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Is Earnings Inequality Also Rising in Other Industrialized Countries ?--
the Role of Institutional Constraints

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I. Introduction

A vast literature, reviewed in Levy and Murnane (1992), has documented the substantial increases in inequality of wage rates and annual earnings in the United States during the 1980's. This increase in inequality reflects both an increase in returns to education and experience, and an increase in inequality within skill groups. There is now a wide consensus that this increase in inequality largely reflects a continued decline in demand for less skilled workers.

A growing literature on changes in earnings inequality in other industrialized countries indicates that the US is not unique in experiencing an increase in inequality. However, while inequality grew in most other countries, only the UK experienced as large an increase as the US. Furthermore, countries with centralized labor markets seem to have experienced the smallest growth in earnings inequality. This has led to the working hypothesis that wage setting institutions in these countries limited the growth in inequality.¹

This paper explores this hypothesis by looking beyond the correlation between the degree of centralization of labor markets and the change in overall inequality. Using a unique data set we estimate changes in returns to age and education (or occupation) in a wide variety of countries using a unified framework. Small increases in returns to these two observable skill categories could either come from a decrease in the supply of less-skilled labor that matched the decrease in demand for their skills or from institutional constraints that limited declines in their wages. Without information on changes in relative quantities it is impossible to separate these two explanations. We, therefore, examine changes in the relative supplies and unemployment rates by skill category in each country. If institutional constraints were binding, then we would expect to see an increase in the relative unemployment rates of less skilled workers whose wages were not allowed to fall when demand for their skills declined more quickly than supply. If we

observe a decrease in supply of less-skilled workers and no increase in their relative unemployment rates, then we suggest that market forces rather than institutional constraints were responsible for limiting the growth in inequality in that country. For such countries institutional constraints do not seem to have been binding.

The paper is divided into five parts. The next section reviews the literature on international comparisons of inequality. Section III uses the data sets in the Luxembourg Income Study (LIS) to measure changes in overall inequality and changes in inequality between and within age and education/occupation groups. These data include two countries that have received little previous attention (Israel, Netherlands and Finland) and several other countries that have been analyzed previously with different data sets and a variety of methods (Australia, France, Sweden, and the UK). In Section IV we examine changes in unemployment by age and education to see whether countries with small overall increases in inequality experienced relatively large changes in the relative unemployment rates or labor supply of workers classified by skill level. The final section draws conclusions from the data presented.

II. Review of Literature

US Experience

Rising earnings and wage inequality in the United States has led to a substantial literature, reviewed in Levy and Murnane (1992), documenting the trends and attempting to identify the causes of the rising inequality.² Changes in the dispersion of 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 education groups and between experience groups. Within-group inequality focuses on increased dispersion in the wage distributions within education and experience groups.

Almost all studies of the US use the Current Population Survey (CPS) to examine the distribution of weekly or annual wages for males, working full-time and full-year. These studies find that wage growth varied dramatically between the upper, middle and lower parts of the

distribution. For example, Karoly (1992) finds that between 1975 and 1987 the real wages for the 90th and 75th percentiles increased ten percent faster than real median wages . In contrast, the real wages for the 25th and 10th percentiles declined sharply relative to the median. The increase in inequality in both weekly and hourly wage series indicates that the increase in annual wage dispersion is not due solely to changes in annual hours worked.

Part of the observed change in the overall distribution reflects the large increase in the returns to education during the 1980's . This is in sharp contrast to the decline in the returns to education during the 1970s.³ The returns to experience also increased, especially among the less educated. The result of these trends has been a dramatic decline in the relative position of young, high school graduates and high school dropouts. Juhn, Murphy and Pierce (1993) illustrate this decline by noting that real wages at the 10th percentile of high school graduates with 1 to 10 years of experience was roughly 15 percent lower in 1989 than wages for the same group in 1963. The wages of the least skilled workers were rapidly falling away from the rest of the distribution.

In addition to the increased inequality between education and experience groups, recent studies find a large increase in wage dispersion within skill groups. The increase in within-group inequality, however, seems to have started earlier, beginning in the early 1970s. The wage differential between the 90th and 10th percentile has increased within the distribution of wages of young and old workers and within the distribution wages of high school and college graduates. Persons in the upper part of the distribution have experienced significant growth in real wages while those in the lower part have experienced slight growth or, in most cases, declines in real wages.

International Experience

With the recent availability of cross-national data, researchers have begun to compare the increase in earnings and income inequality in the US with changes in other industrialized countries.⁴ Some international studies provide pair wise comparisons with the United States. For example, Freeman and Needels (1993) compare the United States with Canada; Katz,

Loveman and Blanchflower (1994) compare the United States with the United Kingdom, Japan and France; Katz and Revenga (1989) compare the United States and Japan; while Abraham and Houseman (1992) contrast the United States with West Germany. Country-specific studies of overall changes in inequality are now available for several other countries. For example, Borland (1992) and Gregory (1993) present data on Australia; Gustafson and Palmer (1995), Hibbs(1990) and Edin and Holmlund(1992) on Sweden; Hartoog, Oosterbeek and Teulings (1993) on the Netherlands; and Schmitt (1992) on the United Kingdom.

