FACTOR COMPONENTS OF INEQUALITY:
A CROSS-COUNTRY STUDY

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This paper uses data from the Luxembourg Income Study to examine some of the forces that have driven changes in household income inequality over the last three decades of the twentieth century. We decompose inequality for six countries (Canada, Germany, Norway, Sweden, the U.K., and the U.S.) into the three sources of market income (earnings, property income, and income from self-employment) and taxes and transfers. Our findings indicate that although changes in the distribution of earnings are an important force behind recent trends, they are not the only one. Greater earnings dispersion has in some cases been accompanied by a reduction in the share of earnings which dampened its impact on overall household income inequality. In some countries the contribution of self-employment income to inequality has been on the rise, while in others, increases in inequality in capital income account for a substantial fraction of the observed distributional changes.

1. INTRODUCTION

The extent to which different sources of income influence overall income inequality across households has interested economists for several decades.[1] One of the problems of this type of research is the fact that because income concepts vary across national surveys, most existing studies deal with a single country. In this paper, we exploit the data collected by the Luxemburg Income Study in order to decompose income inequality into its factor components for six countries over a 35-year period.

[1]See, amongst others, Fei *et al.* (1978), Fields (1979), Pyatt *et al.* (1980), Lerman and Yitzhaki (1985), Shorrocks (1983), Podder (1993), Jenkins (1995), and Jäntti and Jenkins (2010).

A number of industrial countries have experienced an increase in household income inequality in the last decades of the twentieth century. At the same time, they have also witnessed an increase in earnings dispersion.[2] By decomposing inequality by factor sources we can assess whether increased earnings dispersion has been the only culprit for observed income inequality trends, or whether other factors have also contributed to the changing distribution of income. Gottschalk and Smeeding (1997) find that in a number of countries increased earnings dispersion was not accompanied by increased household income inequality, and there are indications in the literature that other factors have been important. Notably, Jenkins (1995) finds that changes in both the distribution of capital income and self-employment income contributed to the increase in income inequality in the U.K. in the first half of the 1980s. The availability of new data allows us to examine whether these trends have persisted or if they were only a temporary feature. Moreover, by comparing six economies we address the question of whether such patterns have been restricted to the U.K. or part of a more general phenomenon present also in other countries.

The second aspect on which we focus is the age composition of the population and the differences in inequality across age groups. There are two reasons why a decomposition by age can help us understand the forces that drive inequality changes. First, we want to understand the role of capital income inequality. High inequality in this factor can be due to two effects. One possibility is that it is the result of an unequal distribution of wealth for all age groups. Alternatively, it may be caused by life-cycle savings, in which case the data should show that capital income inequality is mainly due to differences across age groups and not within age groups. Moreover, if life-cycle considerations were the main cause of wealth inequality we should also observe important differences across countries. In countries with generous public pension systems, old individuals would tend to live off state pensions rather than their own savings, and hence we would expect to observe less inequality in the distribution of capital incomes. Second, a number of papers examining the recent increase in earnings dispersion have shown that, at least in the U.S. and the U.K., greater wage dispersion has been partly the result of increased returns to experience.[3] Our analysis can then help understand to what extent the increase in overall earnings inequality across households is due to the fact that older individuals now receive higher wages. Existing work—such as Cowell and Jenkins (1995), Jenkins (1995), and Jäntti (1997)—has found that inequality across age groups has little explanatory power, but this could be due to the short time periods considered. Here we examine whether this result still holds over the substantially longer period that we analyze.

