition to the countries from the LIS data set, we also show data for Japan. This data is used to highlight differences between the Japanese experience and the experience of the OECD countries we examine.

Table V shows a remarkable similarity across countries in the redirection of employment toward the service sector. Although the relative size of the sectors in each countries varies, the direction of the changes in employment by sector is the same in all countries. Each experienced a decline in employment shares in agriculture and manufacturing and an increase in employment shares in the service sector. Thus, the deindustrialization observed in the US is not unique to this country. In fact, even Japan experienced a decline in manufacturing employment.

While the direction is the same in all countries the magnitudes differ. The decline in agricultural employment is the largest in Japan, with a decline of 9.6 percent ,and the smallest in the United Kingdom, with a decline of 1.1 percent. The decline in manufacturing employment is largest in United Kingdom (13.1 percent), followed by the Australia and the United States. All countries, including Japan, experienced large increases in employment in the service sector. These increases range from 8.5 in Canada to 16.3 percent in France. Viewed in this context, the 9.2 increase in the service sector in the US is not an outlier, especially when compared to the 11.4 percent increase in Japan.

The increase in the service sector is often assumed to reflect an increase in the number of low wage jobs. Service sector jobs, however, include everything from hospital orderlies to investment bankers. In order to gauge the type of job being generated in the service sector Table VI disaggregates the service employment into four types; 1.wholesale and retail trade, restaurants and hotels; 2. transport, storage and communication ; 3. finance, insurance, real estate, and business services; 4.community, social and personal services.

Since the BLS data does not have a detailed breakdown of the service sector by type of service, Table VI, uses data from the OECD . For comparability we show the proportion of persons in the service sector (column 1) as well as the proportion in each subsector (columns 2 -5). The data in columns 2 to 5, therefore, add to the data in column 1. Table VI shows that in all countries the largest growth, by far, in the services sector has been growth in finance, insurance, real estate and business services. The increases range from 48 percent in the Netherlands to 184 percent in Japan. This is in contrast to the range of 14 (U.S.) to 32 percent (France) increase in all services.

Thus, Table VI does not support the notion that growth in the service sector is synonymous with growth in low wage jobs. In fact, wholesale and retail trade grew by less than three percent in Australia, Germany, and Sweden. Even the largest growth in wholesale and retail trade (16 percent in Canada and Japan) is small compared to the growth in high paid service employment.

We conclude that if inequality is being driven by deindustrialization, which is in turn being driven by increased international competition, then deindustrialization is affecting all these countries in a very similar manner. While one might think that institutional differences between countries could partially mitigate these trends, the evidence suggests that these structural factors were dominant.

Changes in Skill Mix within Sectors

Our initial hope of distinguishing between the impact of changes in industrial structure from the impact of changes in technology by exploiting cross-national comparisons, has proven to be elusive. The data has shown that the countries we studied experienced similar changes in the inequality and industrial structure. With little variation in either the dependent or the explanatory variable it is difficult to determine the role played by changes in industrial structure.

However, as discussed earlier, deindustrialization and technological change have different implications for changes in the skill mix within sectors. If changing industrial structure is the primary cause of the increase demand for skilled workers then we would expect to see an increase in the skill differential, as documented in Table III. This increase in the relative cost of more skilled workers would, however, lead to a decline in the proportion of skilled workers hired as firms had to pay higher prices for workers whose productivity had not increased. In contrast, if technological change was the cause

of the increase in the skill premium documented in Table III, then we would expect to see an increase in skill intensity within all sectors. The rising skill differential would reflect the fact that the productivity of skilled workers had increased enough to induce firms to bid up their relative price.

Table VII presents data on the growth in the proportion of the labor force with a university education by sector and country. The bottom row shows the yearly percentage increase in the proportion of the labor force (in all industries) with a college degree. The growth rates for each country are very similar (ranging from .27 to .58 percent per year). The increase in skill intensity in all industries could have come about because the fast growing sector were the more skill intensive (i.e. the deindustrialization explanation) or because each sector became more skill intensive (the technological explanation)

The data in Table VII confirms the importance of technological change. While there is some diversity across sectors, almost all sectors in all countries show an increase in the proportion of university educated workers. Agriculture, a rapidly declining sector, experienced some of the largest increases in educational upgrading. Likewise, manufacturing and professional services, two sectors with very different employment patterns, had above average growth in the proportion of their workers with a university degree. Technological change was increasing the demand for college educated workers sufficiently fast to offset any effects of the rising skill premium coming from deindustrialization. Thus, changes in technology are a necessary part of the explanation for the rise in inequality[24].

The increase in the skill differential reflected increases in demand coming from both greater skill intensity within each sector (the technological aspect) and growth in the more skill intensive sectors (deindustrialization). How important were each of these factors in raising the wages of the more educated workers? In order to answer this question Table VIII shows the aggregate skill intensity, as measured by the ratio of university educated workers to less than a secondary educated workers, under two scenarios. The first shows the actual change in skill intensity or skill mix. This change reflects both changes in skill intensity within sectors and changes in the weights attached to each sector. If the more skill intensive sectors experienced the largest growth then

[24]This does not mean that deindustrialization had no impact. The decline in employment in the less skill intensive sectors did put additional downward pressure on the wages of less skilled workers. However, the rising skill mix documented in Table VII is inconsistent with the view that deindustrialization was the only driving force.

more weight would be given to these sectors . The second scenario shows what the skill intensity would have been if the skill mix had changed within sectors but the weights had not changed.[25]

In all countries, the fastest growing industry was finance, insurance real estate and business which is also typically the most skill intensive. Similarly, all countries experienced large declines in agricultural employment which happens to be the least skill intensive sector in every country. Table VIII indicates that these and similar shifts toward the skill intensive sectors in all countries accounts for an important part of the skill upgrading. The proportion of the total change resulting from shifts in employment ranged from a low of 53.2 percent in Canada to a high of 75.6 percent in Germany. In all countries, the shift in employment towards the skill intensive sectors was more important in explaining the total change in the skill mix than was the shift in skill intensity within sectors .