The broad consensus emerging out of this literature, summarized in Freeman and Katz (1994), is that while some countries experienced large increases in inequality, the US was unusual in the magnitude of the rise in overall inequality and increases in returns to education.⁵ Only the UK experienced an increase in overall inequality as large as the US. Furthermore, countries that experienced the smallest increase in overall inequality (Sweden, the Netherlands, Germany, Italy, and France) all had more centralized labor markets than countries experiencing large increases in inequality (Canada, US and UK). This has led to the working hypothesis that these institutional constraints were responsible for the lack of significant increase in inequality in countries with more centralized wage setting.

The implicit assumption behind this hypothesis is that the institutional constraints were binding in these countries that experienced small increases in inequality. While the existence of institutions that can constrain market forces may give these countries the option of limiting wage declines for less skilled workers, this does not necessarily mean that these constraints were binding. Market forces, such as a decrease in the relative supply of less skilled workers, could have been responsible for limiting the downward pressure on wages of less-skilled workers in some of these countries. In section IV we explore the evidence for this alternative market-based explanation.

III. Patterns of Changes in Inequality

In order to assess the impact of institutional constraints and market forces on changes in inequality by skill group we first estimate changes in returns to observable skills in each country. These can be compared to changes in relative supplies of different skill groups to see whether market forces are sufficient to explain differences across countries. The estimation of earnings functions requires data which is consistent across countries. Most existing cross-national studies have made pair wise comparisons with the United States. These studies used selection criteria and data definitions that were most appropriate for their specific cross-national comparisons. Definitions and data were, however, not designed to be consistent across studies. Therefore, they yield high quality data on pair wise comparisons with the United States but relatively little information that would allow comparisons across a wide variety of countries, for example between Sweden and the UK. Furthermore, estimates of changes in between group inequality are either lacking or are based on measures which make comparisons across studies difficult.

We use a data source, the Luxembourg Income study (LIS) that was created specifically to improve consistency across countries. The LIS data is a collection of micro data sets obtained from annual income surveys in various countries.⁶ The surveys are similar in form to the Current Population Survey for the United States or the Survey of Consumer Finances for Canada.⁷ The advantage of these data is that extensive effort has been made by country specialists to make information on income and household characteristics as comparable as possible across a large number of countries.⁸ While our discussion will point out remaining issues of comparability in LIS, these differences are small relative to differences across studies that are not designed to be comparable. A further advantage of LIS is that it offers the only publicly available micro data sets for France, the Netherlands, and Israel. The availability of micro data allows us to estimate a consistent set of earnings functions in a wide variety of countries..

While our data overcome some problems of comparability they are by no means perfect. Since the underlying data sets were originally designed in different countries for a variety of purposes, they clearly depart from the ideal of a single survey instrument applied to all countries. Attempts to make these data sets comparable has costs as well as benefits. The major cost is that

we are forced to use the lowest common denominator in defining variables and samples. For example, we are limited to the earnings of heads of households since the earnings of other individuals is not available for all countries in the years we use.⁹ The advantage is, however, that the data definitions that have been used facilitate comparisons across countries.

Since we are interested in changes in inequality during the 1980's, we are restricted to the countries with two years of data in LIS during this period. LIS includes two years of data on Australia, Canada, France, Finland, Israel, the Netherlands, Sweden, United Kingdom, and the United States.¹⁰ Although the years used were dictated by the years covered for each country in LIS, they represent a roughly similar time period for all countries except Finland-- 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.¹¹

Our measure of earnings is real annual gross wages and salaries of male family heads. We exclude females since we are trying to replicate studies for the US that have focused primarily on males.¹² In order to restrict the sample to people who are not likely to be in school or retired, we limit our sample to males between the ages of 25 and 54. We use the earnings of male heads, rather than all males since data on individuals who are not heads or spouses is not available in LIS for all countries in these years. Since studies using the CPS data have found similar patterns of earnings inequality using heads or individuals this should not cause a serious problem .

To be consistent with other studies, we attempt to limit the sample to full-time workers.¹³ Since no full-time variable is available for Canada, France or Israel, we present separate analyses for these countries and contrast their experiences with comparable data for the US.¹⁴ Finally, in order to exclude potential returns to capital we exclude male heads of households who were self-employed.¹⁵

To maintain confidentiality some countries recode earnings above some upper bound. For example, in recent years the US data is top-coded at \$100,000.¹⁶ This top coding affects comparisons both across time and across countries.¹⁷ We use two different methods to account

for the effects of top coding. The first is to use summary measures, such as percentile points, that are not affected by top coding. The second method, which we use when calculating the coefficient of variation, is to measure the dispersion of the truncated distribution by excluding the top five percent of the distribution in each year. By providing a consistent cutoffs across time and countries we limit the effects of top-coding.¹⁸ Thus, the data we present on the coefficient of variation is for the truncated distribution. Percentile points and other measures not affected by top-coding are for the full distribution.

