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Luxembourg Income Study Working Paper Series

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**Inequality in Five Countries in the 1980's: The Role of
Demographic Shifts, Markets and Government Policies**

Markus Jäntti

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Inequality in Five Countries in the 1980s:
The Role of Demographic Shifts, Markets and Government
Policies

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Abstract

Using LIS data I examine levels of and trends in income inequality among families in five industrialized countries, namely Canada, the Netherlands, Sweden, the United Kingdom and the United States, exploring the possibility that markets, the public sector or demographic shifts would account for changes. Inequality increased in Sweden, the United Kingdom and the United States but did not increase in Canada and the Netherlands. I find that earnings account for much of the observed increase in income inequality, partly due to increased inequality of head's earnings and partly because of an increased share of spouse's earnings in household income. The public sector can, in general, be assigned a moderating effect on these changes. Demographic shifts cannot be assigned any major role in the increase in inequality.

1 Introduction

In this paper I examine levels of and changes in the distribution of income in five industrialized countries, namely Canada, the Netherlands, Sweden, the United Kingdom and the United States. Using data from the Luxembourg Income Study (LIS), I account for the change in income inequality over time, exploring the effects of changes in markets, public policies and demographic shifts. Income inequality increased in the 1980s in many industrialized countries. They share some, but far from all of the economic trends in the 1980s. For instance, many countries changed their tax systems.¹ Similar structural changes, such as de-industrialization and technological change, also affected many countries. On the other hand, demographic changes, often blamed for adverse developments, are unlikely to have occurred rapidly enough to be able to account for the bulk of the changes. Existing systems of taxes and transfer payments can be expected to have different effects on the increases in factor income inequality. Thus, even with similar trends affecting factor incomes, I would still expect to observe differences in the trends in disposable income inequality.

The two distinctive features of this paper are that it examines the trends in inequality in disposable income among the whole population in the five countries using comparable data, and examines which broad sets of explanations are and which are not compatible with the observations, using a unified framework. Most international comparisons include a smaller or different set of countries, a limited part of the population (such as families with a working-age head) and/or an income concept other than post-tax-post-transfer income, arguably a more welfare-relevant income concept than income before tax. My aim is to understand what, if anything, is common and what is different in the changes in income inequality in the five countries between the early- and the mid-1980s. I use an accounting framework, i.e., I use decompositions of income inequality indices either by income source or by population sub-groups.

To study the contribution of income components to levels of income inequality I decompose the squared coefficient of variation, the CV^2 , of disposable income into a sum of separate components due to the market economy (five components: earnings of head, earnings of spouse, self-employment income, property income and other private income), transfers (means-tested and social transfers) and taxes (payroll and income taxes).

¹See Pechman (1988) and OECD (1988).

After this I decompose the *change* in disposable income inequality into its different components. To examine the role of changing demographic structure on income inequality, I study the extent of within- and between-group inequality of three different partitions of the population. These are by the age of the household head, the number of earners and family structure. I also decompose the *change* in both the CV^2 and the mean logarithmic deviation to assess the relative importance of income inequality within each sub-group and the relative income differences between the groups.

Using similar data and similar definitions, I find that inequality did not increase in Canada and the Netherlands, but increased in Sweden, the United Kingdom and the United States. Among the various explanations for the increases, I have three major similarities to report. First, earnings account for much of the observed increase in income inequality, partly because of increased inequality of heads' earnings and partly because of an increased share of spouses' earnings in household income. Most of the changes occurred within groups, rather than through shifts in the relative incomes between groups. Second, the public sector can, in general, be assigned a moderating effect on these changes. Finally, demographic shifts cannot be assigned any major role in the increase in inequality. Thus, future work on international income inequality trends should focus on explanations for increases in inequality within different socio-economic groups.

This paper is organized as follows. In Section 2 I present the overall trends in income inequality. In Section 3 I discuss links between the decomposition and aspects of the economic environment. In Section 4 I review a few national studies and some of the literature on international inequality trends. In Section 5 I present the methods and data used. In Sections 6 and 7 I present the decompositions of both levels and trends of inequality by income sources and by population subgroups. A final section summarizes the paper.

2 Overall trends in income inequality

I study income inequality in Canada, the Netherlands, Sweden, the United Kingdom and the United States using LIS data. Canada and the United States are chosen because they are large economies with similar structures, but which differ interestingly in the functioning and extent of the welfare state.² Sweden and the Netherlands, on the other hand, have well-developed welfare states which nonetheless are based on very different principles. Sweden redistributes income extensively, and has high levels of female labour force participation as well as low unemployment rates. Many, or most, of its transfer schemes are earnings related. In the Netherlands the labour force participation of women is very low and the public sector transfers quite large amounts of cash to those outside the labour force. It is interesting to compare the United Kingdom with the other countries, especially since the policies pursued during the Thatcher years were in similar spirit as the United States policies of the Reagan administration.

What then are the facts to be explained? To gauge the overall trends in inequality within each country I have estimated Lorenz curves for the five countries in the two years in LIS, shown in Figure 1.³

The Lorenz curves for Canada are virtually indistinguishable but on closer inspection turn out to cross each other. The Lorenz curve for the Netherlands in 1987 is closer to the diagonal than in 1983 for all heads, indicating a decrease in inequality. In Sweden, the United Kingdom and the United States, on the other hand, the Lorenz curves for the later year are everywhere below those for the earlier years. Thus, in these countries inequality is unambiguously higher in the later years.⁴

In Table 1 I report the level and the annualized percentage change in adjusted disposable income inequality summarized by three inequality indices, the Gini-coefficient, the mean logarithmic deviation and the squared coefficient of variation for the two samples, the full and the restricted sample. Because the time span covered by the two samples for each country vary, I have divided the percentage changes by the number of years between the samples to make the changes comparable.

²See Hanratty & Blank (1992) and Blank & Hanratty (n.d.).

³The Lorenz curves are estimated for disposable equivalent household income, using person sample weights. See below, section 5 for details.

⁴In many countries, very high incomes are top-coded, i.e., the true income of a unit in the sample is replaced by a maximum value if it exceeds this limit. I have also studied a trimmed sample where those with incomes in excess of the 95th percentile have been excluded, because the CV² is sensitive to very high incomes. Changes in the top-codes might not reflect real changes but can still influence estimated inequality. The overall assessment of the trends in income inequality remained intact.

Figure 1: Lorenz curves for disposable equivalent income in selected countries in selected years, all heads