VI Conclusions

There are two types of conclusions that can be reached on the basis of the data in this paper. The first are purely descriptive. Our review of the evidence shows similar patterns in inequality, international competition and industrial structure in the eight economies we study. All countries experienced an increase in inequality both within and between groups. Viewed in this light, the US experience is not atypical. Furthermore, the deindustrialization and increased openness of the US are again not aberrations. All countries experienced increases in trade, declines in manufacturing and increases in service sector jobs.

Some causal conclusions are also offered on the basis of data in this paper. These are offered much more tentatively since cross-national comparisons do not provide the type of natural experiment which one would ideally like to have in order to draw causal inferences. We started this paper by proposing that the distribution of wages in a country are the result of market forces mediated by social institutions. Since the countries we study have considerably different institutions we would expect these countries to react somewhat differently to manageable changes in market forces. The fact that all countries experienced rapid increases in inequality suggests that the economic pressures were

[25] The skill intensities for all industries were computed by weighting each sector by its percent of the civilian employed. The employment percentages were taken from the OECD Labor Force Statistic 1967-1987 while the data on skill intensities by sector were taken from a special 1987 OECD study on education and the labor force.

large compared to the ability (or will) of institutional forces to counter these structural changes.

Were these structural changes more reflective of changes in the industrial structure or changes in technology? This is an even more difficult question to answer. We have shown that cross national comparisons offer little guidance since the independent variables (industrial structure and technology) moved in similar directions in all countries and the dependent variable (inequality) behaved similarly across countries. We have argued that comparing shifts in the skill mix within industries does give some handle on the relative importance of technology versus deindustrialization. The fact that the proportion of the labor force with a college degree increased in all sectors implies that deindustrialization could not be the whole story-- without technological change industries would have become less skill intensive as a result of the increase in the cost of skilled workers. However, changes in the industrial structure were a substantial factor in putting upward pressure on wages of the skilled.

In summary, this study shows that the US is not atypical. It is representative of a widely experienced phenomenon. The fact that countries as different as Germany and Sweden had increases in inequality similar to those in the US suggests that structural changes are affecting developed economies around the globe. While there is still no "smoking gun", this study shows that technological change remains a primary suspect of the cause of rising inequality.

Table I

Real Gross Annual Wages and Salaries[1]

Yearly Percentage Change in Mean, Median, Coefficient of Variation, and Log Variance

Country	yearly % change Mean wages	yearly % change Median wages	yearly % change CV	yearly % change ln var
United States 1979-1986	-.33	-.63	3.06	7.67
Canada 1981-1987	-.25	-.02	3.70	20.80
Germany 1981-1984	.25	-.24	4.97	10.70
Australia 1981-1985	-.73	-.85	1.65	13.10
Sweden 1981-1987	.68	.49	.85	6.62
France 1979-1984	-.62	-.64	1.32	2.60
Netherlands 1983-1987	.01	.00	.96	.22
United Kingdom 1979-1986	2.80	2.41	1.89	6.21

[1] Sample excluded those in the top five percent of the wage distribution.

Table II

Yearly Percentage Change in Real Gross Wages and Salaries by Decile[2]

Country	yearly % change median	yearly % change 10th percentile	yearly % change 20th percentile	yearly % change 80th percentile	yearly % change in 90th percentile
United States 1979-1986	-.63	-3.24	-2.00	.44	.79
Canada 1981-1987	-.02	-4.21	-1.94	.94	1.00
Germany 1981-1984	-.24	-1.87	-.72	1.74	2.32
Australia 1981-1985	-.85	-1.63	-.93	-.23	-.55
Sweden 1981-1987	.49	.00	.26	1.08	1.36
France 1979-1984	-.64	-1.78	-1.35	-.48	-.32
Netherlands 1983-1987	.00	-.75	-.24	.00	.32
United Kingdom 1979-1986	6.21	1.71	1.84	3.64	3.93

Source: LIS data

[2]Sample excluded those in the top five percent of the wage distribution

Table III

Means and Medians for Real Gross Wages and Salary by Education and Age[1]

UNITED STATES	Mean (1988 U.S. dollars) 1979	1986	yearly % Δ	Median (1988 U.S. dollars) 1979	1986	yearly %Δ
Full sample	28419	27766	-.33	27859	26627	-.63
Age						
25-30	24114	21611	1.48	23216	21302	-1.17
40-55	30846	31640	.37	30181	30152	-.01
Ratio of 25-30/40-55	**.782**	**.683**	-1.80	**.769**	**.707**	-1.16
Education						
Low	21255	18332	-1.97	20121	17808	-1.64
Medium	26889	24080	-1.48	27116	23431	-1.94
High	32419	33221	.36	30954	31952	.46
Ratio of Low/High	**.6556**	**.5518**	-2.26	**.6500**	**.5573**	-2.04
Ratio of Medium/High	**.8294**	**.7248**	-1.80	**.8760**	**.7331**	-2.33

CANADA	Mean (1988 Canadian dollars) 1981	1987	Yearly % Δ	Median (1988 Canadian dollars) 1981	1987	Yearly %Δ
Full sample	31916	31423	-.25	31383	31344	-.02
Age						
25-30	28466	26010	-1.43	28804	25598	-1.85
40-50	33025	34531	.77	32322	33873	.80
Ratio of 25-30/40-55	**.862**	**.753**	-2.10	**.891**	**.756**	-2.53
Education						
Low	27696	26401	-.78	27283	26583	-.43
Medium	31027	29642	-.75	30692	30029	-.37
High	36184	35634	-.25	35479	36472	.47
Ratio of Low/High	**.7654**	**.7409**	-.53	**.7690**	**.7289**	-.87
Ratio of Medium/High	**.8575**	**.8318**	-.50	**.8651**	**.8233**	-.80

[1] Sample excludes persons in the top five percent of the wage distribution.

Table III (cont.)