To explore changes both between and within education groups, we construct four education categories corresponding in the United States to less-than 12 years of education, 12 years, 13 to 15 years and 16 or more years. The recoding into these groups is straight forward in countries where the education variable represents years of schooling (i.e. Canada, Finland, and Israel) and somewhat more problematic for countries where the education variable is already grouped (i.e. the Netherlands). Since no education information is available for Sweden, France, or the United Kingdom, we follow Katz and Loveman, Blanchflower (1994) by looking at returns to broad occupations. We construct three occupation groups corresponding roughly to professional and managerial workers, blue collar workers, and a residual category which includes lower-level white collar workers.

Changes in Earnings Inequality

In this section we present data on changes in annual earnings inequality for our nine countries. We first present crossnational comparisons of changes in the overall earnings distribution. Where possible this allows us to benchmark our data against previous studies. We then present new estimates of changes in between-group inequality based on earnings functions that can be compared across countries.

Changes in the Overall Distributions

Table 1 and Figure 1 document changes in overall inequality in each country using two different measures. Table 1 presents the coefficient of variation of the truncated distribution of

earnings for each country in each year. The left hand panel includes countries for which we have data on hours worked, which allows us to focus on full-time workers. The right hand panel includes those countries in LIS for which we are unable to distinguish between full- and part-time status. This panel, therefore, includes all workers. For comparability, we also present results for the US including all workers.

The measures in Table 1 summarize the change in inequality but do not isolate where within the overall earnings distribution the changes were occurring. Figure 1 therefore, presents changes in the earnings of persons at the 10th, 20th, 80th, and 90th percentile, all measured as log deviations from median earnings. The top two panels of Figure 1 plot data for countries with data on full-time workers while the bottom panel focuses on the other countries.

The countries break down into three broad groups. Consistent with many other studies we find that the US and the UK experienced the largest rise in inequality.¹⁹ Furthermore, where the US stands out is the increase at the top of the distribution. In the US, the earnings at the 90th percentile grew 2.2 percent per year faster than the median. The value for the UK was half as large and all other countries experienced even smaller increases.

Australia, Canada, France and Israel form a middle group of countries which experienced increases in inequality but less than the US and the UK. The coefficient of variation increased moderately and the 90/10 ratio increased in all these countries. In Canada and France the rise in the 90/10 was largely a result of declines at the bottom of the distribution. Our data for Israel shows very modest declines at the bottom but large increases at the top.²⁰ In Australia, the 10th percentile lost relative to the median by a similar magnitude as the 90th gained relative to the median.²¹

Our findings for France differ from Katz, Loveman, and Blanchflower (1994) who use tabulations of employer surveys provided by INSEE, the central statistical agency, to measure changes in earnings inequality.²² They find a narrowing in the 90/10 log wage differential in France from 1967 to 1984, followed by a moderate increase from 1984 to 1987.²³ Their findings are for full time, full-year workers in private and semi-public firms, who comprise 70 percent of

wage and salary workers. Our results, based on income tax returns for persons in the public as well as private sectors cover 91 percent of the population. The LIS data, however, include UI benefits in earnings and the sample includes part-time and/or part-year workers. These data differences may explain the differences in the findings since most of the increase in inequality that we observe comes from declines at the bottom of the distribution.

The Netherlands, Sweden and Finland form a third group with the smallest changes in inequality. All three countries exhibit substantially smaller increases in the coefficient of variation and much smaller increases in the 90/50 ratio than the US. In the Netherlands, the top gained and the bottom lost relative to the median but the 20th and 80th percentiles experienced no faster earnings growth than the median.²⁴ In Sweden, most of the increase was due to moderate gains by the 80th and 90th percentiles, whereas in Finland most of the change was in the bottom of the distribution.²⁵

In summary, these overall changes in earnings inequality indicate that the LIS data sets are broadly consistent with previous country specific studies. Furthermore, Freeman and Katz's (1994) observation of the correlation between centralized labor markets and the degree of growth in inequality is born out in our data, including the new countries we include. The six countries with the smallest increases in inequality all have some form of coordinated wage setting which may potentially limit market forces. In Finland wages are set through coordinated wage bargains between employers' organization and central trade unions. The bargained wages apply to all workers, even if they are not union members. Likewise, collective bargaining agreements are negotiated in Israel by a trade union (the Histadrut) that includes roughly three-quarters of all wage earners but these agreements are usually legally binding on the full labor force. Australia's Accord between the government and trade unions allows unions to coordinate and centralize wage setting. This agreement, enacted in the early 1980's, had the potential of limiting shifts in the distribution of earnings as well limiting inflationary pressures. In France bargaining is fairly decentralized but the bottom of the wage structure is tightly controlled by a widely applied minimum wage (the SMIC) that rose in real terms throughout the 1980's and even

rose relative to the average wages of manual workers.²⁶ If market forces were primarily focused on the bottom of the distribution in France, this seemingly unimportant institutional factor might explain the lack of substantial increase in inequality. In Sweden wage setting is coordinated through industry-wide bargaining between employers' councils and unions. Similarly, unions bargain with employers' organizations in the Netherlands. Even though union membership is only about 25 percent, the agreements are applied to nearly 80 percent of the workforce.