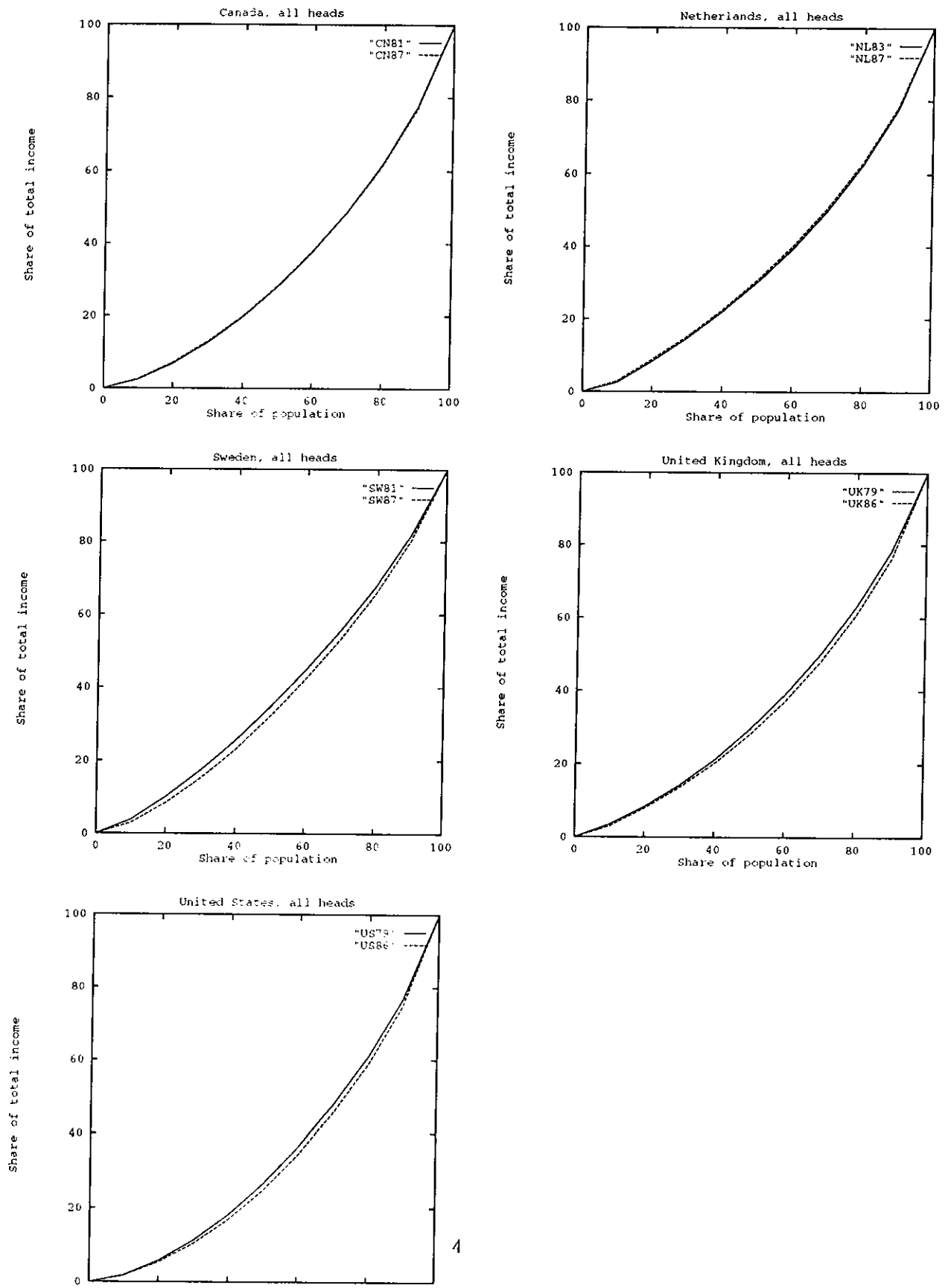


Table 1: Level and annual rate of change in aggregate income inequality, selected countries and years

Index	Country	$t1$	$t2$	Change
Gini-coefficient $100 \times G$	Canada	27	27	0.5
	Netherlands	24	24	-0.3
	Sweden	20	22	1.7
	United Kingdom	24	26	1.4
	United States	29	32	1.7
Mean logarithmic deviation $100 \times MLD$	Canada	13	13	1.0
	Netherlands	9	9	-0.5
	Sweden	7	10	6.2
	United Kingdom	9	12	3.5
	United States	16	19	3.0
Coefficient of variation $100 \times CV^2$	Canada	26	28	1.3
	Netherlands	23	21	-1.5
	Sweden	13	26	16.1
	United Kingdom	21	28	4.6
	United States	28	38	4.8

Note: $t1$ and $t2$ are: Canada, 1981 and 1987, the Netherlands, 1983 and 1987, Sweden, 1981 and 1987, the United Kingdom, 1979 and 1986 and the United States, 1979 and 1986. Income is household disposable equivalent income. Changes are annualized percentage change in inequality index.

Source: Author's calculations from LIS.

The only unambiguous result as to the ordering of the countries is that the United States has the highest level of inequality for all measures in both years in both samples. By and large, the ordering seems to be that the United States has the highest inequality, followed by Canada, the United Kingdom and the Netherlands, while Sweden has the lowest. However, the precise ordering of the countries other than the United States depends on which inequality measure one looks at.

The annualized rates of change of the inequality indices, also shown in Table 1, echo the results of the Lorenz-curve comparisons of Figure 1. Inequality increased unambiguously in Sweden, the United Kingdom and the United States, while the comparison over time for Canada and the Netherlands is ambiguous. I have calculated the approximate t -ratios of the changes in the CV^2 , shown in Table 5. The changes in disposable income inequality are significant in the Netherlands (where it decreased), in the United Kingdom and in the United States (where it increased). Sweden's large increase is not significant at conventional significance levels. The estimated standard errors are approximate at best, and for Sweden the Lorenz curves do not cross. I shall therefore proceed as if Swedish inequality had increased. However, the Swedish trend should be viewed with some caution.

3 The economic environment, potential causes and the decompositions

Accounts for changes in income inequality generally sort under three main headings. First, there are changes that occur due to changes in markets (earnings and property income). Second, there are changes that might occur because the demographic composition of the population is changing. Third, there are changes that can be due to changes in tax and/or transfers policies. Naturally, all these headings conceal a large number of sub-headings. Witness, for instance, the large literature (reviewed by Levy & Murnane (1992)) on the changes in earnings inequality in the United States. Also, categories mix. For instance, labour markets might induce changes because the demographic composition of the labour force is changing. The hypotheses I study in this paper are the following.

Labour markets There are several ways in which changes in labour markets can translate into changes in income distribution. Changes in earnings/wage inequality of especially male workers have recently received much attention. If, for instance, shifts in the returns to age were the main driving force behind the changes, then the decompositions by age groups should reveal this. Changes in the labour force participation of women, either through declining non-participation, or through increased hours of those in the labour force, imply that between-groups inequality and changes in the relative weights should account for most of the changes. Also, it should change the contribution of spouses' earnings to overall inequality in the decomposition by income source.

Demographic shifts If shifts in the demographic composition were to account for the observed changes in inequality, this should be evident in the decompositions by population sub-groups. More specifically, demographic shifts would imply that changing weights and between-group terms would be important parts of inequality change. Only three types of demographic shifts are considered in this paper, namely shifts in age structure, family structure and the number of earners.

Public policy changes If changes in public policy, through tax and transfer policies, were to account for observed changes in disposable income inequality, this would imply that the terms associated with the public sector in the decompositions would be large. Also, if changes in transfers were directed to specific groups, such as lone mothers or senior citizens, we should observe changes between population sub-groups.

The decompositions are by their nature only suggestive of which the more likely causes of inequality change are. At the very most, some explanations can be ruled out. Several competing explanations might still remain just as likely as before. Especially, explanations that relate to industrial structure, and therefore, earnings inequality, are not easy to discriminate among from these data. Neither are the explanations necessarily mutually exclusive. For instance, changing labour force attachment of women and men should lead to changing contributions of between-group inequality for the partition by number of earners, at the same time as earnings inequality within these groups could be changing because of a growing share of service sector jobs.

LIS constrains my choice of years, so there is little I can do to control for stages in the business cycle. However, I do not think that my results are biased by differences in macroeconomic conditions in the countries. Table 2 shows the unemployment and inflation rates as well as the growth rates of real GNP for the countries in the study. GNP growth was higher in the second year for all countries except the Netherlands. Unemployment was lower in the second year in the Netherlands and Sweden, and higher in all the rest. Inflation rates are lower in the second year in all countries.

Generally, one would expect inequality to increase with high unemployment and to decrease during economic recoveries.⁵ Thus, for Sweden, I would expect a decrease in income inequality. For the other countries, no simple expectation arises, because the trends in unemployment and GNP growth are mixed. However, inequality increased in all countries except in Canada and the Netherlands (including Sweden). Thus, although the data are sampled at slightly different stages of the business cycle, these differences can not account for why inequality changed in three of the five countries and not in the remaining two.

It is often thought that countries differ so much in their institutions and other characteristics that

⁵See Danziger & Gottschalk (1989).

Table 2: Macroeconomic conditions

	Years	Unemployment	Inflation	Real GNP growth
<u>Canada</u>	1981	7.5	11.3	3.4
	1987	8.8	3.1	4.2
	1981-1987	10.0	5.8	3.1
	1971-1990	8.0	6.3	3.8
<u>Netherlands</u>	1983	12.0	2.8	1.4
	1987	9.6	-0.2	0.8
	1983-1987	10.8	1.4	2.0
	1971-1990	7.0	5.0	2.4
<u>Sweden</u>	1981	2.5	12.4	0
	1987	1.9	5.3	2.8
	1981-1987	2.8	8.4	2.0
	1971-1990	2.3	9.0	1.9
<u>United Kingdom</u>	1979	5.0	13.6	2.8
	1986	11.2	4.4	3.8
	1979-1986	8.1	9	3.3
	1971-1990	5.25	6.65	1.3
<u>United States</u>	1979	5.8	9.2	2.5
	1986	6.9	2.4	2.7
	1979-1986	7.6	6.1	2.3
	1971-1990	6.7	6.0	2.8

Source: OECD, 1991.

comparing levels of inequality is not meaningful.⁶ However, given a high degree of inertia in how these characteristics change, comparing *changes* across countries is thought to be meaningful, since this controls for what is constant over time. Below, I will briefly discuss transfer and tax policies, how these have changed and how these changes can be expected to affect the income distribution.