Means and Medians for Real Gross Wages and Salary by Education and Age

	Mean (German marks)		Yearly % Δ	Median (German marks)		Yearly %Δ
GERMANY	1981	1984		1981	1984	
Full sample	45062	45394	.25	43313	42999	.13
Age						
25-30	40550	35273	-4.33	40440	35796	-3.67
40-55	46006	48963	2.13	43792	45509	1.50
Ratio of 25-30/40-55	**.881**	**.720**	-6.06	**.923**	**.787**	-4.90
Education						
Low	36572	36613	.04	36609	37651	.93
Medium	42439	43396	.77	41389	42562	.93
High	57535	61518	2.30	55692	62424	4.03
Ratio of Low/High	**.6356**	**.5952**	-2.07	**.6573**	**.6031**	-2.73
Ratio of Medium/High	**.7376**	**.7054**	-1.43	**.7432**	**.6818**	-2.77

	Mean (Australian dollars)		Yearly % Δ	Median (Australian dollars)		Yearly %Δ
AUSTRALIA	1981	1985		1981	1985	
Full sample	29825	28951	-.73	29529	28517	-.85
Age						
25-30	27184	25414	-.93	27325	26309	-.93
40-55	30978	30597	-.30	29635	29892	.22
Ratio of 25-30/40-55	**.878**	**.831**	-1.35	**.922**	**.880**	-1.13
Education						
Low	26729	25976	-.70	26097	26186	.08
Medium	30147	28756	-1.15	29998	28658	-1.13
High	40154	36816	-2.08	40686	37502	-1.95
Ratio of Low/High	**.6657**	**.7056**	1.50	**.6414**	**.6983**	2.23
Ratio of Medium/High	**.7508**	**.7811**	1.00	**.7373**	**.7642**	.90

Table III (cont)

Means and Medians for Real Gross Wages and Salary by Education and Age[1]

	Mean (1980 Sweden dollars)		Yearly % Δ	Median (1980 Sweden. dollars)		Yearly %Δ
SWEDEN	1981	1987		1981	1987	
Full sample	75652	78729	.68	73797	75972	.49
Age						
25-30	66606	68535	.48	67104	68037	.23
40-55	80223	83585	.69	77717	80244	.54
Ratio of 25-30/40-55	**.830**	**.820**	-.21	**.863**	**.848**	-.30

	Mean (French francs)		Yearly % Δ	Median (French francs)		Yearly %Δ
FRANCE	1979	1984		1979	1984	
Full sample	98616	95536	-.62	91105	88167	-.64
Age						
25-30	82332	75426	-1.68	81301	74151	-1.76
40-55	103181	105369	.42	92280	95617	.72
Ratio of 25-30/40-55	**.798**	**.716**	-2.06	**.881**	**.776**	-2.72

	Mean (U.K. pounds)		Yearly % Δ	Median (U.K.pounds)		Yearly % Δ
UNITED KINGDOM	1979	1986		1979	1986	
Full sample	10452	12485	2.79	9982	11667	2.41
Age						
25-30	9747	10973	1.80	9444	10476	1.55
40-55	10549	12784	3.03	9905	11740	2.64
Ratio of 25-30/40-55	**.924**	**.858**	-1.02	**.953**	**.892**	.92

[1] Sample excludes persons in the top five percent of the wage distribution.

Table III (cont)

Means and Medians for Real Gross Wages and Salary by Education and Age[1]

NETHERLANDS	Mean (Netherlands dollars)		Yearly % Δ	Median (Netherlands dollars)		Yearly % Δ
	1983	1987		1983	1987	
Full sample	47403	47391	.01	44287	44290	.00
Age						
25-30	39569	38706	.54	38441	37485	.62
40-55	51506	54051	1.22	47252	50222	1.57
Ratio of 25-30/40-55	**.768**	**.716**	-1.69	**.813**	**.746**	2.05
Education						
Low	40343	43387	1.88	39541	41639	1.33
Medium	52928	55093	1.03	50967	51652	.34
High	75651	67577	-2.68	74869	62527	-4.13
Ratio of Low/High	**.5333**	**.6420**	5.09	**.5281**	**.6659**	6.52
Ratio of Medium/High	**.6997**	**.8153**	4.13	**.6807**	**.8261**	5.34

[1] Sample excludes persons in the top five percent of the wage distribution.

TABLE IV

Inequality Measures Within Age and Education Groups[1]

UNITED STATES	CV		yearly % Δ	Log Variance		yearly % Δ
	1979	1986		1979	1986	
Full Sample	.4003	.4860	3.06	.322	.495	7.67
Age						
25-30	.3496	.4631	4.64	.214	.468	16.96
40-55	.4318	.4959	2.11	.346	.551	8.46
Education						
Low	.4048	.5029	3.46	.346	.630	11.72
Medium	.3549	.4363	3.27	.314	.429	5.23
High	.4085	.4617	1.86	.288	.428	6.68
CANADA	CV		yearly % Δ	Log Variance		yearly % Δ
	1981	1987		1981	1987	
Full Sample	.3497	.4274	3.70	.203	.456	20.77
Age						
25-30	.3144	.4146	5.30	.192	.409	18.83
40-55	.3551	.4305	3.53	.199	.494	24.70
Education						
Low	.3454	.4031	2.78	.226	.329	7.60
Medium	.3395	.3993	2.93	.187	.422	20.95
High	.3312	.4309	5.02	.169	.532	35.80
GERMANY	CV		yearly % Δ	Log Variance		yearly % Δ
	1981	1984		1981	1984	
Full Sample	.2967	.3400	4.87	.140	.185	10.70
Age						
25-30	.2130	.3373	19.47	.061	.185	67.76
40-55	.3215	.3326	1.13	.180	.141	-7.33
Education						
Low	.2112	.2714	9.50	.058	.147	21.07
Medium	.2501	.2903	5.37	.137	.155	4.37
High	.3121	.3345	2.40	.133	.217	21.07

[1] Sample excludes persons in the top five percent of the distribution of gross wages and salaries.

TABLE IV (cont.)