Changes in Between-group Inequality

In this section we exploit the availability of micro data in LIS to see how the underlying changes between and within groups differed across these countries. We estimate standard log earnings regressions to compare changes in the education and age premiums across countries, as well as changes in within-group inequality. This allows us to isolate whether the changes in overall inequality found in Table 1 reflect complementary or offsetting changes in the between- and within-group components of inequality.

The equations we estimate include a quadratic in age and either a set of education or occupation dummies. The education dummies correspond as closely as possible to less than high school, high school (the excluded group), some college, and four or more years of college.²⁷ For countries that do not provide data on educational level we include occupational categories, that roughly correspond to managerial or professional workers, blue collar workers, and a residual category which is typically other white collar (the excluded group).²⁸ In addition to these variables we also include dummies for race categories identified in each country survey, marital status, and number of children under 18.

Educational and Occupational Differentials

Table 2 presents results for the six countries for which we have education measures.²⁹ The US clearly had the largest increase in the college-high school differential. In 1979 full-time workers with at least a college degree earned 26 percent more than high school graduates of the same age. This differential rose to 40 percent by 1986. The result was a 2.0 percent per year increase in the college premium for full time workers (a 2.3 percent per year increase among all

workers). The only other countries to experience even moderate increases in the college premium are Israel (1.5 percent increase), Canada (1.0 percent) and Finland (1.0 percent).³⁰ The Netherlands actually experienced a decline in the college premium. While the small or negative changes in the college premium in these countries may reflect institutional constraints on the growth in wages of more educated workers, they may also reflect relatively large increases in the supply of college educated workers which matched the increase in demand. We explore these alternative explorations in Section IV.

Table 3 presents the results of estimating similar log earnings regressions with occupational dummies for those countries for which we do not have information on education.³¹ The omitted group is lower level white collar occupations. For the US and the UK these equations indicate a clear increase in the premium to being in high paid occupations.³² Managers and professionals gained relative to lower paid white collar occupations while blue collar workers lost ground to lower level white collar occupations.

In France the occupational differential between managerial and professional workers and lower level white collar occupations narrowed, leading to a decrease in inequality. However, the differential between manager/professional and blue collar worker hardly changed. Thus, if institutional constraints were responsible for the small increase in inequality in France, these institutions were more effective in protecting lower level white collar workers than blue collar workers.

In contrast, in Sweden managers and professionals gained relative to both groups. Their earnings grew 2.0 percent faster than lower level white collar occupations and 1.1 percent faster than blue collar workers. As we will show in the next section the slow growth in overall inequality in Sweden largely reflects the offsetting decline in the premium received by older workers.

Age Differentials

Tables 2 and 3 also present the coefficients on age and age squared, plus the log differential in earnings between persons 25 and 45 years old. Like previous studies of the US we

also find that the age earnings profile steepened. For example, the earnings function in Table 2 shows that 45 year-old full-time workers earned 36 percent more than 25 year-olds in 1979 but 42 percent more in 1986. This steepening also holds when we control for occupation (Table 3) or expand the sample to include part-time workers.

While the US stands out as the country with the largest increase in returns to education, changes in age differentials in the US were not particularly large. Australia, the Netherlands, Canada, France and the UK all experienced increases in the age premium roughly as large as in the US. The only country to experience a larger increase than the US was Israel. Thus, several countries with centralized wage setting allowed the age differential to increase as much as in the US. Finland shows a small decline in the age premium while the decline in Sweden is large enough to offset much of the increase in inequality resulting from the substantial rise in its manager/professional college premium..

The fact that the increases in the age premium are not substantially higher in the US than in most other countries could indicate that wage setting institutions were more concerned about growing disparities across education and occupation than across age groups. Alternatively, changes in the relative supply of young workers in these countries may explain these patterns.

Changes in Within-group Inequality

While we are primarily concerned with changes in returns to observable characteristics, Table 4 displays changes in within-group inequality as measured by the standard deviation of the residuals from the earnings equations. We also show the log differential of the residual between the 90th percentile and the median and between the 10th percentile and the median. The latter allows us to determine whether changes in the overall measure of within-group inequality changed at the top or bottom of the distribution of log earnings, conditional on age and education (or occupation).