The paper closest to our analysis is Jäntti (1997), who uses data from the Luxembourg Income Study for five countries—Canada, the Netherlands, Sweden, United Kingdom, and United States—and has two observations, one for the early and one for the late 1980s. He concludes that the increase in household income inequality that took place in Sweden, the U.K., and the U.S. during the period was

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[2]See, for example, Atkinson (1997, 2007, 2008b), Gottschalk and Smeeding (1997), and Lemieux (2008).
[3]See, for example, Gottschalk and Smeeding (1997), Machin (1996), and Machin and Van Reenen (1998).

mainly due to an increase in labor earnings inequality. We extend the work of Jäntti in two dimensions. First, we consider a longer time period. The increase in available data is significant: our sample includes six countries, and we have at best eight observations per country, going from 1969/70 to 2004/05. This implies a substantially longer period of study, and allows us to assess to what extent the increases in inequality observed in the 1980s have continued or been reversed. Second, although Jäntti performs decompositions both by factors and by household characteristics such as age, these decompositions are performed separately. In contrast, we nest the decompositions by factors and by age. This allows us to examine not only whether the incomes of the young are more or less unequal than those of the old, but also which factors have generated the observed differences across age groups. Brandolini and Smeeding (2009) also perform factor decompositions for a number of countries, but they focus on one year (2000 or thereabouts), thus abstracting from the evolution over time. Their results, like ours, highlight important cross-country differences in the contribution of the various factors to overall household income inequality.

Methodologically, we follow a large literature that has performed decompositions of an inequality index into a within-group and between-group component; see, for instance, Mookherjee and Shorrocks (1982), Karoly (1992), Parker (1999), and Brandolini and D'Alessio (2003). However, there are only a few studies that perform both decompositions across groups and factors. As well as Jenkins (1995) and Jäntti (1997), this approach has been taken by Flückiger and Silber (1995), Achdut (1996), and Drescher (1999), who focus, respectively, on Switzerland, Israel, and Denmark, all of them countries that are not included in our sample. These papers consider *either* the factor decomposition *or* the decomposition by age (or other characteristics). In contrast, we decompose inequality using a nested approach that allows us to differentiate the contribution of various factors to inequality within each age group.[4] Some recent work, such as Jenkins and van Kerm (2005), proposes as an alternative density function decompositions that allow a richer analysis of distributional changes at all points of the distribution. This method has the advantage of being independent of the choice of inequality index, but does not provide summary measures of the decomposition, making cross-country comparisons cumbersome.

Our results indicate that the stability of the share of earnings in household income in the U.S. is remarkable when compared to the experience of other countries. The share of earnings fell sharply in the other Anglo-Saxon economies, dropping by 5 percentage points in the U.K. and by 6 in Canada over the period 1974/75 to 2004, and fell by between 6 and 12 points in the continental economies. As a result, although all countries in our sample experienced an increase in earnings inequality, the contribution of this source of income to overall inequality sometimes remained unchanged due to a reduction in the earnings share. The share of different factors also fluctuates over time. Consider, for example, the U.K. over the period 1979–2004: the share of earnings fell steadily, that of self-employment income grew from 6 to 10 percent, while that of capital income first increased and

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[4]See Mussard (2004) and Giammatteo (2007) for analyses of nested decompositions.

then decreased. Our decompositions indicate that these movements in factor shares have been a key determinant of the evolution of inequality amongst British households.

The contribution of different factors to overall inequality varies sharply across countries. That of earnings accounted, in 2004, for as much as 120 percent in the U.S. and as little as 95 percent in Germany and Norway, where both capital and self-employment income make large contributions.[5] In the U.K. and Canada the contribution of self-employment income to overall inequality has been on the rise, while greater inequality in income from property is crucial in explaining the experience of the Scandinavian economies. These results indicate the difficulty in generalizing the causes of distributional changes even within a relatively homogeneous group of countries.

The paper is organized as follows. Section 2 presents an overview of the data and discusses some of the explanations for observed changes in inequality. In Section 3 we present the decomposition rule of our inequality measure, the half squared coefficient of variation, into factor components and population groups. Sections 4 and 5 present the results of the decomposition of the inequality index, examining first decompositions by factor and subsequently the nested decompositions by age-groups and factor. We then turn to the decomposition of earnings in Section 6, and conclude in Section 7.