Inequality Measures Within Age and Education Groups[1]

AUSTRALIA	CV		yearly % Δ	Log Variance		yearly % Δ
	1981	1985		1981	1985	
Full Sample	.3338	.3560	1.65	.244	.372	13.13
Age						
25-30	.3142	.3351	1.67	.267	.406	13.02
40-55	.3540	.3735	1.37	.254	.367	11.12
Education						
Low	.3201	.3395	1.52	.234	.289	5.87
Medium	.3069	.3392	2.63	.215	.399	21.40
High	.3402	.3462	.42	.325	.393	5.22
Netherlands	CV		yearly % Δ	Log Variance		yearly % Δ
	1983	1987		1983	1987	
Full Sample	.3052	.3169	.96	.113	.114	.22
Age						
25-30	.2036	.2120	2.02	.049	.055	3.05
40-55	.3534	.3517	-.12	.157	.138	-3.00
Education						
Low	.2183	.2617	4.95	.078	.087	2.89
Medium	.2734	.3211	4.35	.101	.116	3.73
High	.3053	.3496	3.62	.122	.178	11.47
SWEDEN	CV		yearly % Δ	Log Variance		yearly % Δ
	1981	1987		1981	1987	
Full Sample	.3095	.3254	.85	.302	.442	7.73
Age						
25-30	.2519	.2461	-.38	.144	.249	12.15
40-55	.3458	.3504	.22	.417	.507	3.60

[1] Sample excludes persons in the top five percent of the distribution of gross wages and salaries.

TABLE IV (cont.)

Inequality Measures Within Age and Education Groups[1]

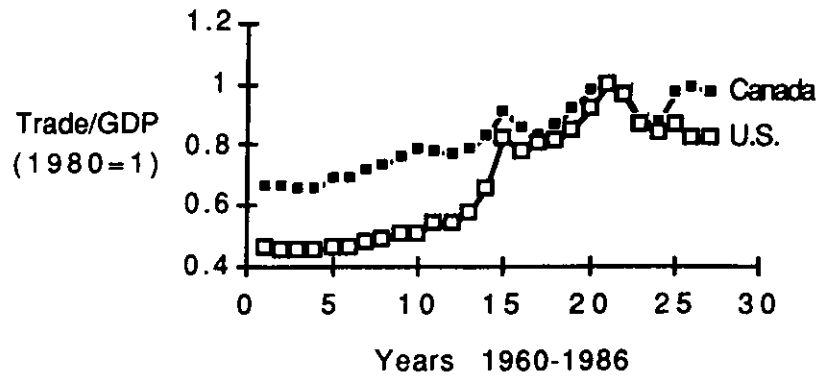
FRANCE	CV		yearly % Δ	Log Variance		yearly % Δ
	1979	1984		1979	1984	
Full Sample	.4347	.4634	1.32	.338	.382	2.60
Age						
25-30	.3378	.3538	.95	.354	.266	-1.76
40-55	.4861	.5074	.88	.392	.433	2.09

UNITED KINGDOM	CV		yearly % Δ	Log Variance		yearly % Δ
	1979	1986		1979	1986	
Full Sample	.3265	.3695	1.88	.124	.178	6.21
Age						
25-30	.3024	.3129	.50	.114	.116	.25
40-55	.3521	.3912	1.58	.137	.205	7.09

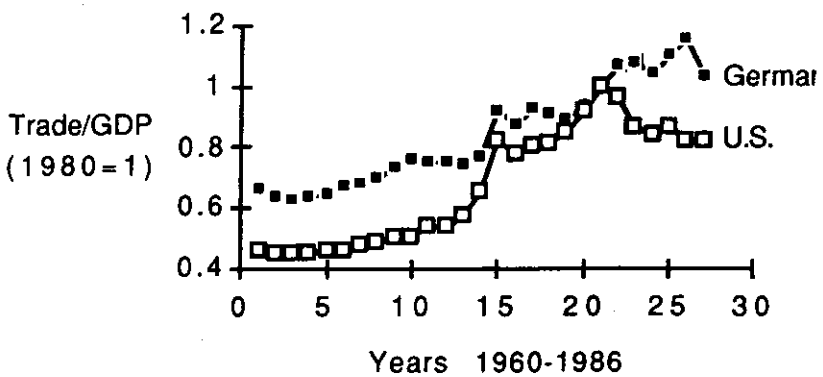
[1] Sample excludes persons in the top five percent of the distribution of gross wages and salaries.