The overall pattern across countries is not very different from the overall changes in inequality. Most countries exhibit increases in within-group inequality but the changes are larger in the US than in almost all other countries. Canada experienced smaller changes in within-

group inequality than the US but in both countries the 10th percentile lost relative to the median and the 90th percentile gained. France and Israel, two countries that showed moderate increases in overall inequality in Table 1, experienced relatively small increases in within-group inequality and among those countries with the smallest increases in overall inequality in Table 1 all but the Netherlands experienced only small increases in within-group inequality.

Summary

Table 5 summarizes changes in equality between and within groups. The US and the UK are at the top of the Table indicating that they experienced the largest changes in overall inequality. While the UK experienced somewhat smaller increases in the age premium than the US, increases in inequality in all other categories were as large as the US. These two countries are followed by Australia, Canada, France and Israel which had moderate increases in overall inequality. While changes in the education or occupation premiums were smaller than in the US, these countries still experienced increases in inequality between age groups similar to the US.

Sweden, the Netherlands and Finland experienced little or no change in overall inequality. While these countries had similar overall changes, they differ sharply in specific components. Sweden experienced a large increase in the premium paid to managers and professionals relative to blue collar workers but a decline in the return to age. The Netherlands had the opposite pattern of a large increase in the age premium which was largely canceled by the large decline in the return to college. Finland balanced the increase in the education premium and within group inequality with a moderate decline in the age premium.

Table 5 highlights the fact that countries with small overall increases in inequality experienced very different patterns of changes in between group differentials. The fact that returns to some skills rose substantially even in countries with centralized labor markets raises some questions. For example, why would the coordinated wage bargaining between employer associations and unions in Sweden lead to large increases in the occupational differentials but a decline in the age differentials while the wide union coverage in the Netherlands would lead to an increase in the age differential but a decline in the returns to education?

One possible explanation is that supply shifts were different in these countries and that differences in these market forces played an important role even in some countries with centralized wage setting institutions. The depressed age premium in Sweden may have been caused by a shortage of young workers in that country while the increase in the premium in the Netherlands may reflect a baby boom coming onto the labor market. Without further evidence it is not possible to separate the role of market forces from institutional constraints.

IV. Impact of Institutional Constraints

The institutional arrangements for wage setting have the potential for placing limits on the effects of market forces. This, however, does not necessarily imply that these potential constraints were binding in all countries. It is possible that supply changes were sufficiently large to leave these constraints slack in some countries but not in others. Diversity rather than uniformity in the role of institutional factors may well be the rule.

Additional information on the relative role of markets versus institutional factors can be gained from examining changes in the relative supply and the relative unemployment of different skill groups.³³ Consider a country with little change in the relative wages of one of these groups of less skilled workers. The strongest case for the importance of institutional constraints would come from rising relative unemployment rates for these skilled workers and an *increase* in their relative supply. A rise in unemployment would be consistent with a binding lower bound on the earnings of less skilled workers in the face of a decline in demand. Since it would take a *decrease* in supply of less skilled workers to offset the decline in demand, an increase in supply would not be consistent with a market based explanation for the observed stability in wages. The strongest case for the importance of market forces would come from evidence that the relative supply of less skilled workers declined, thus keeping their relative wages from falling, but that relative unemployment rates of less skilled workers were either stable or declining, indicating that their wages were not being maintained above market clearing levels by institutional constraints.

Figures 2 -7 present relative unemployment rates and labor supplies by age and education for the six countries with the smallest increases in inequality. The solid line in the first panel of each figure shows the unemployment rates of men 25-34 years of age relative to the unemployment rates of men 45-54 years of age.³⁴ The dashed line shows the ratio of the number of men 25-34 years old in the labor force relative to 45-54 year olds.³⁵ For each country, the first year shown in the figure is either the first year of LIS data or the first year of available data. The second LIS year is indicated by a vertical line. The second panel of each figure shows the relative unemployment rate and labor supply of male high school graduates relative to college graduates.³⁶

Figures 2 and 3 present data on France and Sweden, the two countries that provide the strongest evidence that institutional factors limited the increase in inequality. The minimum wage in France (the SMIC) increased faster than the average wage during the first half of the 1980's and then slowed later in the decade. These changes in the minimum wage closely parallel the relative stability of inequality through the mid-1980s followed by increasing inequality during the late 1980's and early 1990s found in other studies.³⁷ This time series correlation suggests that the rising minimum wage may have limited the rise in inequality in France during the years covered by LIS. If the minimum wage was a binding constraint then we should observe an increase in the relative unemployment rates of young and less educated workers.³⁸ This is exactly what happened. The top panel in Figure 2 shows a steady increase in the relative unemployment rates of the young up to the mid 1980's. Between 1979 and 1984 (the two years of LIS data for France) unemployment rates of 25-34 year olds relative to 45-54 year olds rose by 42 percent.