2. Trends in Income Inequality

2.1. *The Data*

The source of our data is the Luxembourg Income Study (LIS). The LIS is a project started in 1983 by researchers in several European and American countries in order to collect income, demographic, labor market, and expenditure information at the micro-economic level in a way that is consistent across countries. Surveys are conducted every few years, and the number of member countries has expanded over time, with the project now covering 32 countries. As is well known, the data on income inequality are problematic and international comparisons difficult (see Atkinson and Brandolini, 2001). Although some differences in methodology remain, LIS provides the best existing data on inequality in terms of cross-country consistency.[6]

Our choice of countries has been largely driven by data availability and comparability. Our initial intention was to look at three groups: three Anglo-Saxon countries (U.S., U.K., and Canada), the large continental European economies (France, Germany, and Italy), and the Scandinavian economies (Sweden and Norway). Differences in the degree of inequality across these groups are well documented (see, for example, Brandolini and Smeeding, 2008) and the aim of our

[5]Because we are decomposing disposable income, the tax–transfer component makes a negative contribution to overall inequality and hence the contributions of the three market incomes adds up to over 100 percent; see below.

[6]One problem of the LIS data is that since they are collected every few years, a particular year could be an outlier. We compared the patterns that we obtain with LIS to annual time series reported by Brandolini and Smeeding (2008) for all countries in our sample except Norway and found no reason for concern.

decomposition is to look at these differences from an alternative perspective. Unfortunately, the only measure of earnings available for France and Italy is net earnings, implying, on the one hand, that the results on the contribution of this factor would capture both changes in the underlying distribution of earnings and in taxes, and, on the other, that the results would not be directly comparable with those on gross earnings obtained for other countries. We hence decided to remove France and Italy from our sample and focus on the remaining six countries.

Details on the data are provided in the Appendix. The number of observations varies across countries, depending on the number and frequency of surveys, with countries having between 5 and 9 observations spread over the period. The data range between 1969 and 2005, starting in 1969/71 for the U.K. and Canada, in the mid-70s for the U.S. and the Scandinavian economies, and in 1984 for Germany.

Our income concept is household disposable income. We consider four sources of income: earnings, capital income, self-employment income, and a residual category that we term "taxes and transfers." The fourth term consists mainly of direct taxes, public pensions, and government transfers such as unemployment benefit or child benefit, but includes also private transfers such as alimony payments. We would have liked to separate public pensions from the remaining sources of income, but for many countries they are not reported separately. Hence, in order to make our results comparable across countries, we grouped pensions with other income even when the information was available.

Cross-country comparisons of inequality use equivalence scales in order to obtain a better proxy for the welfare of the household than that provided by unadjusted household income. Because our main interest is the effect of changes in aggregate factor shares, rather than obtaining welfare comparisons on which there is a large literature, we have decided not to use equivalence scales. If we were to adjust income by the size of the household, the resulting factor shares would have no clear interpretation since they would not correspond to the factor shares obtained by aggregating each income category. Without the adjustment, the resulting factor shares have a straightforward interpretation: they are simply the share of each factor in average household income. It is important to note that, consequently, our decompositions are not directly comparable with those that use equivalence scales, such as Jenkins (1995).