The tax system affects the distribution of income principally through social security contributions (payroll taxes), income taxation and taxes on wealth and income from wealth. Changes in any of these are likely to affect income inequality. Payroll taxes are generally a constant proportion of labour earnings. Increases in the rate at which they are collected will raise the taxes on earners and will tend to equalize relative income differences with respect to those not in the labour force. On the other hand, increases in payroll tax rates will worsen the situation for those who derive income mainly from labour relative to those with a higher degree of property or self-employment income. The effect of changes in payroll taxes is thus ambiguous.

Income taxes (i.e. taxes on total income), if progressive, decrease income inequality. Moves to less

⁶See, e.g., Blackburn & Bloom (1994).

progressive taxes will then, *ceteris paribus*, increase income inequality (absent any labour supply effects). At least the United States and Sweden had tax reforms during the time period I study. A common goal of those was to decrease the progressivity of the tax schedules and to broaden the tax base. Decreased progressivity will, *ceteris paribus*, increase the inequality of income. The effect of the reform will still depend on the fate of various exemptions, capital taxation, the threshold at which households enter the tax rolls etc, as well as labour supply responses. However, a decrease in progressivity of the tax schedule combined with a movement of earners up in the earnings distribution might keep observed progressivity, and hence, the observed equalizing effect of taxes roughly constant (as will happen, e.g., when the earnings of women increase because of increased labour supply).⁷

Although a number of major changes in the Swedish tax system were introduced after the time period covered by the data sets in LIS, the tax system in Sweden was subject to some changes during the time period in this study. The main changes were a reduction in marginal tax rates, the number of tax brackets from 14 to 4 and the number and rate of tax deductions. Joint taxation of capital income of married couples, the last income source that was jointly taxed, was abolished in 1986. Further, indexation of tax rates, formally introduced in 1979, was abolished in 1985 (Ljungh 1988).

Most changes in the U.K. tax system took effect in 1979, so these changes are already in effect in the 1979 LIS data and can not directly account for the observed changes in income inequality. The United States had two major tax reforms in the 1980's, those of 1983 and 1986. Generally stated, it seems that some changes that worsened the situation for low income groups in the first tax reform were repealed in 1986, too late for our data. However, it is not clear how the two reforms affected overall inequality.⁸

Means-tested transfers will account for a reduction of observed inequality. Earnings-related transfers will, on the other hand, tend to either be neutral or account for a positive contribution to inequality. The sign of the effect of transfers on inequality depends on the correlation of transfers with income.⁹ If the factor

⁷The question of whether the shift in labour supply is a response to changes in the tax schedule is not addressed here.

⁸However, Gravelle (1992, 36) concludes that "...the reality is probably that the Tax Reform Act of 1986 is now making lower-income individuals worse off and higher income individuals better off."

⁹That earnings-related transfers will account for a positive contribution to overall inequality when decomposing inequality into its income sources should not be confused with the fact that even earnings-related transfers equalize relative incomes between groups of receivers and non-receivers (e.g., employed and unemployed) and have an equalizing effect when analyzed in those terms.

share or the dispersion of means-tested transfers decreases, their inequality-reducing effect will decrease. Conversely, if the relative mean (i.e., factor share) or the dispersion of earnings-related transfers increases, their inequality-augmenting effect will be stronger. Means-tested transfers are, by definition, negatively correlated with other income. Social transfers, on the other hand, may be positively or negatively correlated with income.

The multitude and diversity of various social transfer program precludes a lengthy review of the programs and changes in these in the countries I cover. I concentrate on changes in two programs, namely those of unemployment benefits and family allowances in the two years for each country.¹⁰

Canada had no major institutional changes in either program over the time period we study, the last major change being the introduction of child tax credits in addition to the universal child allowance. There was no major change in family allowances in the Netherlands. Unemployment benefit rules changed after 1983, however. Earnings-related unemployment benefits were 80 percent of earnings up to a maximum of 262 guilders a day. In 1985, this was down to 70 percent of earnings with an unchanged limit. In 1989, the limit was still only 263 guilder; thus, the real value of the limit was eroding. Means-tested unemployment benefits were down from 75 to 70 percent of earnings between 1983 and 1985.

In Sweden, rules governing unemployment benefits did not change. The universal child allowance, having given a constant contribution per child, became after 1981 progressive after the third child. No major changes in these programs were enacted between 1979 and 1986 in the United Kingdom. In the United States, there is no universal family allowance. The main source of social transfers to (families with) children is Aid to Families with Dependent Children (AFDC). During the early Reagan years, this partly federal and partly state-level program suffered some cut-backs, although the specifics of these cuts varied from state to state (Nathan & Doolittle 1987). The duration of unemployment benefits also varied by state. The lower limit, a duration of 26 weeks remained unchanged. The higher limit of 39 weeks was reduced to 26 weeks. The maximum extension of up to 26 additional weeks duration in 1979 was reduced to 13 additional weeks by 1986.

The effects of these changes are not always clear. The effect of raising child allowances, or making them

¹⁰Information on transfer schemes are taken from U.S. Department of Health, 1979, 1981, 1983, 1985 and 1989.

progressive, as in Sweden, depends on the distribution of children in different types of families, the position of these in the income distribution and so on. In as much as families with children are below or at average (in per capita equivalent) income, raising child allowances should reduce inequality. The effect of changes in unemployment benefits, again, depends on the extent of means-testing (or correlation with earnings), the normal incomes of the unemployed and their distribution across family types. It would, however, be surprising if restrictions in duration and/or the correlation with earnings would increase measured inequality – this would occur if those with high incomes were the unemployed, or if reductions in unemployment benefits were accompanied with increases in benefits to those with lower incomes (= mean preserving progressive transfers). In sum, the institutional changes I report above suggest that there could be some increase in equality in Sweden due to progressive child allowances. In the other cases, I would suspect changes to lead to increased inequality.

4 Previous studies of income inequality

In Table 3 I summarize a few national studies of the trend in income inequality within the countries during or close to the time period in this study. The summary is very sketchy and should not be taken to be an attempt at a complete review. In most cases, the trends reported in the national studies are similar to the findings in this study. The exception seems to be the Netherlands. Differences in income concepts, equivalence scales, household definitions etc are why the Luxembourg Income Study was needed. Rather than to start weeding out the differences between the national studies in this respect, I proceed to give a brief review of some LIS-based studies of income inequality changes.

Blackburn & Bloom (1994) study family income inequality in Australia, Canada and the United States using both waves of data available in LIS. They focus on gross income, i.e. household income before taxes and limit their sample to married couples with prime-aged (25 to 64 year old) husbands. The focus of their study is whether the observed increases in income inequality, especially that in the United States, is best explained by changes in earnings inequality (hours \times wages), changes in the labour force participation of husbands and wives or an increased correlation in the earnings of couples. They find that the change in the inequality of husbands' earnings, and, for Canada and the United States, the change in the correlation between husbands and wives earnings are important in explaining the increase in income inequality. They do not explicitly analyze the effects of other income components, and taxes do not enter the analysis at all.

Cancian & Schoeni (1992) have also studied the impact of female labour force participation and earnings on family earnings inequality in 11 developed countries in LIS. In order to understand the patterns and changes in work behaviour of wives and their impact on earnings inequality they study the labour force participation of wives in different parts of the earnings distribution of husbands rather than only overall patterns. They find large differences in both overall levels of participation and in the levels across the distribution. They also find large differences in the levels dispersion, correlation between spouses' earnings across the countries. But, by studying the change in earnings inequality when wives earnings are included, they find that in all countries, wives' earnings have a reducing effect on family earnings inequality. Where two waves of data were available, the inequality reducing effect of working wives increased over time.