Although we were unable to obtain a time series of unemployment rates in France by education or occupation that went back to 1979, the second panel of Figure 2 plots the relative unemployment rates of males with the equivalent of a high school education (relative to those with a university degree) in France starting in 1982. The relative unemployment rates of less-educated workers rose by 36 percent between 1982 and 1984.³⁹ These increases in relative

unemployment rates of less skilled workers are consistent with institutional constraints keeping wages for less skilled workers from falling. The fact that the relative unemployment rate of less educated workers rose while their relative supply fell between 1982 and 1984 suggest that demand was falling even faster than supply.

The second country in which the patterns in unemployment are consistent with an institutional explanation for the limited rise in inequality is Sweden. Centralized wage setting allows social norms about the desired degree of inequality to be turned into specific "solidaristic" wage policies in Sweden.⁴⁰ The fact that the earnings of young workers actually rose faster than the earnings of older workers suggests that these institutions may have been successful in countering market forces.

Figure 3 indicates that the unemployment rate of the young men (relative to older men) ratcheted up in the late 1980's in Sweden, increasing by 75 percent between 1981 and 1987.⁴¹ This rise in unemployment is again consistent with wage setting institutions keeping the wages of the young from following market forces. Since the relative supply of young workers declined throughout the 1980's this indicates that demand at the institutionally fixed wage was dropping faster than supply.

While a time series of relative unemployment rates by education are not available for the LIS years in Sweden, data by education and age is available for 1978 and 1988. The bottom panel of Figure 3 shows that the relative unemployment rates of high school to college workers increased in Sweden between these two years. In 1978 high school graduates actually had lower unemployment rates than college graduates (1.5 percent versus 2.0 percent). By 1988 the high school unemployment rate was nearly twice the unemployment rate for college graduates (though both were still very low compared to the US). As Figure 3 shows, this increase in relative unemployment rates of less educated workers in Sweden was largest among younger workers. This increase in the relative unemployment rates of less educated workers is consistent with a decrease in demand that was not matched by a sufficiently large decline in relative wages.

Institutional constraints are a sufficient explanation for the limited increase in inequality in France and Sweden but institutional factors are not necessary to explain the lack of increase in inequality in several other countries with centralized wage setting. In fact, institutional explanations are inconsistent with the change in the composition of the unemployed in several countries we study. For example, Finland and the Netherlands are two countries with centralized labor markets that experienced little or no overall change in inequality. But changes in the supply of less skilled workers are sufficient to explain both the changes in wages and unemployment rates by skill level in the Netherlands and part of the change in Finland.

Table 2 showed that the earnings of young workers in Finland actually rose faster than the wages of 45 year-olds between 1987 and 1991. The modest decline in the supply of young workers in Finland during this period, shown in Figure 4, seems to have been sufficient to offset any decline in demand between 1987 and 1989 since relative unemployment rates of young workers did not increase. However, during the 1990s the relative unemployment rates of the young started rising, suggesting that during this period the decrease in supply of young workers may not have matched the decline in demand.

The case for the importance of market forces in Finland is stronger when we turn to changes in the education premium. Table 2 shows a considerably smaller rise in the college wage premium in Finland than in the US. However, Figure 4 shows no evidence that the rise in the college wage premium was limited by institutional constraints. Between 1987 and 1991 the relative unemployment rates of less educated workers fell, giving no indication of a quantity adjustment resulting from inflexible wages.

The Netherlands offers an example of a country in which market driven wages are sufficient to explain the changes in both the age and educational differentials. As we have seen, the relative stability of the overall level of inequality in the Netherlands was the result of a sharp decline in the relative earnings of the young matched by a large increase in the relative earnings of less educated workers. The decline in the relative wages of the young is consistent with a market driven explanation. The increase in the relative supply of young workers between 1982

and 1987, shown in the top panel of Figure 5, served to depress their wages. This increase in supply compounded the effects of declines in demand for less experienced workers. Wages, however, seem to have adjusted sufficiently fast to absorb the increased supply of young workers, as indicated by the sharp decrease in the relative unemployment rates of the young.

Changes in the education premium is likewise consistent with the importance of market forces. Table 2 showed that the college premium in the Netherlands fell by 3.1 percent per year between 1983 and 1987. Hartoog et al (1993) review the evidence on the composition of the Dutch labor force by education level and conclude that the decline in the education premium is largely a result of the sharp increase in the proportion of the labor force with higher education that resulted from growing parental wealth and generous government subsidies. This market driven explanation for the change in the education premium in the Netherlands is also consistent with the limited evidence on the educational composition of the unemployed presented in Figure 5. While unemployment rates by education level are not available for the LIS years (1983 and 1987), data shown in the bottom panel of Figure 5 indicates that the relative unemployment rates of secondary school graduates declined slightly between 1983 and 1985. This suggests that relative wages were adjusting sufficiently fast to offset changes in market driven forces.