Chart I

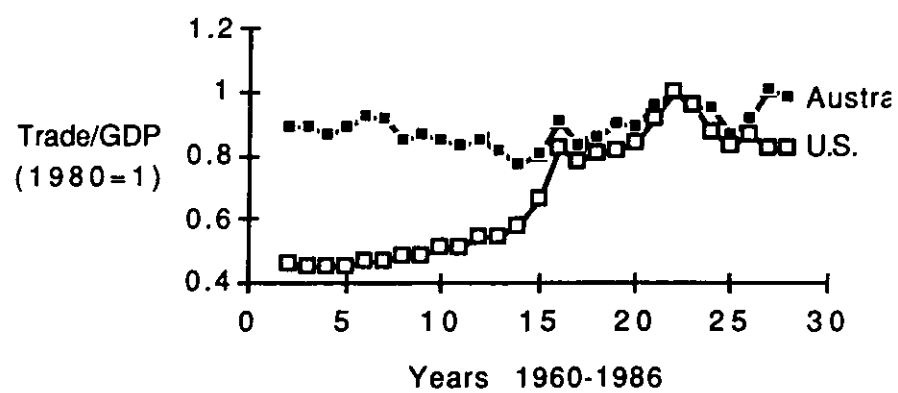
Imports plus Exports as Percent of GDP



Imports plus Exports as Percent of GDP



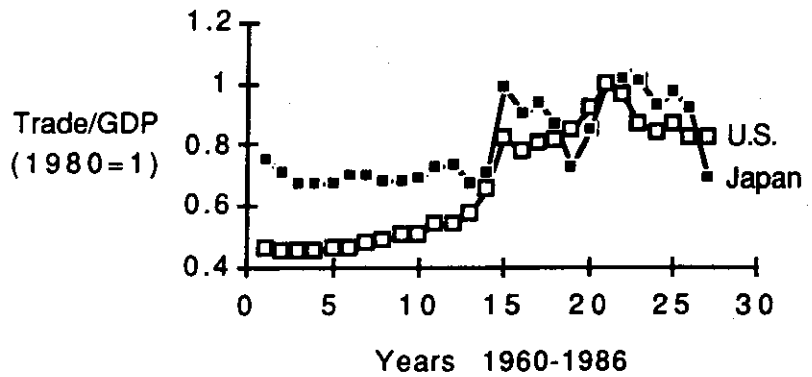
Imports plus Exports as Percent of GDP



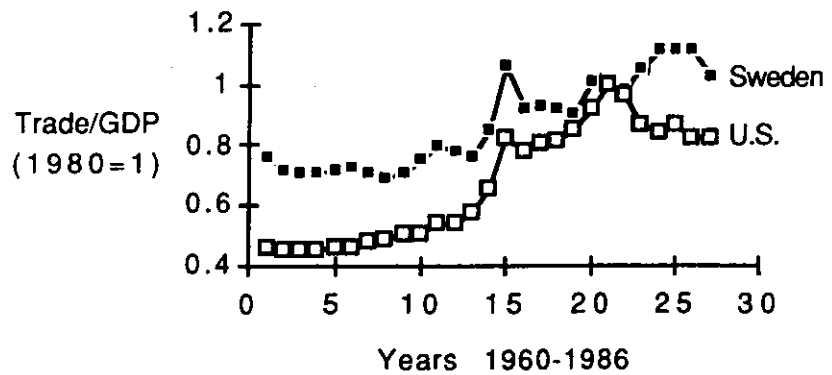
Source: OECD National Accounts 1960-1986

Chart I (cont.)

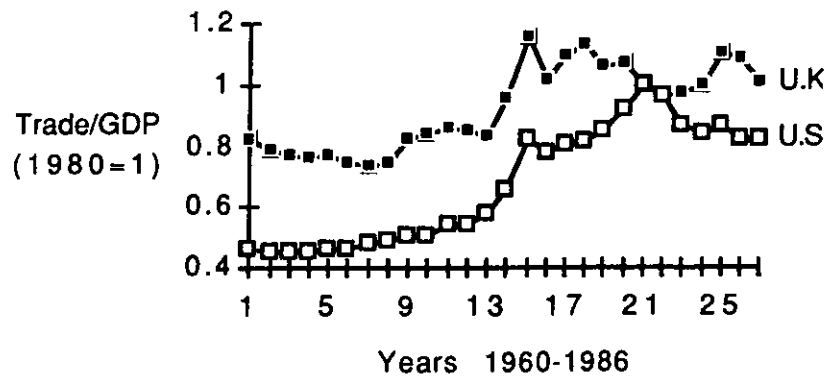
Imports plus Exports as Percent of GDP



Imports plus Exports as Percent of GDP

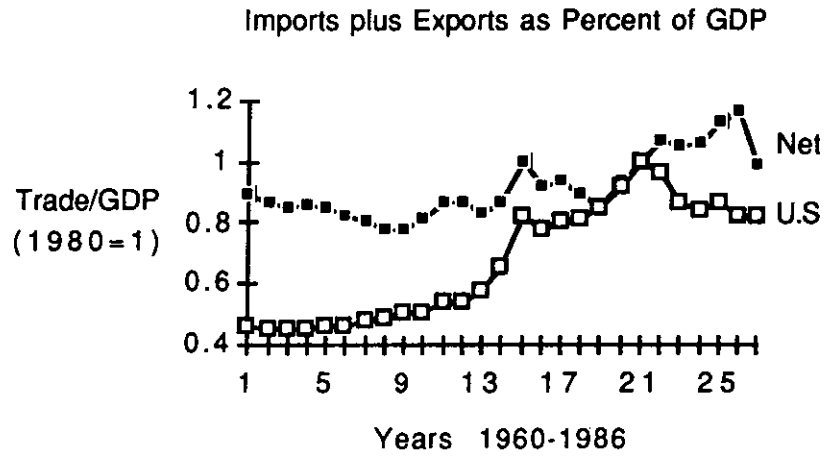


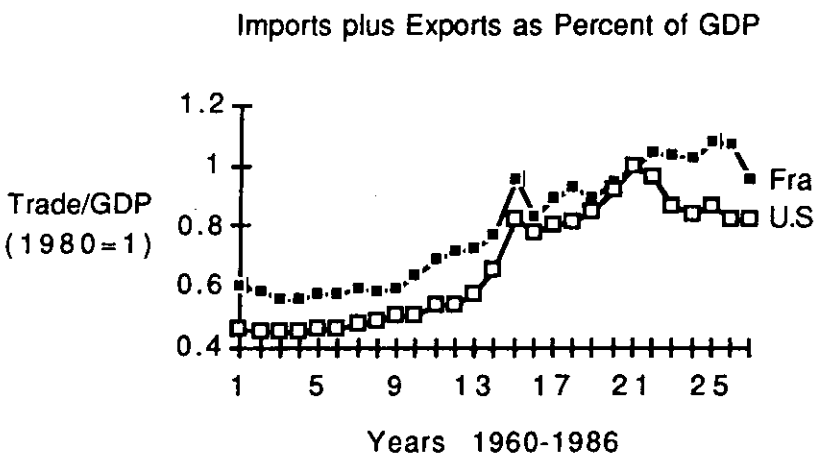
Imports plus Exports as Percent of GDP



Source: OECD National Accounts 1960-1986

Chart 1 (cont.)