Table 3: National studies of inequality trends

	Years	Income concept	Inequality measure	Inequality change
McWalters & Beach (1990)	1965-1987	<u>Canada</u> Total family income	Quintile share and ratios	no change between 1981 and 1987
Blackburn & Bloom (1991)	1979, 1986	Total per capita and equivalent family income	Lorenz-curves, MLD, Theil, Gini, Log variance	no change between 1979 and 1986
Centraal Bureau voor de Statistiek (1989)	1977-1989	<u>Netherlands</u> Disposable per capita household income	Theil	increased inequality between 1983 and 1987
Muffels & Nelissen (1993)	1959-1988	Disposable income per capita	Theil	increased inequality between 1983 and 1987
Gustafsson & Palmer (1993)	1975-1991	<u>Sweden</u> Disposable equivalent household income	Gini, Theil, MLD	increased inequality between 1981 and 1987
Atkinson (1993, 18)	1977-1988	<u>United Kingdom</u> Equivalent household disposable income	Gini	increasing inequality 1979-1986
Jenkins (1994)	1971, 1976, 1981, 1986	Total equivalent household income	Gini, Theil, MLD and CV^2	increasing inequality between 1981 and 1986
Karoly (1992)	1963-1987	<u>United States</u> Total equivalent family income	Percentile ratios, Log variance, Gini	increasing in inequality between 1979 and 1986
Blackburn & Bloom (1991)	1979, 1986	Total per capita and equivalent family income	Lorenz-curves, MLD, Theil, Gini, Log variance	increasing inequality between 1979 and 1986

Note: See, e.g., Cowell (1989) for definitions of the inequality measures.

Gottschalk & Joyce (1992*a*) and Gottschalk & Joyce (1992*b*) study different explanations for changes in the earnings distributions for full time male workers in Australia, Canada, France, the Netherlands, Sweden, the United Kingdom and the United States using LIS data. They limit analyses to males who are household heads, between 25 and 54 years of age and do not report self-employment income. They control for top-coding problems by studying a trimmed sample (the first 95 percent) and by studying percentiles, which are unaffected by top-coding. They focus on overall trends in earnings inequality and changes within and between age and education groups.

They find that all countries experienced increases in earnings inequality, but the magnitude of the change was largest in the United States. The patterns of within- and between-group inequality are also, to a large extent shared, with within-age-group and between-education-group inequality increasing.¹¹ They also conclude that changes in industrial structure within the countries account for very little of the change, and, consequently, that similar structural changes are affecting economies across the globe. The fact that the magnitude of earnings inequality increases differ is attributed in part to differences in labour market policies.

Changes in industrial structure in the form of international competition and de-industrialization on the one hand, and technological change, on the other, have often been offered as explanations of increases in earnings inequality in the United States. Gottschalk & Joyce (1992*a*) present data on changes in trade, industrial structure and technology. They conclude that changes in the internationalization of competition and technological change are more likely to explain the observed patterns of earnings inequality than de-industrialization. Both of the studies focus explicitly on trends in and explanations for changes in prime-age male earnings.

Fritzell (1993), also using LIS, studies the change in disposable income inequality. The countries included in the study are Canada, Germany, Sweden the United Kingdom and the United States. He recodes negative income to 0.1 and recoded any income that is more than 1500 times the median income to this limit. For the most part, all households are included, but some are conducted also for a subset where the age of the

¹¹Education variables in LIS for the countries they study are only available for Canada, the Netherlands and the United States.

head is 20 to 64 years old. Income inequality increased substantially in Sweden, the United Kingdom and the United States, and more modestly in Germany. In Canada, the evidence is mixed.

Fritzell (1993) goes on to study the effect of demographic factors (age and family structure), income redistribution and the structure of market rewards. The effect of age and family structure are analyzed by decomposing the CV^2 in t_2 into within- and between-group components. Then the age or family population shares in t_1 is used to produce an estimate of what inequality had been if all within-group means and variances had changed by the actual amounts but the population share had stayed constant. In neither case can demographic changes account for much of the change in inequality.

Fritzell studies the effects of income redistribution by comparing the pre-tax – pre-transfer distribution of income with the post-tax – post-transfer distribution. The analyses are conducted both for the full sample and for a sample of households with a non-aged head in order to exclude the influence of pensions. Fritzell defines the effect of the welfare state as the relative change in income inequality before and after the intervention of the welfare state. He then calculates the effect of changes in the total redistributive effect by calculating what later year post-intervention inequality had been if the total re-distributive effect had been the same as in the first year (Fritzell 1993, 54–55) and comparing that to actual inequality. He concludes that changes in tax and transfer policies in Sweden, the United Kingdom and the United States had an augmenting effect of income inequality, i.e., the increase in income inequality would have been lower were it not for changes in redistribution. In Canada and Germany, on the other hand, he finds that the equalizing effect of the welfare-state increased between the sample years.

The effect of changing market rewards is analyzed for the non-aged population focusing on earnings. Earnings are divided into four groups, (i) those with incomes less than 50 percent of median income, (ii) between 50 and 150 percent of the median, (iii) between 150 and 200 percent of the median and (iv) over 200 percent of the median. This has the advantage of localizing the changes in earnings, but the disadvantages of using uncommon partitions of the distribution (instead of, say, deciles) and of comparing the distribution of earnings with the median of income. Fritzell concludes that in all countries, earnings distribution tended to widen.

Fritzell's study is closest to the present paper, in that it focuses on the same set of countries (except for

Germany) and, broadly, the same set of explanations as I do. The methods, however, are different; Fritzell uses, essentially, a variant of shift-share analyses, i.e., he studies the effect of one factor at a time. My analyses by population subgroup produce exact decompositions, as do my decompositions by income source. I also study the different factors at a finer level of disaggregation.

5 Research strategy: decomposition methods

There is no best way of decomposing income inequality indices by income source, just as there is no one best income inequality index. A commonly used measure which satisfies some standard axioms, such as the principle of transfers, symmetry, Lorenz-dominance and sub-group consistency is the squared coefficient of variation, $CV^2 = \sigma^2/\mu^2$, where σ^2 is the variance and μ is the mean of income.¹² Since it also has some convenient decomposition properties, I choose to work with this inequality index. This can conveniently be decomposed into separate components to assess the quantitative importance of each income source. A common method uses the fact that the CV^2 can be written as

$$CV^2 = \sum_k \frac{\mu_k^2}{\mu^2} CV_k^2 + \sum_{j \neq k} \sum_k \frac{\mu_j}{\mu} \frac{\mu_k}{\mu} \rho_{jk} CV_j CV_k, \quad (1)$$

where μ_k and μ are the means of the k th income component and disposable income, respectively, CV_k and CV are the coefficients of variation and ρ_{jk} is the correlation between the j th and the k th component. The square of the ratio of the mean of the k th component to the overall mean can be interpreted as the weight on the income inequality of the k th component. One possibility to assess the contribution of the income components to changing inequality is to change the weights, the coefficients of variation and the correlations sequentially, and to register the percentage change in overall inequality at each stage. An alternative is to change the three sets of parameters – the means, the variances and the correlations between different income components – sequentially.

The problem with these approaches is that the magnitude of each effect depends on the order in which the parameters are changed. This follows from the fact that changing the parameters sequentially creates a different income distribution at each stage in the sequence. Other approaches are available. In this paper I decompose the CV^2 into a sum of k terms:

$$CV^2 = \sum_k \frac{Cov(y_k, y)}{\mu^2} = \sum_k \rho_k CV_k CV \frac{\mu_k}{\mu} = \sum_k S_k, \quad (2)$$

¹²See Nygård & Sandström (1981, 406–7).

where ρ_k is the correlation coefficient between y_k , the k th component and y , disposable income. Dividing through by the CV^2 of disposable income, I get the relative contribution of each k components, s_k , to overall income inequality:

$$\sum_k \frac{S_k}{CV^2} = \sum_k s_k \equiv 1. \quad (3)$$

These relative contributions can then be compared across years to assess the importance of each income component. S_k and s_k are measures of the importance of a component for total CV^2 . Looking at how these terms change reveals how the contribution of each separate source of income changes in total inequality.¹³

I am also interested in another type of question, namely: What was the share of each component in the change in CV^2 from the first year we have data, $t1$, to the second year, $t2$? This can be studied by decomposing the change in the CV^2 into separate parts. Define the annualized change as

$$\% \Delta = 100 \times \frac{CV_{t2}^2 - CV_{t1}^2}{CV_{t1}^2} \cdot \frac{1}{\tau}, \quad (4)$$

where $\tau = t2 - t1$. This can be decomposed into a sum of the k parts; in order to study $\% \Delta$ in terms of the percentage change in each components contribution, $\% \Delta S_k$, write

$$\begin{aligned} \% \Delta &= \sum_k 100 \times \frac{S_{k,t2} - S_{k,t1}}{S_{k,t1}} \cdot \frac{S_{k,t1}}{CV_{t1}^2} \cdot \frac{1}{\tau} \\ &= \sum_k \% \Delta S_k \cdot s_{k,t1}, \end{aligned} \quad (5)$$

giving the contribution of each component to total change. The first part in the product in equation 5 is the annualized percentage change in the contribution and the second part is the relative contribution of the k th income component in the starting period. Thus, the change in the CV^2 is expressed as the percentage change of each components contribution weighted by the relative contribution of that component in the base year.¹⁴

The methods for studying the effects of changes in population structure are the following. The mean

¹³ See Jenkins (1994), or Shorrocks (1982).