Australia's coordinated wage setting through the 1983 Accord was expected to compress the distribution of wages.⁴² If the Accord provided a binding constraint on wages of less skilled workers, then we would expect to see a rise in the relative unemployment of the less skilled during the mid-1980s followed by a flattening as the Accord weakened during the late 1980's. Figure 6, however, does not show this pattern. Relative unemployment rates of the young were flat between 1981 and 1987 indicating no quantity adjustments. Furthermore, the bottom panel of Table 7 shows the relative unemployment rates of less educated workers falling during the last half of the 1990s.

The fact that Israel can now be added to the collection of countries with centralized labor markets that did not experience large increases in inequality would seem to bolster the case for the importance of institutional constraints. Figure 7, however, again shows no evidence that

wages were being kept above their market clearing level . The relative unemployment rates of the young were clearly lower in 1986 than in 1979, the two years of LIS data. While we were not able to obtain relative unemployment rates by education for Israel, the evidence we do have does not point to an institutional explanation.

V. Conclusion

This paper has presented evidence from a unique data source that allows comparisons across a large number of countries. The data presented in the first section confirms that the US was not unique in experiencing an increase in inequality of labor market income. However, the US and the UK were the only countries to experience large increases in inequality between both education and age groups and within each of these groups. Other countries managed to avoid one or more of these sources of increased inequality. As a result, several countries experienced much smaller increases in overall inequality.

We exploits the diversity in changes in returns to age and education (or occupation) to explore the hypothesis that institutional limits to wage adjustments were responsible for the small increase in inequality in several Scandinavian and northern European countries. Our review of changes in the composition of unemployment in countries with centralized wage setting indicates that the existence of institutional constraints does not necessarily imply that these constraints were binding. France and Sweden offer the strongest support for the importance of wage setting institutions in limiting the growth in inequality. In these countries the wages of less skilled workers did not fall very much but their unemployment rates rose. On the other hand, institutional constraints on wages do not seem to be binding in Finland, the Netherlands, Israel or Australia over the period we study. Changes in relative unemployment rates are not generally consistent with an institutional explanation in these countries. Furthermore, changes in relative supplies are often consistent with the observed changes in their wage structures.

In summary, the data presented in this paper suggests that the existence of wage setting institutions does not necessarily imply that these institutions impose binding constraints. One

should not conclude that institutional constraints are binding just because most countries with centralized wage setting did not experience an increase in inequality. What we have shown is that market forces provide a better explanation for changes in wages in earnings and unemployment in several of these countries. This does not mean that institutional constraints are never binding, only that they may not be binding if there are sufficiently large supply shifts to offset the demand shifts.

¹For example see Freeman and Katz (1994)

² For recent studies using the CPS see Juhn, Murphy, and Pierce (1993) and Karoly (1993). Moffitt and Gottschalk (1994) find similar trends in the PSID.

³ See Freeman (1976)

⁴See Gottschalk and Smeeding (1995) for a review of this literature.

⁵ Blau and Kahn (1994) also examine the relationship between inequality and the degree of wage centralization. They, however, focus on differences in inequality across countries *at a moment in time* rather than on the relationship between institutional constraints and the *rise* in inequality.

⁶ See Smeeding et al. (1990) for a detailed description of the data source and methods for accessing the data.

⁷ Appendix A lists the surveys used in each country.

⁸ Previously cited studies that compare individual countries with the US also attempt to make concepts and measures comparable between the specific country and the US. However, since each study uses concepts and measures that minimize the difference between the US and the specific country, it is difficult to make comparisons across studies.

⁹Data covering a later period for some of these countries include earnings of non-heads.

¹⁰ The German data in LIS were not used because the 1981 and 1984 data were obtained from two different surveys, the German Transfer Survey and the German Panel Survey, respectively. All other countries had data from the same surveys in the two years.

¹¹ For all countries other than Sweden and the Netherlands unemployment rates were higher in the second year than the first year.

¹² Since there were large inflows of women into the labor markets during the 1970s and 1980's, the distribution of the earnings of females was affected by selection (which women entered) as well as by changes in supply and demand for women with given characteristics. Focusing on males partially avoids these selection issues.

¹³ The Australian and Netherlands data is for full-time last week rather than full-time in the reference year.

¹⁴ For Canada and Israel, the 'hours of worked' variable is recoded so that only a full-time/year-round selection can be made in the first year and only a full-time cut can be made in the second year. As a result, no full-time cut is made for these countries.

¹⁵ The self-employed variable is not available in Australia, the Netherlands, and the United Kingdom.

¹⁶ Earnings over this amount are recoded to \$100,000.

¹⁷ Even if the nominal upper bound does not change, inflation will erode it's real value.

¹⁸ An alternative would be to impute values to persons who are top coded. This has the advantage of maintaining information on all persons but the disadvantage of introducing substantial measurement error, which may have a large effect on second moments.

¹⁹ Schmitt (1992) finds an increase in overall dispersion in weekly earnings using data from the British General Household Survey. Katz, Loveman, and Blanchflower (1994) also find a strong similarities in the pattern of increased wage inequality in the US and UK using gross hourly earnings from the New Earnings Survey.