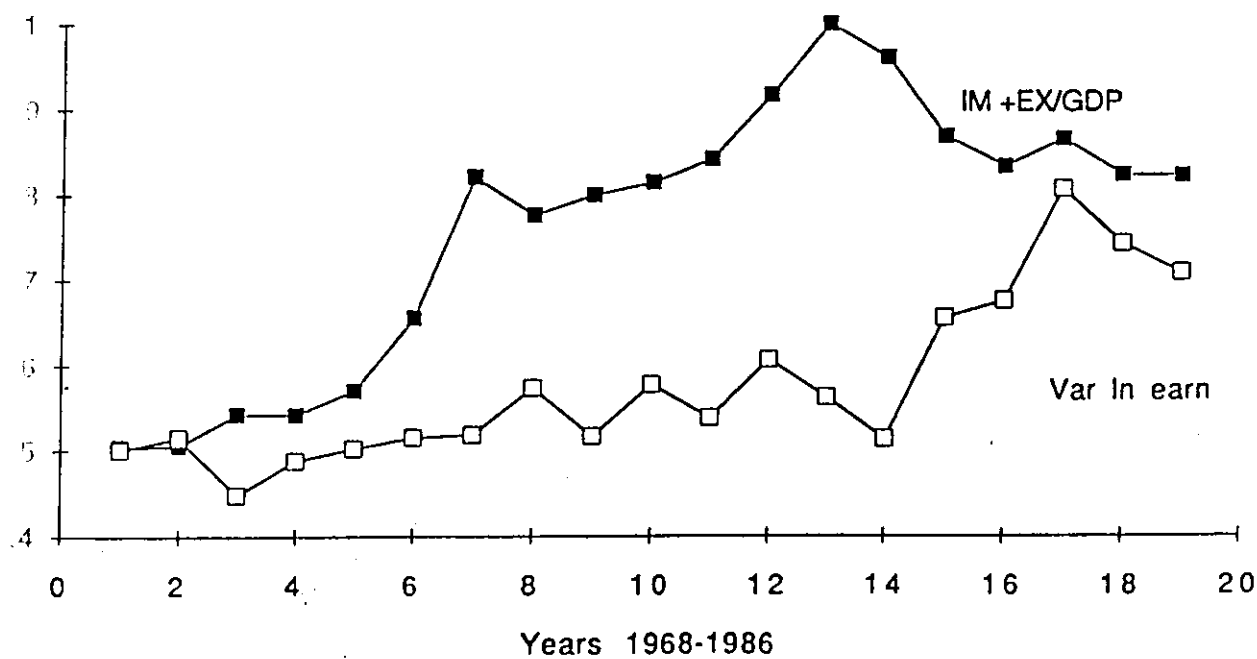




Source: OECD National Accounts 1960-1986

Chart II

United States Time Series



Source: Karoly (1990) and OECD National Accounts

TABLE V
Percent Distribution of Civilian Employment by Sector

Country	Agriculture	Services	Manufacturing	Other
UNITED STATES				
1970	4.5	62.3	26.4	6.7
1989	2.9	71.5	18.5	7.1
change	-1.6	9.2	-7.9	.4
CANADA				
1970	7.6	62.6	22.3	7.5
1989	4.3	71.1	17.0	7.6
change	-3.3	8.5	-5.3	.1
AUSTRALIA				
1970	8.0	57.0	24.9	10.1
1989	5.5	69.5	16.0	9.0
change	-2.5	12.5	-8.9	-1.1
GERMANY				
1970	8.6	41.8	37.4	10.2
1989	3.9	57.3	na[0]	na
change	-4.7	15.5	na	na
SWEDEN				
1970	8.2	53.9	27.7	10.3
1989	4.1	67.4	21.8	6.7
change	-4.1	13.5	-5.9	-3.6
JAPAN				
1970	16.9	47.4	27.4	8.3
1989	7.3	58.7	24.5	9.5
change	-9.6	11.4	-2.9	1.2
Netherlands				
1970	6.2	55.8	27.0	11.0
1988	4.8	69.6	18.7	6.9
change	-1.4	13.8	-8.3	-4.1
FRANCE				
1970	13.5	48.0	27.5	11.0
1989	6.5	64.3	21.7	7.5
change	-7.0	16.3	-5.8	-3.5
United Kingdom				
1970	3.2	53.6	34.7	8.5
1989	2.1	69.0	21.6	7.3
change	-1.1	15.4	-13.1	-1.2

Source: Comparative Labor Force Statistics for Ten Countries, 1959-1989
U.S. Department of Labor, Bureau of Labor Statistics, November 1990

[0]Values for 1989 were not available. The latest year available is 1986. The change in Manufacturing from 1970 to 1986 was -5.3 and the change in Other from 1970 to 1986 is -2.3.

TABLE VI

Percent Distribution of Civilian Employment in Services by Type of Service

Country	Services	Wholesale and Retail Trade	Transport Storage & Communication	Finance, Insurance Real Estate & Business Services	Com., Social & Personal Services
UNITED STATES					
1970	61.1	20.3	6.0	6.8	28.0
1987	69.9	22.2	5.4	11.1	31.2
Change	8.8	1.9	-.6	4.3	3.2
% Change	14.4	9.4	-10.0	63.2	11.4
CANADA					
1970	61.4	16.8	7.7	4.8	32.2
1987	69.8	23.6	6.6	10.5	29.1
Change	8.4	6.8	-1.1	5.7	-3.1
% Change	21.0	16.9	-6.5	52.1	28.6
AUSTRALIA					
1970	55.6	20.1	7.7	7.1	20.6
1987	68.1	23.5	7.2	10.8	26.5
Change	12.9	3.4	-.5	3.7	5.9
% Change	28.9	2.72	5.3	61.9	50.3
GERMANY					
1970	42.1	14.7	5.7	4.2	17.5
1987	54.3	15.1	6.0	6.8	26.3
Change	12.2	.4	.3	2.6	8.8
% Change	29.0	2.7	5.3	61.9	50.3
SWEDEN					
1970	53.5	14.4	6.9	5.0	27.1
1987	66.3	14.0	7.1	7.6	37.5
Change	12.9	-.4	.2	2.6	10.4
% Change	24.1	2.8	2.9	52.0	38.4
JAPAN					
1970	46.9	19.9	6.4	2.6	17.9
1987	57.9	23.1	5.9	7.4	21.1
change	11.0	3.2	.5	4.8	3.2
% Change	23.5	16.1	7.8	184.6	17.9

TABLE VI (cont.)

Percent Distribution of Civilian Employment in Services by Type of Service

Country	Services	Wholesale and Retail Trade	Transport Storage & Communication	Finance, Insurance Real Estate & Business Services	Com., Social & Personal Services
FRANCE					
1970	47.2	15.4	5.9	5.3	20.7
1987	62.1	16.9	6.5	8.6	30.1
Change	14.9	1.5	.6	3.3	9.4
% Change	31.6	9.7	10.2	62.3	45.4
Netherlands					
1975	59.4	17.2	6.1	7.5	28.6
1987	68.2	16.7	6.5	11.1	33.9
Change	8.8	-.5	.4	3.6	5.3
% Change	14.8	-2.9	6.6	48.0	18.5
UNITED KINGDOM					
1970	52.0	16.4	5.7	5.0	23.8
1987	67.8	20.3	6.0	10.4	29.9
Change	15.8	3.9	.3	5.4	6.1
% Change	30.4	23.8	5.3	108.0	25.6

Source:
OECD, Department of Economics and Statistics, Labour Force Statistics: 1967-1987

Table VII

Yearly Percent Change in the Relative Proportion of the Labor Force with University Educational Attainment.