¹⁴ Note that the procedure assumes constant growth over time instead of, e.g., compound growth.

logarithmic deviation (MLD) is defined as

$$MLD = \log \mu - \overline{\log y}, \quad (6)$$

where $\overline{\log y}$ is the mean of the natural logarithm of and $\log \mu$ is the logarithm of the mean of disposable equivalent household income.¹⁵ Following Jenkins (1994), I use this measure of inequality to assess the relative importance of population shares, relative incomes and within-group inequality to the trend in inequality. Assume that the population is decomposed into J mutually exclusive subgroups and let v_j be the population share of the j th subgroup, MLD_j inequality within group j , $\lambda_j = \mu_j/\mu$ the relative income for the j th subgroup. This measure can be decomposed by sub-groups into

$$MLD = \sum_j v_j MLD_j + v_j \log(1/\lambda_j), \quad (7)$$

The first term in equation 7 is interpreted as the part of MLD attributable to within-group inequality and the second term is the part attributable to differences in mean incomes between the groups. Dividing through by MLD gives the proportion of income inequality due to within- and between-group variation.

I use the mean logarithmic deviation also to decompose the change in inequality. The change this measure can be decomposed into terms which have a much neater interpretation than the decomposition of the CV^2 . Mookherjee & Shorrocks (1982) show that the change ΔMLD can be approximated by

$$\Delta MLD \simeq \underbrace{\sum_j \bar{v}_j \Delta MLD_j}_A + \underbrace{\sum_j \bar{M}LD_j \Delta v_j}_B + \underbrace{\sum_j (\bar{\lambda}_j - \overline{\log \lambda_j}) \Delta v_j}_C + \underbrace{\sum_j (\overline{v_j \lambda_j} - \bar{v}_j) \Delta \mu_j}_D. \quad (8)$$

The term A is the contribution of within-group inequality change, terms B and C represent the effects of changing population shares and term D represents the effect of changing relative incomes.

Finally, the issue of statistical inference should be addressed. One should always be wary of the possibility of inferring a non-zero parameter – in this case, a non-zero change over time – where none is present, other

¹⁵This inequality index also satisfies the principle of transfers, symmetry, scale-invariance and sub-group consistency.

than by chance (i.e., due to sampling error). In the case of the CV^2 , providing an approximation for the standard errors is not very complicated, an issue I shall return to. However, analytically assessing the sampling variance of the S_k and s_k terms is an extremely complex task – the terms are viciously non-linear functions of sample statistics that are estimated from widely differing and complex sampling designs. There is little information in LIS of the sample design, and without that information providing the correct standard errors is impossible, even if we were to be content with the asymptotic variance of the estimates. A solution would be to use computer-intensive re-sampling methods such as the jack-knife or the bootstrap. Such methods could provide asymptotically valid variance estimates over a wide range of sampling designs and would clearly be appropriate here. However, in using LIS data, one is at the time of writing confined to the use of the statistical package SPSS and, more importantly, to limited computer resources. Thus, the use of re-sampling methods is not feasible. I have settled for estimating the approximate standard errors for the CV^2 for each income component and disposable income, and for reporting the t -ratios for the levels and changes in those variables. I approximate the sampling variance of the CV^2 by

$$Var(CV^2) \simeq \frac{1}{n} 4CV^4 \left[4^{-1}(\beta_4 - 1) - CV\beta_3 + CV^2 \right], \quad (9)$$

where n is the unweighted sample size, $\beta_\alpha = \frac{1}{n} \sum_i w_i (y_i - \mu)^\alpha / \sigma^\alpha$, $\alpha = 3, 4$ are the population estimates of the skewness and kurtosis of the income variable y and σ^2 is the estimated sample variance¹⁶

Data

The Luxembourg Income Study was created in order to minimize the problems that are due to data inconsistencies in international comparisons using microdata. The major advantage with the LIS data is that, as far as possible, the income variables and households have been similarly defined.¹⁷ I am restricted to the specific years of data available in LIS. For each country I have two years of data – early 1980s and mid-1980s.

¹⁶This is an adaptation of the formula given in Nygård & Sandström (1981, 386). Cowell (1989) provides formulae for estimating the variance of the generalized entropy class indexes of which (one half of) CV^2 and MLD are members for the case when the income variable is per capita household income and data are sampled by simple random sampling. Presently, however, we use equivalent household income and, more importantly, sampling designs are complex (and unknown). See also Nygård & Sandström (1989).

¹⁷See Smeeding, O'Higgins & Rainwater (1990), for description of the LIS data base

Table 2 shows the specific years of data from each country.

As an accounting identity, disposable income consists of earnings of the household head, the spouse, self-employment income, property income, other (private) income, social and means-tested transfers and payroll and income taxes. Earnings are defined as all labour income accruing to either the household head or the spouse during the accounting year. There is one institutional difference between countries that the LIS earnings definition does not standardize. Gross earnings consist of payroll taxes paid by the employee plus net earnings, whereas payroll taxes paid by the employer have already been deducted. There are large differences between countries in how large a share of payroll taxes are paid by the employee and employer, respectively. To standardize for these differences I have added the payroll taxes paid by the employer to both earnings and payroll taxes.¹⁸

Self-employment income is studied at the household level, because LIS data do not contain this income component for the head and the spouse separately in the first wave of data. Some other earnings-related components, such as work-related pensions or sick-pay are included in “other income”, along with all other private income.¹⁹ Property income is income from capital. All means-tested social transfer income and near-cash transfers (e.g, food stamps) are included in means-tested transfers; all others – universal or earnings related – are included in social transfers. Payroll taxes, i.e., employee social security contributions are separated from income taxes, if LIS records payroll taxes separately (which is not the case for Canada and Sweden).²⁰

The aggregation of the variables in LIS constrain the level of analysis. I have attempted to find the “least common denominator” – level of aggregation. Differences in economic institutions make this difficult in many cases. For instance, social security contributions, i.e., payroll taxes, are in some countries paid wholly by the employer (Canada) and in some, partly by the employee and partly by the employer (e.g, the United States). However, I think it is important that we distinguish between changes in income taxes and social security contributions. The latter contain information about the tax system *and* both transfer policy and employment structure, while income taxes are, in principal, not much affected by employment structure

¹⁸The exception to this is Canada, where there unfortunately is no information on payroll taxes in the LIS data base.

¹⁹LIS records no “other income” for Sweden in the first year. To avoid having different definitions across the years, I have lumped all other private income with self-employment income in the second year.

²⁰See Smeeding et al. (1990, 9) for details on income variables in LIS.

directly, only through the level of income this generates.

In the decompositions by population subgroup, I examine three partitions of the population. First, I partition the population according to the age of the household head into categories according to a five-year classification scheme (under 20, 20-24, 25-30 and so on). Second, I partition the households into four types of households, single persons, married couples without children, single-parent and two-parent families. Third, I study a partition by the number of earners in the household: 0, 1, 2 and 3 earners.²¹

The research population consists of households, where all members are related through blood or marriage, including single-person households. I have also studied the inequality of income for the population of households where the head is between 20 and 65 years old as well as the inequality within the lowest 95 percent of the restricted sample in order to minimize the effect of top-coding. With a few exceptions, discussed in the text, the conclusions are robust with respect to the sample restrictions.