²⁰ While there are no studies of changes in earnings inequality among males in Israel Achdut (1995), using a different data set, finds increases in the Gini coefficient for all family heads that are roughly as large as the increases in the coefficient of variation for the earnings of male heads in Table 1.

²¹ Borland (1992) finds similar increases in inequality in Australia using both grouped data from the ABS Labour Force Survey and individual-level data from the ABS Income Distribution Survey.

²² Katz, Loveman, and Blanchflower (1994) use published data and special tabulations of data collected by the national statistical agency (INSEE) from private sector employers on full time workers under "Les Déclarations Annuelles de Salaires" (DAS). LIS provides the only publicly available micro data set for France.

²³ Concialdi (1995) shows that this increase in inequality continues through 1993, the latest year of published data.

²⁴ Hartoog, Oosterbeek and Teulings (1993, Table 8.6) provide information on the Netherlands based on crosstabulations provided by the Central Planning Bureau and several small micro data sets. They find almost no change in inequality between 1979 and 1989.

²⁵ Edin and Holmlund (1992), Hibbs (1990), and Gustafson and Palmer (1995) report small increases in earnings inequality in Sweden using alternative micro data sets and tabulations from associations of employers and trade unions. Edin and Holmlund use the Level of Living Survey (LNU) and Household Market and Nonmarket Activities Survey (HUS). Hibbs uses tabulations of data provided by the Swedish Confederation of Trade Unions (LO) and the Swedish Confederation of Employers (SAF). Eriksson and Jantti (1994) also find a small increase in inequality for Finland between 1985 and 1990 but this follows a sharp decline during the 1970s and early 1980's.

²⁶ See Bazen and Martin (1991).

²⁷ Appendix B1 presents our recoding of education into these categories.

²⁸ Appendix B2 presents our recoding of occupations.

²⁹ Due to a change in the coding of the education and occupation variables across the two years of LIS data for Australia we are unable to estimate changes in returns to these skill categories. The age coefficients in Table 2 are based on equations using a comprehensive set of educational dummies in each year. The education coefficients are not shown because they are not strictly comparable.

³⁰ The finding for Canada is consistent with Freeman and Needels' (1993) conclusion that the increase in the college premium in Canada was small compared to the US.

³¹ Juhn (1994) finds large increases to professional and managerial occupations in the US.

³² Given the change in the occupational classification scheme that occurred in 1983, the occupation regressions for the US are based on recoded CPS data where the 1979 occupation data was recoded into post-1983 terms. We thank Maury Gittleman for providing the recoded data. See the appendix in Gittleman (1994) for a discussion of the recoding.

³³Blank (1995) stresses the need for empirical research on the links between unemployment, inequality and labor market institutions.

³⁴The source for these unemployment rates is OECD Labour Force Statistics, 1970-1990. Since these unemployment rate ratios vary considerably, especially for countries in which both the unemployment rates of young and old males are small (such as in Sweden), the figures display three year moving averages of the unemployment rates. The use of moving averages also helps remove some of the cyclical movements in the ratio. The actual unemployment rates for both age groups and the ratio of the young to the old and the young to the total are given in Appendix C.

³⁵The labor force totals are from ILO yearbook of labor statistics. The actual labor supplies are given in Appendix C2.

³⁶ We wish to thank the following people for their generous help in obtaining data on unemployment by education--Pierre Concialdi (France), Rudd Muffels (the Netherlands), Markus Jantti (Finland) and Greg Wurzburg (Sweden). See Appendix D for a description of the two education groups and Appendix E for the actual unemployment rates and labor supplies.

³⁷See Concialdi (1995).

³⁸Abowd, et al. (1995) show a strong relationship between increases in minimum wages and unemployment rate probabilities in France.

³⁹The moving average increased by 22 percent. The OECD Job Study also indicates a substantially higher unemployment rates of men in France with less than a secondary education relative to men with an upper secondary or higher education in 1990 than in 1979.

⁴⁰See Gustafson and Palmer (1995).

⁴¹ The three year moving average increased by 28 percent. These changes in relative unemployment rates may understate the rise in the proportion of young men not finding unsubsidized jobs since the Swedish government has a fairly large Works Projects program that provides employment to the long term unemployed.

⁴²See Gregory and Vella (1992).

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Appendix A

Household Surveys in the LIS Database

Country	Survey	Sample Size
United States	March Current Population Survey	1979-15,225
		1986-11,614
Australia	The Income and Housing Survey	1981-15,985
		1985-7,560
Canada	Survey of Consumer Finance	1981-15,136
		1987-10,999
Finland	Survey of Income Distribution	1987-11863
		1991-11749
France	The Survey of Individual Income Tax Returns	1979-11,044
		1984-12,693
Israel	The Family Expenditure Survey	1979-2271
		1986-2400
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