2.2. *Inequality Trends*

Figure 1 presents the evolution of inequality of disposable income, measured by the half squared coefficient of variation (SCV; defined as the variance of income divided by twice the square of the mean of income, see below), in the six countries we consider. The data show the well-documented pattern that inequality is highest in the Anglo-Saxon economies and lowest in Scandinavian countries, with the large European economies being somewhere in between. Note, nevertheless that there have been large fluctuations. In the 1970s the SCV in the U.K. was roughly the same as those observed in the Scandinavian economies. When we compare Germany with the two Scandinavian economies, the data indicate that although the latter exhibited lower inequality in the 1980s, by the end of the period this was
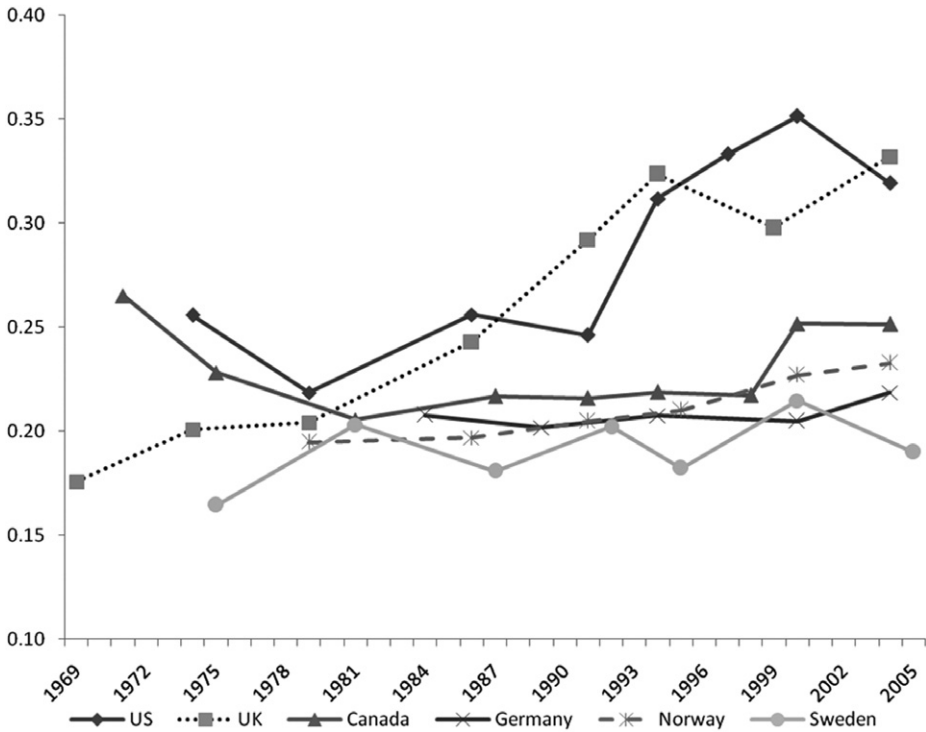
Figure 1. Income Inequality: The Squared Coefficient of Variation

no longer the case. We observe the trends that have been widely discussed by the literature, such as the increase in household income inequality in the U.S. and the U.K. In contrast, Canada exhibits a U-shaped pattern, with little change in the 1980s and 1990s. An increase in income inequality is also apparent for the Scandinavian countries, while the German data indicate a rather flat time trend.

The ranking of countries in terms of the Gini coefficient and observed time trends reproduce those obtained with the SCV (see Appendix). The two measures indicate, nevertheless, differences in the timing, notably for the U.S. where the Gini coefficient peaked in the mid-1990s while the SCV kept increasing until 2000. Because the Gini coefficient places less weight at the extremes of the distribution, this difference is likely due to changes at the top or bottom of the distribution.

2.3. *What May Drive Changes in Inequality?*

There are three main reasons why the distribution of household income may change: changes in market incomes, such as earnings or income from property; a different demographic structure; and changes in tax and transfer policies. In what follows, we have chosen to concentrate on the first two effects. The first question we want to address is to what extent different sources of market income have driven inequality changes. Market income may come from three sources: earnings, self-employment income, and capital income. The increase in earnings inequality

has been well documented, although there has been little work examining to what extent changes in the distribution of individual earnings drive changes in the distribution of household income. A notable exception is Gottschalk and Danziger (2005), who examine the evolution of hourly wage rates and household income inequality in the U.S.[7] One of our objectives is to quantify the extent to which earnings inequality has been the culprit for the observed increase in household income inequality.

Although earnings are the largest source of household income in all countries, changes in income from self-employment and property can also play a major role. Jenkins (1995) identified a substantial contribution of self-employment income to the increase in inequality in the U.K. in the first half of the 1980s. Since we can use data for a longer period, we will be able to assess whether the increased contribution of self-employment has continued, and whether this phenomenon also took place in other countries. The early 1980s also witnessed a sharp rise in the contribution of property income to overall inequality. There are three elements that may have contributed to this: changes in the labor and capital shares in overall income; changes in the rate of return; and changes in taxation that may have favored property income. One possibility is that the changes in property income inequality in the 1980s were the result of the high interest rates that prevailed at the time, rather than of an increase in the concentration of wealth. If this were the case, we would expect that the subsequent reduction in interest rates caused a reduction both in the share of property income in total household income and in its dispersion. Moreover, if it were high interest rates that drove the increase in capital income inequality in the U.K., we should observe a similar increase in the other countries in our sample.