	United States 1972-1987	Canada 1975-1987	Germany 1978-1987	Japan 1974-1987	United Kingdom 1981-1987	Sweden 1971-1987
Agriculture	.5	.58	1.1	.31	.40	.42
Mining and Quarrying	.28	.34	.24	.43	1.23	na
Manufacturing	.39	.43	.77	.29	.78	.42
Electricity, gas and water	na	na	.19	.28	1.57	na
Construction	.29	.37	.69	.26	.78	.28
Trade, restaurants	.29	.43	.57	.25	.45	.39
Transport, communicatin	.46	.43	.56	.22	.05	.33
Finance, Insurance, Real Estate Business	.25	.43	.34	.31	.60	.18
Other Services	.16	.23	-.03	.26	.33	.18
All Industries	.27	.33	.28	.33	.58	.32

Source: OECD Outlook on Employment, 1987.

TABLE VIII

Ratio of Skilled to Less Skilled Labor Force by Industry*

United States	Ratio of Skilled to Less Skilled		Percent of Civilian employed		% change in percent employed
	1972	1987	1972	1987	72-87
Agriculture	0.273	0.313	4.4	3.0	-31.8
Mining & quarrying	1.289	1.451	0.7	0.7	0
Manufacturing	0.784	0.879	24.7	18.6	-24.7
Construction	0.325	0.360	6.3	6.6	4.8
Trade and restaurants	0.547	0.597	21.3	22.2	4.2
Transport &communication	1.326	1.534	6.0	5.4	-10.0
FIREB	5.073	5.585	6.9	11.1	60.9
Other Services	2.699	2.923	28.5	31.2	9.5
All Industries-(actual weights)	1.129	1.374			
All Industries-(1972 weights)	1.129	1.240			
Percent of change due to changes in weights	54.7 %				
Percent of change due to changes within industries	45.3 %				

Canada	Ratio of Skilled to Less Skilled		Percent of Civilian employed		% change in percent employed
	1975	1987	1975	1987	75-87
Agriculture	0.075	0.084	6.1	4.9	-19.7
Mining & quarrying	0.259	0.283	1.5	1.5	0
Manufacturing	0.240	0.267	20.2	17.1	-15.3
Construction	0.096	0.106	6.5	5.7	-12.3
Trade and restaurants	0.250	0.277	21.9	23.6	7.8
Transport & communication	0.303	0.337	7.6	6.6	-13.1
FIREB	1.738	1.913	8.1	10.5	29.6
Other services	1.309	1.409	2.7	29.1	7.8
All industry-(actual weights)	0.461	0.555			
All Industry-(1972 weights)	0.461	0.505			
Percent of change due to changes in weights	53.2%				
Percent of change due to changes within industries	46.8%				

* Skilled are employed workers with university education. Less skilled are employed workers with less than secondary education.

TABLE VIII (cont.)

Germany	Ratio of Skilled to Less Skilled		Percent of Civilian employed		% change in percent employed
	1978	1987	1978	1987	78-87
Agriculture	0.012	0.014	6.1	5.2	-14.7
Mining &quarrying	0.067	0.070	1.4	1.2	-14.3
Manufacturing	0.091	0.100	34.8	31.9	-8.3
Electricity, gas and water	0.197	0.203	0.9	0.9	0
Construction	0.047	0.050	7.4	6.5	-12.2
Trade and restaurants	0.087	0.094	15.3	15.1	-1.3
Transport & communication	0.067	0.072	6.0	6.0	0
FIREB	0.700	0.743	5.5	6.8	23.6
Other services	0.891	0.908	22.7	26.3	15.8
All industry-(actual weights)	0.215	0.256			
All industry-(1972 weights)	0.215	0.225			
Percent of change due to changes in weights	75.6%				
Percent of change due to changes within industries	24.4%				

Sweden	Ratio of Skilled to Less Skilled		Percent of Civilian employed		% change in percent employed
	1971	1987	1971	1987	71-87
Agriculture	0.026	0.031	7.8	3.9	-50.0
Manufacturing	0.085	0.098	27.3	22.1	-19.0
Construction	0.042	0.048	9.1	6.4	-29.7
Trade and restaurants	0.078	0.091	14.5	14.0	-3.4
Transport & communication	0.071	0.082	6.9	7.1	2.9
FIREB	0.502	0.560	5.2	7.6	46.1
Other services	0.515	0.558	28.0	37.5	33.9
All industry-(actual weights)	0.178	0.254			
All industry-(1972 weights)	0.178	0.199			
Percent of change due to changes in weights	72.4%				
Percent of change due to changes within industries	27.6%				

TABLE VIII (cont.)

Japan

	Ratio of Skilled to Less Skilled		Percent of Civilian employed		% change in percent employed
	1974	1987	1974	1987	74-87
Agriculture	0.015	0.017	12.9	8.3	-35.6
Manufacturing	0.326	0.364	27.3	24.1	-11.7
Construction	0.186	0.206	8.9	9.0	1.1
Trade and restaurants	0.492	0.543	20.9	23.1	10.5
Transport & communication	0.281	0.308	6.3	5.9	-6.3
FIREB	2.571	2.853	3.1	7.4	138.7
Other services	1.305	1.448	19.5	21.1	8.2
All industries-(actual weights)	0.377	0.507			
All industries-(1972 weights)	0.377	0.416			
Percent of change due to changes in weights	70.0%				
Percent of change due to changes within industries	30.0%				