The unit of analysis is the individual, to whom I assign the equivalent household income using the equivalence scale implied by the U.S. official poverty line.²² Technically, I only have information on the family (or, income-receiving unit). To study the individuals, rather than their families, I reconstruct the population of individuals by multiplying the sample weights by the number of individuals in each family. I assume that all individuals within each family are allotted an equal share of income, that is the possibility of age- or sex-discrimination within households is not taken into account.²³ To standardize for differences in needs between households of different composition, I use the equivalence scales implied by the U.S. poverty line.²⁴ These thresholds vary by family size and the presence of children. Roughly measured, the poverty line for a family of four persons is almost twice that of a single person. Thus, if the well-being of a single person is indexed as 1.0, families of 2,3,4,5 and 6 persons will have equivalent incomes if their actual incomes are 1.28, 1.59, 2.01, 2.38, and 2.69 times this level, respectively.

²¹The earnings of a third earner, if present, is included in "other private income".

²²Thus, I use person weights and assign household income divided through by the number of equivalent adults. See Danziger & Taussig (1979), Sen (1979) or Uusitalo (1989).

²³In fact, all within-family inequality is assumed away – a dubious assumption which is the norm in income distribution research. Lazear & Michael (1988), as well as Thomas (1990), explicitly study the allocation of income between adults and children.

²⁴See Coulter, Cowell & Jenkins (1992a), Coulter, Cowell & Jenkins (1992b), for reviews and possible pitfalls with respect to equivalence scales. See also Bulmann, Rainwater, Schmaus & Smeeding (1988), for extensive empirical analyses, and Lazear & Michael (1988, 55–61), for a theoretical treatment of the topic.

6 Decompositions by income source

In Table 4 I report the means, factor shares, and inequality of the various income sources. The earnings of household heads account for the bulk of household income – their share of family income ranges from a high of 130 percent in the Netherlands in 1983 to a low of 63 percent in Canada in 1981.²⁵ Earnings inequality among household heads, measured by the CV^2 , increased in all countries except Canada – see Table 5. The United Kingdom and the United States have the largest increases, 5 and 4 percent annually. The Netherlands and Sweden have more modest increases, 2 and 3 percent, respectively. Earnings inequality among household heads remained roughly constant in Canada.

The earnings of the spouse accounted for far less, ranging from a low of 16 percent in Canada in 1981 to a high of 47 percent in Sweden in 1987. In all countries, both the real level and the factor share of spouses' earnings increased over time. Earnings inequality among spouses decreased in all countries except the United Kingdom, the main reason probably being a decrease in the number of spouses with zero earnings.

The share of self-employment income ranged from 4 percent in Sweden in 1987 to 7 percent in the Netherlands. The real level of self-employment income increased in Canada, the United Kingdom and the United States, while it decreased in Sweden and the Netherlands. The importance of property income varies widely across countries. The largest factor share is in Canada, 7 percent, and lowest in the Netherlands, only 1 percent. Property income inequality decreased in the Netherlands, the United Kingdom and the United States but increased in Canada and Sweden. The share of other private income varies from a low of 1 percent in Sweden to a high of 21 percent in Canada in 1981.

Social transfers (earnings-related or universal) generally have a larger factor share than means-tested transfers. The relative sizes of both reflect prior beliefs – the countries with larger welfare states have a larger factor share of both types of transfers, and a relatively larger share of social transfers. The factor share of social transfers in Canada and the United States is 7 and 4 percent in the later year. In the Netherlands it is 10, in Sweden 25 and in the United Kingdom 9 percent in the later year. Means-tested transfers were 1 percent in Canada, Sweden and the United States, 2 percent in the United Kingdom and 4

²⁵Note that payroll and income taxes are recorded as negative incomes, so, the income share of one component can exceed 100 percent.

Table 4: Decompositions of level of income inequality by income source. All households.

Country	Income source	Factor share		Coefficient of variation		Absolute contribution		Relative contribution	
		$100 \times \frac{\mu_k}{\mu}$	$t2$	$100 \times CV^2$	$t2$	$100 \times S_k$	$t2$	$100 \times s_k$	$t2$
<u>Canada</u>	Earnings head	63	70	70	69	13	18	49	65
	Earnings spouse	16	22	302	205	6	8	24	30
	Self-employment	5	6	2539	1974	3	4	13	14
	Property income	7	4	918	1695	4	4	17	13
	Other private	21	14	347	455	7	5	28	18
	Social insurance	6	7	248	244	-0	-0	-1	-1
	Means-tested	1	1	737	853	-0	-0	-1	-2
	Income taxes	-19	-24	101	91	-7	-10	-29	-37
	Payroll taxes	0	0	@ERR	@ERR	@ERR	@ERR	@ERR	@ERR
	<i>Disposable income</i>	100	100	26	28	26	28	100	100
<u>Netherlands</u>	Earnings head	130	107	42	43	19	17	82	79
	Earnings spouse	21	21	489	424	11	10	50	49
	Self-employment	7	7	2881	3633	8	6	34	28
	Property income	1	1	10743	9556	0	1	2	3
	Other private	19	11	626	995	6	4	26	19
	Social insurance	12	10	361	530	2	1	7	5
	Means-tested	1	4	6865	954	-0	1	-0	4
	Income taxes	-19	-22	185	236	-9	-11	-42	-53
	Payroll taxes	-71	-38	23	38	-13	-7	-59	-35
	<i>Disposable income</i>	100	100	23	21	23	21	100	100
<u>Sweden</u>	Earnings head	110	116	46	53	16	21	122	81
	Earnings spouse	41	47	137	128	11	14	81	55
	Self-employment	4	4	1890	2029	-1	-1	-6	-3
	Property income	4	4	741	8277	1	13	5	48
	Other private	1	2	1544	650	0	-0	1	-0
	Social insurance	21	25	218	202	2	3	12	10
	Means-tested	5	1	671	1277	-0	-0	-1	-1
	Income taxes	-42	-48	59	67	-8	-13	-58	-48
	Payroll taxes	-44	-53	36	42	-8	-11	-56	-42
	<i>Disposable income</i>	100	100	13	26	13	26	100	100
<u>United Kingdom</u>	Earnings head	83	79	51	70	15	21	73	74
	Earnings spouse	19	21	248	277	6	8	30	29
	Self-employment	4	6	2228	1695	1	4	6	13
	Property income	2	3	2980	1589	2	3	8	10
	Other private	21	20	341	354	7	7	31	25
	Social insurance	10	9	138	150	-0	-0	-0	-1
	Means-tested	1	2	1201	832	-0	-0	-1	-1
	Income taxes	-19	-22	74	94	-5	-9	-25	-32
	Payroll taxes	-22	-19	34	51	-5	-5	-22	-18
	<i>Disposable income</i>	100	100	21	28	21	28	100	100
<u>United States</u>	Earnings head	93	76	64	82	26	28	90	73
	Earnings spouse	21	22	283	261	8	11	29	28
	Self-employment	6	6	2075	2051	3	4	10	10
	Property income	5	6	1988	1896	5	7	16	18
	Other private	15	14	476	495	5	6	17	16
	Social insurance	4	4	865	765	1	1	3	2
	Means-tested	1	1	1791	1850	-0	-0	-2	-1
	Income taxes	-22	-21	218	258	-12	-15	-42	-39
	Payroll taxes	-24	-8	52	49	-6	-3	-21	-7
	<i>Disposable income</i>	100	100	28	38	28	38	100	100

Note: $t1$ and $t2$ are: Canada, 1981 and 1987, the Netherlands, 1983 and 1987, Sweden, 1981 and 1987, the United Kingdom, 1979 and 1986 and the United States, 1979 and 1986. Factor shares are the ratio of k th component mean to mean of disposable income. See equations 2 and 3.

Source: Author's calculations from LIS.

percent in the Netherlands.

Income taxes are the dominant form of taxation. Income taxes range from 19 percent of disposable income in the United Kingdom to 47 percent in Sweden. The Netherlands and Sweden collect a larger share of taxes as payroll taxes than as income taxes. The factor shares of payroll and income taxes are 38 and 22 percent in the Netherlands and 53 and 48 percent in Sweden in the later year. LIS does not contain any information on payroll taxes in Canada. The United Kingdom and the United States collect 19 and 8 percent of mean income in payroll taxes in 1986.

The changes in the inequality of factor components, shown in Table 5, are generally not statistically significant. Because of the large standard errors the results on changes in the inequality of factor sources should be viewed with some caution. For instance, while the change in heads' earnings inequality is quite large in both Sweden and the United Kingdom, the *t*-ratio of the change is not statistically significant. Another exception is that while the increase in property income inequality in Sweden is very large, the *t*-ratio is close to zero.