The second aspect on which we focus is the age composition of the population and the differences in inequality across age groups. There are two main reasons why a decomposition by age can help us understand the forces that drive inequality changes. First, we want to understand the role of capital income inequality. High inequality in this factor can be due to two reasons. One possibility is that it is the result of an unequal distribution of wealth for any age group. Alternatively, it may be caused by life-cycle savings, in which case the data should show that capital income inequality is mainly due to differences across and not within age groups. Moreover, if life-cycle considerations were the main cause of wealth inequality we should also observe important differences across countries. In countries with generous public pension systems, old individuals would tend to live off state pensions rather than their own savings, and hence we should observe less inequality in the distribution of capital incomes across age groups. Second, the literature on the increase in earnings dispersion has shown that, at least in the U.S. and the U.K., greater wage dispersion has been partly the result of increased returns to experience. This would imply that we should observe an increase in earnings inequality across age groups. A further question concerns self-employment. There is evidence that self-employment is more frequent amongst mature workers, and

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[7]See also Gottschalk (1997) and Checchi and García-Peñalosa (2008, 2010) on the relationship between wage inequality and household income inequality.

this too should be reflected in a greater contribution of self-employment income to inequality for those age groups.

Both Jenkins (1995) and Jäntti (1997) find little role for demographic changes in their inequality decompositions. However, their data spans a substantially shorter period of time, with the former having data for a 15-year period and the latter for just under a decade. In our case the data cover a longer period, particularly for the U.K. and Canada, where we have information from 1969 to 2004. One could hence expect that changes in the demographic composition are more pronounced and play a greater role in explaining inequality.

Lastly, since earnings are the largest component of household incomes, we also decompose this source according to two criteria. First, we consider what share of earnings inequality is due to a fraction of the population having no earnings and what is due to differences amongst households with positive earnings. This would capture the effect that both unemployment and an aging population (i.e.. an increase in the number of retired households) have. Such decomposition is particularly important when looking at various countries since they may be at different stages of the business cycle. Second, we look at inequality in earnings for households with positive earnings and assess how much of it is due to greater inequality amongst household heads, to inequality amongst spouses, or to the correlation between the two. This decomposition is intended to capture the role of a higher participation of women in the labor market as well as that of their improved access to high-paying jobs, both of which exhibited a major upward trend over the period in most countries. It also captures the effect of assortative matting, which Burtless (1999) finds had an important impact on the increase in household income inequality in the U.S. during the 1980s and early 90s.[8]

In order to address these questions, we decompose household disposable income into four categories: earnings, self-employment, capital income, and tax and transfers. The first three together sum up to market income, and our discussion of changes in inequality will be mainly concerned with those. Although tax and transfer changes are a crucial aspect when examining the evolution over time of disposable income, we will only consider the overall impact of this rather broad component. Discussing in detail changes in taxation and progressivity in the six countries under consideration over three decades is a major task which is beyond the scope of this paper. Note also that fiscal policy will have an indirect impact on disposable incomes, as fiscal changes induce reactions in factor prices and shares and through these affect market incomes.

3. Inequality Index Decompositions

3.1. *Inequality Index Decompositions*

A large theoretical literature has examined possible ways of decomposing inequality indices by factor components, and illustrated the methodologies

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[8]Breen and Salazar (2010, 2011) examine whether educational assortative matting was behind this effect, using data for both the U.S. and the U.K. Their results indicate that the correlation in education across household members was not a factor driving earnings inequality in either economy.

proposed with some empirical evidence.[9] As is well known, different inequality indices have different merits and drawbacks. We have chosen to employ as our measure of inequality the SCV, as is common in the empirical literature on inequality decompositions. The SCV has two key features, as compared to other inequality indices. The first one is that decompositions can be nested, allowing us to examine the changes in factor contributions by population subgroups. The second is that it is more sensitive to extreme values than the Gini coefficient. Although this is an argument that is often used to prefer the use of the latter index, it is useful when we perform decompositions by factor incomes. In those decompositions we find that there are many observations with zero values, notably in the case of self-employment and property income, and we want to use an index that is sensitive to such extreme values.