United Kingdom

	Ratio of Skilled to Less Skilled		Percent of Civilian employed		% change in percent employed
	1981	1987	1981	1987	81-87
Agriculture	0.068	0.074	2.8	2.4	-14.3
Manufacturing	0.166	0.181	30.1	21.6	-28.2
Construction	0.171	0.182	6.2	6.2	0
Trade and restaurants	0.073	0.078	18.6	20.3	9.1
Transport & communication	0.105	0.112	6.3	6.0	-4.8
FIREB	0.461	0.494	6.9	10.4	50.7
Other services	0.670	0.706	26.4	29.9	13.2
All industries-(actual weights)	0.271	0.309			
All industries-(1972 weights)	0.271	0.283			
Percent of change due to changes in weights	68.4%				
Percent of change due to changes within industries	31.6%				

Appendix A1

Household Surveys in the LIS Database

Country	Survey	Lis Sample Size
Australia	The Inomce and Housing Survey	1981-15,985 1985-7,560
Canada	Survey of Consumer Finance	1981-15,136 1987-10,999
West Germany	1981 German Transfer Survey 1984 German Panel Survey	1981- 2,727 1984- 5,174
United States	March Current Population Survey	1979-15,225 1986-13,707
France	The Survey of Individual Income Tax Returns	1979-11044 1984-12693
Netherlands	The Survey of Income and Program Users	1983-4833 1987-4190
Sweden	The Swedish Income Distribution Survey	1981-9625 1987-9421
United Kingdom	The Family Expenditure Survey	1979-6888 1986-7178

Appendix A2

Recoding from LIS education categories

Australia 1981

High	-Bachelor Degree or higher
Medium	- Secondary School (small percentage)
	- Trade Certificate
	- Certificate/Diploma (ex: nursing diploma)
	- Left School age 18+
Low	- No schooling or left before age 17

Australia 1985

High	-Bachelor Degree or higher
	-other qualification
Medium	- Secondary school
	- Trade Certificate
	- Other Certificate/Diploma
Low	-Nonqualified
	-never went

Canada 1981 and 1985

High	-University Degree
	- Post secondary diploma
	-Some post-secondary
Medium	-11-13 years
Low	-no schooling
	- less than 10 years

Germany 1981 and 1984

High	-14-18 years
Medium	-11-13 years
Low	-less than 10

Number of years of schooling was found by taken the number of years of high school reported and adding the number of years of apprenticeships or university training.

Netherlands 1983 and 1987

High	-University
Medium	-Secondary
Low	-Primary and extended primary

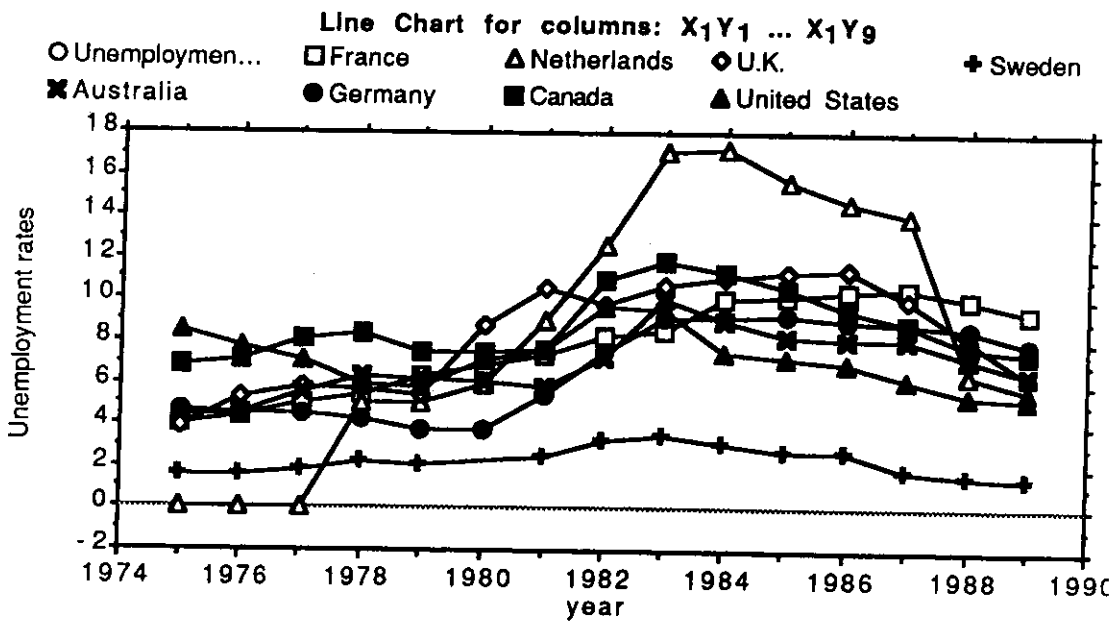
United States 1979 and 1986

High	-13 years or more
Medium	-12 years
Low	- less than 12 years

Appendix A3

Unemployment Rates by Country
1975-1989

	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89
U.S.	8.5	7.7	7.1	6.0	**5.8**	7.1	7.6	9.7	9.6	7.5	7.2	**7.0**	6.2	5.5	5.3
Canada	6.9	7.1	8.1	8.4	7.5	7.5	**7.6**	11	11.9	11.3	10.5	9.6	**8.9**	7.8	7.5
Germany	4.7	4.6	4.5	4.3	3.8	3.8	**5.5**	7.5	9.1	**9.1**	9.3	9.0	8.9	8.7	7.9
Australia	4.4	4.6	5.6	6.3	6.2	6.1	**5.8**	7.2	10	9.0	**8.2**	8.1	8.1	7.2	6.4
Sweden	1.6	1.6	1.8	2.2	2.1	..	**2.5**	3.2	3.5	3.1	2.8	2.7	**1.9**	1.6	1.4
U.K.	3.9	5.3	5.8	5.7	**5.4**	8.8	10.6	9.8	10.7	11.1	11.3	**11.4**	10.1	8.1	6.3
Netherlands	..	..	..	5.0	5.1	5.9	9.0	12.6	**17.1**	17.2	15.7	14.7	**14**	6.4	5.7
France	4.0	4.4	5.1	5.5	**6.3**	6.8	7.4	8.2	8.5	**10**	10.2	10.4	10.5	10.0	9.4



Source: OECD Main Economic Indicators

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