Decomposing levels of inequality

The relative contributions of earnings, on the one hand, and payroll and income taxes, on the other, dominate the relative contributions of other components to income inequality. The relative contribution of heads' earnings increased in Canada, remained constant in the United Kingdom but decreased in the Netherlands, Sweden and the United States. For instance, household heads' earnings accounted for 122 percent of the CV^2 in Sweden in 1981. In 1987, the share was only 81 percent.²⁶ The contribution of spouses' earnings to total CV^2 increased only in Canada, whereas in the other countries it decreased. The inequality of spouses' earnings decreased in all countries except the United Kingdom.

The negative contribution of income taxes increased in Canada, the Netherlands and the United Kingdom, and decreased in Sweden and the United States. Payroll taxes had a constant negative contribution to inequality in the United Kingdom and the United States, and their equalizing contribution increased some-

²⁶The decreases in the relative contributions of earnings in Sweden are due to a high contribution of property income. When the sample is restricted to only 95 percent of the distribution, the relative contributions of earnings remain more or less constant over time.

Table 5: Decompositions of change in income inequality by income source. All households.

Country	Income component	Factor share	Coefficient of variation	Change in:		Share's contribution to change
				Absolute contribution	Relative contribution	
			$100 \times CV^2$	$100 \times S_k$	$100 \times s_k$	$100 \times \Delta S_k \times s_{k,t1}$
<u>Canada</u>	Earnings head	6	-0 (-0.1)	5	16	3.5
	Earnings spouse	6	-5 (-1.2)	2	6	1.3
	Self-employment	1	-4 (-0.0)	1	1	0.4
	Property income	-2	14 (0.0)	-1	-4	-0.5
	Other private	-7	5 (0.4)	-2	-10	-1.4
	Social insurance	1	-0 (-0.1)	-0	-0	-0.0
	Means-tested	0	3 (0.1)	-0	-0	-0.0
	Income taxes	-5	-2 (-0.2)	-3	-9	-1.9
	Payroll taxes	0				
	<i>Disposable income</i>	0	1 (1.7)	2	0	1.3
<u>Netherlands</u>	Earnings head	-23	1 (0.3)	-2	-3	-1.9
	Earnings spouse	-1	-3 (-0.1)	-1	-1	-0.9
	Self-employment	0	7 (0.0)	-2	-6	-2.0
	Property income	1	-3 (-0.0)	0	1	0.3
	Other private	-8	15 (0.2)	-2	-7	-2.0
	Social insurance	-2	12 (0.3)	-1	-2	-0.7
	Means-tested	3	-22 (-0.0)	1	5	1.1
	Income taxes	-3	7 (0.1)	-2	-11	-1.9
	Payroll taxes	33	15 (4.7)	6	24	6.6
	<i>Disposable income</i>	0	-1 (-1.5)	-1	0	-1.5
<u>Sweden</u>	Earnings head	6	3 (0.7)	5	-41	6.1
	Earnings spouse	6	-1 (-0.8)	4	-26	4.5
	Self-employment	-0	1 (0.0)	0	3	0.0
	Property income	1	169 (0.0)	12	42	14.8
	Other private	1	-10 (-0.1)	-0	-1	-0.2
	Social insurance	4	-1 (-0.2)	1	-2	1.4
	Means-tested	-4	15 (0.3)	-0	-1	-0.3
	Income taxes	-6	2 (0.2)	-5	10	-6.0
	Payroll taxes	-8	3 (1.1)	-3	15	-4.3
	<i>Disposable income</i>	0	16 (1.7)	13	-0	16.1
<u>United Kingdom</u>	Earnings head	-4	5 (1.7)	5	0	3.5
	Earnings spouse	2	2 (0.1)	2	-0	1.3
	Self-employment	2	-3 (-0.0)	2	7	1.6
	Property income	1	-7 (-0.0)	1	2	0.7
	Other private	-1	1 (0.0)	0	-6	0.3
	Social insurance	-1	1 @ERR	-0	-1	-0.1
	Means-tested	1	-4 (-0.1)	-0	-0	-0.1
	Income taxes	-3	4 (0.3)	-3	-6	-2.4
	Payroll taxes	3	7 (2.5)	-0	4	-0.3
	<i>Disposable income</i>	0	5 (2.2)	7	0	4.6
<u>United States</u>	Earnings head	-17	4 (4.3)	2	-17	1.1
	Earnings spouse	1	-1 (-0.2)	3	-0	1.3
	Self-employment	0	-0 (-0.0)	1	1	0.6
	Property income	1	-1 (-0.0)	2	2	1.1
	Other private	-1	1 (0.0)	1	-2	0.5
	Social insurance	-0	-2 (-0.1)	-0	-1	-0.1
	Means-tested	-0	0 (0.0)	0	1	0.0
	Income taxes	1	3 (0.1)	-3	3	-1.5
	Payroll taxes	16	-1 (-0.5)	3	14	1.6
	<i>Disposable income</i>	0	5 (3.7)	10	0	4.8

Note: $t1$ and $t2$ are: Canada, 1981 and 1987, the Netherlands, 1983 and 1987, Sweden, 1981 and 1987, the United Kingdom, 1979 and 1986 and the United States, 1979 and 1986. Factor shares are the ratio of k th component mean to mean of disposable income. A component's contribution to change is measured as its annualized percentage change, all other changes are absolute changes. See equations 2, 3 and 5.

Source: Author's calculations from LIS.

what in the Netherlands. There are telling and also somewhat surprising differences across countries in the relative contributions of taxes in the later year. Predictably, the Netherlands and Sweden have the largest relative contribution of income taxes. The United Kingdom has clearly the lowest contribution, followed by Canada. The United States has the third highest relative contribution.

Social transfers had small effects, the sign of which depends on their correlation with disposable income. In Canada and the United Kingdom, social transfers had a small negative relative contribution to CV^2 . In the United States it was small but positive, in Sweden and the Netherlands the contribution was positive. Means-tested transfers, on the other hand, had a negative contribution to total CV^2 . Also here, the effects were small, ranging from -2 percent in the United States and Sweden in the later year to -6 percent in the United Kingdom in 1986.

The *absolute* contributions of the earnings of both the head and the spouse to inequality increased in all countries. Self-employment income increased its absolute contribution to inequality in Canada, the United Kingdom and the United States. In the Netherlands its absolute contribution decreased, while, only in Sweden self-employment income has a negative contribution to inequality. The contribution of property income decreased in Canada and the Netherlands but increased in the remaining countries. In Sweden this increase is very large – in a sample where the top 5 percent has been trimmed off, there is a small reduction, which points to the possibility that the increase in the contribution in property income is due to only a few extreme observations (these results are not reported here). The negative absolute share of both income and payroll taxes increased in most countries, the exception being the Netherlands where both decreased. The share of means-tested transfers increased in all countries. The absolute contribution of social transfers declined in absolute value in all countries except Sweden – the negative contribution of social transfers diminished in Canada and the United Kingdom, while the positive share in the Netherlands and the United States fell.

Decomposing the trend in inequality

What is common in the trends in inequality in the five countries? With a few notable exceptions, the earnings of household heads account for the largest share of the change in income inequality in all countries,

with spouses' earnings accounting for the next largest share (see last column, Table 5). Together, these two components account for the bulk of the increase. This is not surprising, since these are also by far the two largest income sources, accounting for between 72 and 100 percent of disposable income in the most recent year (in the United Kingdom and the Netherlands, respectively). Moreover, in Sweden, the United Kingdom and the United States all of the market income sources contributed positively to inequality. In the Netherlands, property income is assigned an increasing effect on inequality that is countered by a larger moderating effect due to self-employment and other income.

The welfare state can be attributed a moderating effect on the increases in inequality. The negative contribution of income taxes to the trends were large, in cases comparable in magnitude to the positive contribution of (especially spouses') earnings. Only in Sweden and the United Kingdom can any of the increase in CV^2 be attributed to any transfer component: social transfers there had a positive share in the increase in CV^2 . Payroll and income taxes in the Netherlands are assigned a positive contribution to the change in inequality. In all other cases transfers and taxes are assigned a decreasing effect.

Labour markets can be assigned a large positive share of the increase in income inequality in all countries. Transfers and taxes can, with one exception, be assigned a decreasing effect. The other market generated income sources – self-employment, property and other private income – had increasing effects in Sweden, the United Kingdom and the United States, while the Netherlands was in a class of its own. It seems that changes in labour markets can be assigned at least some responsibility for increased inequality in all countries. Heads' earnings increased inequality because the inequality of heads' earnings increased, spouses' earnings increased inequality because the factor share of these increased. Additional blame can be attributed to property income and self-employment income in some, but not all countries. Existing, even somewhat changed tax and transfer systems mostly accounted for a decreasing effect on income inequality.