The sensitivity of the index to top incomes is, however, a concern. In order to reduce this problem we have top-coded the data at 10 times median income (see Appendix for the details). Although top-coding attenuates the problem, it does not solve it completely. For example, Burkhauser *et al.* (2009, 2011) examine in detail U.S. data to understand to what extent inequality indices are sensitive to censoring and top-coding of the raw data and whether different indices imply the same trends over time. Their results highlight the importance of the choice of inequality measure. Burkhauser *et al.* (2011) find that the Gini coefficient and the SCV yield similar inequality trends, although the SCV yields larger changes from one survey to the next.

The choice of inequality index is hence not trivial for the results. The Gini decompositions proposed by Lerman and Yitzhaki (1985) and used, for example, by Garner (1993) and Podder (1993), could give somewhat different results. Moreover, we could have chosen alternative approaches that do not rely on a single index. Some recent work, such as Jenkins and van Kerm (2005), proposes density function decompositions that allow a richer analysis of distributional changes at all points of the distribution. This method has the advantage of being independent of the choice of inequality index. However, because it does not provide summary measures of the decomposition, it would have made our cross-country comparisons cumbersome. We have hence opted for a more compact approach to analyzing the data, which has the cost of relying on a particular index.

3.2. *Decomposition by Factors*

The half squared coefficient of variation is defined as

(1)
$$I \equiv \frac{1}{2n} \sum_i \left[\left(\frac{y_i}{\mu} \right)^2 - 1 \right] = \frac{\sigma^2}{2\mu^2},$$

where the population consists of n individuals indexed by i, with mean income μ and variance σ^2. The income of individual i is denoted by y_i, and incomes are received from various sources or factors, denoted by f, so that $\sum_f y_{if} = y_i$. The

[9]See, for example, Fei *et al.* (1978), Bourguignon (1979), Pyatt *et al.* (1980), Shorrocks (1982), Lerman and Yitzhaki (1985), and Fournier (2001).

population can be partitioned in J mutually exclusive age groups, index by $j = 1, \ldots J$. We can then define the inequality index for a particular factor and a particular group as

$$(2) \qquad I_f = \frac{\sigma_f^2}{2\mu_f^2},$$

$$(3) \qquad I_j = \frac{\sigma_j^2}{2\mu_j^2}.$$

A number of definitions will be useful for the subsequent decompositions:
$\chi_f \equiv \mu_f/\mu$: factor f's share;
ρ_f: correlation between factor f and total income;
$p_j \equiv n_j/n$: population share of group j;
$\lambda_j \equiv \mu_j/\mu$: group j's mean income relative to population mean;
$\lambda_{jf} \equiv \mu_{jf}/\mu_j$: groups j's mean factor-f income relative to population mean.

In order to analyze the impact of various income sources we follow Shorrocks (1982) and Jenkins (1995). A decomposable inequality index can be expressed as

$$(4) \qquad I = \sum_f S_f$$

where S_f is the absolute contribution of factor f to overall inequality. Let $s_f \equiv S_f/I$ be the relative factor contribution, such that $\sum_f s_f = 1$. Shorrocks makes the case for using a decomposition based on the point estimate of a regression of income of source f on total income, that is,

$$(5) \qquad s_f = Cov(y_{if}, y_i)/\sigma^2.$$

It is then possible to express the absolute contributions in terms of the squared coefficient of variation for aggregate and factor incomes,

$$(6) \qquad S_f = s_f I = \rho_f \chi_f \sqrt{I \cdot I_f}.$$

3.3. Age-Group Decompositions

There are two ways in which we can assess how the contribution of different sources of income varies across age groups. First, we can simply compute inequality indices by age-groups and obtain the contribution of different sources for each group. We can perform the factor decomposition described above for each age group, with the factor shares being defined by

$$(7) \qquad S_{jf} = \rho_{jf} \chi_{jf} \sqrt{I_j \cdot I_{jf}}$$

and $I_j = \sum_f S_{jf}$. The term S_{jf} then tells us how much of the overall inequality within-group j is due to inequality in incomes from factor f.