7 Decompositions by population groups

The decompositions by population groups reveal that with few exceptions, inequality increased within population subgroups. Thus, shifts in age or family structure, or between families with different numbers of earners, do not explain the changes, summarized in Table 6. In Panel A of Table 6 I show overall inequality as well as the within- and between-group components in the two years, measured by the mean logarithmic deviation and the coefficient of variation. In Panel B I show the relative contributions of the same (in percentage terms), i.e., the same statistics as in Panel A divided through by overall inequality. The patterns of within- and between-group inequality and the change over time are very similar for the two measures, giving a sense of robustness to the analysis.

The most robust finding is that the within-group contribution to the level of inequality increased for every partition in those countries where overall inequality increased. Thus, at the very least, inequality increased within groups, resulting in increased inequality in every country. This was not always accompanied by an increase in between-group inequality; in some cases between-group inequality stayed constant.

The proportion of total variation accounted for within- and between-group inequality is shown in Panel B of Table 6. In Canada and the Netherlands, where over inequality remained fairly constant the share of within-groups inequality decreased. In Sweden, the United Kingdom and the United States results are mixed. In the partition by family structure, within-groups inequality increased in the United States and the United Kingdom but decreased in Sweden. The share of inequality attributable to shifts in relative income between age groups increased in Sweden and the United States but decreased in the United Kingdom. The share of within-groups inequality in the partition by number of earners, on the other hand, increases in all three countries.

The decomposition of the trend in inequality measured by MLD and CV^2 is shown in Table 7. The bulk of the change is in all cases due to changing within-group inequality. Changes in relative incomes account for some of the trend in breakdowns by family structure in the Netherlands and Sweden and by age structure in Sweden, the United Kingdom and the United States. Apart from these, changes in relative incomes are assigned a decreasing role in the change in inequality.

Table 6: Decomposition of levels of inequality by population group.

Country	Breakdown	t_1			t_2		
		100 × MLD	Within	Between	100 × MLD	Within	Between
Panel A. Absolute share							
<u>Canada</u>	Family	13	11	2	13	12	2
	Age	13	12	1	13	12	1
	Earners	13	12	1	13	12	1
<u>Netherlands</u>	Family	9	7	2	9	7	2
	Age	9	9	1	9	8	1
	Earners	9	8	1	9	8	1
<u>Sweden</u>	Family	7	6	1	10	8	2
	Age	7	6	1	10	8	2
	Earners	7	6	1	10	9	1
<u>United Kingdom</u>	Family	9	8	2	12	10	2
	Age	9	9	0	12	11	0
	Earners	9	8	1	12	10	2
<u>United States</u>	Family	16	14	2	19	17	3
	Age	16	15	1	19	18	2
	Earners	16	15	1	19	19	1
Panel B. Relative share							
<u>Canada</u>	Family	100	87	13	100	87	13
	Age	100	95	5	100	93	7
	Earners	100	93	7	100	92	8
<u>Netherlands</u>	Family	100	78	22	100	76	24
	Age	100	93	7	100	92	8
	Earners	100	84	16	100	84	16
<u>Sweden</u>	Family	100	83	17	100	79	22
	Age	100	87	13	100	78	23
	Earners	100	82	18	100	88	12
<u>United Kingdom</u>	Family	100	82	17	100	85	14
	Age	100	95	5	100	97	3
	Earners	100	88	12	100	84	16
<u>United States</u>	Family	100	85	15	100	86	14
	Age	100	94	6	100	91	9
	Earners	100	95	5	100	96	4

Note: t_1 and t_2 are: Canada, 1981 and 1987, the Netherlands, 1983 and 1987, Sweden, 1981 and 1987, the United Kingdom, 1979 and 1986 and the United States, 1979 and 1986. Partition by Family structure into 4 groups: single person, married couple with no children, single parent, married couple with children; by age into 5-year groups: less than 20, 20-24, 25-30 and so on; number of Earners into 4 groups: 0, 1, 2 and 3 earners. See equation 7.

Source: Author's calculations from LIS.

Table 7: Decomposition of change in inequality by population group.

Country	Breakdown	Change ΔMLD	Mean Logarithmic Deviation			
			Within A	Weights 1 B	Weights 2 C	Between D
<u>Canada</u>	Family	0.7	0.7	-0.0	0.0	0.0
	Age	0.7	0.5	-0.1	-0.1	0.5
	Earners	0.7	0.8	-0.2	-0.1	0.2
<u>Netherlands</u>	Family	-0.2	-0.3	-0.0	0.0	0.1
	Age	-0.2	-0.4	0.0	-0.0	0.2
	Earners	-0.2	-0.2	-0.0	-0.0	0.0
<u>Sweden</u>	Family	2.6	1.6	0.1	0.1	0.8
	Age	2.6	1.3	0.1	0.1	1.1
	Earners	2.6	3.2	-0.4	-0.1	0.0
<u>United Kingdom</u>	Family	2.3	2.3	-0.1	0.2	-0.1
	Age	2.3	2.4	0.0	0.0	-0.1
	Earners	2.3	1.3	0.3	-0.0	0.8
<u>United States</u>	Family	3.4	3.2	-0.1	0.1	0.3
	Age	3.4	2.7	-0.1	-0.2	0.9
	Earners	3.4	3.6	-0.2	-0.1	0.1

Note: Partition by Family structure into 4 groups: single person, married couple with no children, single parent, married couple with children; by age into 5-year groups: less than 20, 20-24, 25-30 and so on ; number of Earners into 4 groups: 0, 1, 2 and 3 earners. See equation 8.

Source: Author's calculations from LIS.

The finding from the decomposition by subgroups is that most of the increase in inequality in the countries studied in this paper occurred within groups. Shifts in the relative incomes between groups or in the relative sizes of the groups can be assigned, at most, very small parts of the observed changes. This means that increases in the share of single-parent or single-person households, declining earnings or sizes of younger cohorts, or changing age structures can not be placed with the whole or most of the blame for the bulk of the increase in inequality. At the very most, and only in a few instances, can these factors be placed with any blame at all. The fact that changes in relative incomes between households distinguished by the number of earners can not account for any of the increase in inequality means that, e.g., changes in labour force participation of women can not account for the increase in income inequality.

8 Summary

Inequality increased in Sweden, the United Kingdom and the United States and remained more or less stable in Canada and the Netherlands between early to mid 1980's. The changes are in part explained by an increased contribution of labour earnings. Earnings inequality among household heads increased over the time period in most countries, thus contributing more to overall inequality. The earnings of spouses, on the other hand, mostly became more equally distributed. However, because their earnings also became a more important part of household income, they are assigned a larger share of overall inequality and a positive contribution to the increase in inequality. Taken together these results suggest that spouse's earnings account for an increased share of income inequality not because of rising labour force participation but because hours worked increased and/or wages increased, both of which lead to spouse's earnings accounting for a larger share of household income. Which of these, hours or (relative) wages is more likely to account for the changes is a question yet to be addressed.

Despite changes in both transfer and tax policies that could be expected to increase inequality, taxes and transfers are assigned a decreasing effect on income inequality. It is unlikely that this was due to any conscious effort to combat increased inequality, except for some changes in transfer policies, notably the progressiveness of child allowances in Sweden. Rather, it seems embedded in the system of progressive income taxes and taxes on earnings (payroll taxes) that increases in inequality will also lead to an increased inequality-reducing effect of these. It is also possible that some of the broadening of the tax base led to an increased inequality-reducing effect. Demographic shifts can at most be given a minor role in increasing inequality, mostly they can not be assigned any of the increase.

The reasons for increased within-group inequality, or the increased variation in household heads' earnings have not been revealed. Gottschalk & Joyce (1992a) and Gottschalk & Joyce (1992b) argue that changes in trade patterns and technological change are more likely to explain increases in increase in earnings inequality than de-industrialization. The sources of increases of inequality within distinct socio-economic groups are clearly an important area of future research. Despite the fact that many common trends are affecting income inequality, it seems evident that these trends do not result in identical patterns of income

inequality, but that existing institutions, in the labour markets and in public policy can and do affect these trends.

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