Alternatively we can use a group decomposition of the inequality index. It is possible to express our inequality index I as

$$(8) \qquad I = \sum_j p_j (\lambda_j)^2 I_j + \frac{1}{2} \sum_j p_j \left[(\lambda_j)^2 - 1 \right] = wg + bg$$

where the first term captures inequality within age groups, wg, and the second term represents inequality between-groups, bg. For factor f we can express the inequality index as

$$(9) \qquad I_f = \sum_j p_{jf} (\lambda_{jf})^2 I_{jf} + \frac{1}{2} \sum_j p_{jf} \left[(\lambda_{jf})^2 - 1 \right] = wg_f + bg_f,$$

and using this expression we can write overall inequality as

$$(10) \qquad I = \sum_f S_f = \sum_f (\alpha_f wg_f + \alpha_f bg_f),$$

with $\alpha_f \equiv S_f / I_f$. The term wg_f represents within-group inequality in factor f, while $\alpha_f wg_f$ captures the contribution of within-group inequality in factor f to overall inequality. Similarly bg_f represents between-group inequality in factor f, and $\alpha_f bg_f$ is the contribution of between-group inequality in factor f to overall inequality. This decomposition allows us to first determine the contribution of inequality in factor f to overall inequality, and then assess how much of it is due to within-group and how much to between-group inequality.

3.4. *Decomposing Earnings Inequality*

As we will see below, earnings inequality is the largest factor component in all countries. Because of their importance in determining inequality, we further decompose them according to earner categories. Household earnings are the sum of the earnings of the household head, those of his/her spouse, and those of other household members. As a result, an increase in earnings inequality could be due to a more unequal distribution of earnings across household heads, across spouses, across other members, or to a higher correlation across members. Moreover, a substantial fraction of households have no earnings (because its members are unemployed, self-employed or retired, for example), and if this fraction changes over time the increase in earnings inequality could reflect changes in employment even if the distribution of earnings amongst the employed remains unchanged.

Let p_e be the fraction of the population with positive earnings and I_e^+ be earnings inequality amongst households with positive earnings. In order to examine the role of the above aspects we decompose household earnings inequality, I_e, as follows:

$$(11) \qquad I_e = \frac{1}{2} \frac{1 - p_e}{p_e} + \frac{I_e^+}{p_e} = \frac{1}{2} \frac{1 - p_e}{p_e} + \frac{S_h + S_s + S_o}{p_e}.$$

The first decomposition divides earnings inequality into a component due to the absence of earners, given by $(1 - p_e)/2p_e$, and one due to inequality amongst

households with positive earnings, given by I_e^+/p_e. Moreover, this second term can be further decomposed by obtaining the absolute contribution to I_e^+ of the earnings of the household head, the spouse, and other household members. Defining these contributions as S_h, S_s, and S_o, respectively, we have $I_e^+ = S_h + S_s + S_o$. As before, we define the absolute contributions as $S_h = \rho_h \chi_h \sqrt{I_e \cdot I_{he}}$, where I_{he} is inequality in household-head earnings, ρ_h is the correlation between household earnings and those of the household head, and χ_h is the share of the household head's earnings in total household earnings. Equivalent expressions give the contributions of the two other groups.

We can further define the relative contributions of different types of earners to overall earnings inequality, s_k, as

$$(12) \qquad s_n + s_h + s_s + s_o = \frac{1}{2}\frac{1 - p_e}{I_e p_e} + \frac{S_h}{I_e p_e} + \frac{S_s}{I_e p_e} + \frac{S_o}{I_e p_e} = 1$$

where the subscripts indicate non-earners, household head, spouse, and other members, respectively. Obviously, the nature of these contributions is very different to that of non-earners depending exclusively on their share in the population (since there is no inequality within the group of non-earners).

4. Decomposition by Income Sources

4.1. *Absolute Factor Contributions*

We start by reporting the factor decomposition for the six countries in our sample, for selected years in Tables 1, 2, and 3.[10] The inequality index, the SCV, is calculated both for total disposable income (first column) and for its four components: earnings, self-employment income, capital income, and taxes–transfers. We then report the absolute contribution of each of these factors to overall inequality, that is, S_f as given by equation (6), so that the horizontal sum of factor contributions sums up to overall income inequality for each year. The third panel reports the share of factor f in total household income, χ_f, as well as the share of the first three components in market income. As we will see, factor shares have played an important role in observed inequality changes. The bottom panel gives the percentage changes in inequality and the percentage changes in each source contribution, where the latter are given by the expression $s_{ft} \cdot 100 \cdot (s_{ft+1}/s_{ft} - 1)$ and the sum of the four components adds up to the total percentage change in inequality.

Throughout our analysis, we find that disposable income inequality is lower than earnings inequality, which in turn is much lower than inequality in the other three factors. High levels of self-employment and capital-income inequality are both due to a large fraction of the population having no income from those sources, but also to the large inequality that prevails for those with positive

[10]We have chosen not to report the decomposition for all available years for all countries and give results (approximately) for each decade. Other country–year decompositions are available upon request. Bootstrapped results find small confidence intervals for our estimates.

incomes. The SCV for taxes–transfers is also large, in some cases surprisingly large (see, for example, the observations for the U.K. for 1974 and 1979 in Table 1), and fluctuates sharply over time. The reason for this is that we have grouped together transfers and taxes, implying that a very large fraction of households have a negative component, which, for the richest households can be extremely large. Moreover, the mean varies sharply over time, being positive some years and negative others, probably reflecting changes in the tax–transfer system. The result is sharp fluctuations in the SCV of this component. Nevertheless, as we will see below, the absolute contribution of taxes and transfers to inequality is relatively stable over time, even in the years in which the SCV of taxes and transfers jumps abruptly. The other feature of the data that needs to be noted is that because we are looking at disposable income, the relative contribution of the first three components (earnings, self-employment, and capital income) adds up to over one, while that of the fourth factor is negative, capturing the redistributive effect of taxes and transfers.

Table 1 reports the data for the U.S. and the U.K. for five dates: 1974, 1979, 1991, 1999/2000, and 2004. The U.S. experienced a reduction in inequality in the first decade and an increase in latter ones, while the SCV dropped again at the end of the period (from 0.352 to 0.319 between 2000 and 2004).[11] The U.K. had an initially lower degree of inequality than the U.S., which increased through to 1999, and exhibited little change between 1999 and 2004. The overall increase over 30 years was of 0.064 points in the U.S. and 0.126 points in the U.K., increases of 25 and 63 percent, respectively, that led to similar levels of inequality in both economies by the end of the period. The patterns for the two countries are similar in some aspects, different in others. During the 1970s both countries experienced a decline in the contribution of self-employment and capital income inequality, while the contribution of earnings inequality fell in the U.S. and rose in the U.K. As a result, overall inequality fell in the U.S. but remained constant in the U.K. In the U.S., the SCV of earnings fell slightly between 1974 and 1979 (from 0.473 to 0.466), while in the U.K. it rose by 15 percent (it had already started rising in 1969 with a cumulative increase of 30 percent over the 10 years to 1979).

Over the next 25 years, inequality increased in both countries, by 46 percent in the U.S. and by 60 percent in the U.K., with a peak in 1999/2000. As has been well documented, both countries witnessed a large increase in wage inequality over this period. Between 1979 and 2004, the SCV of earnings increased by 67 and 43 percent in the U.K. and in the U.S., respectively, and this change was clearly the main force driving the increase in income inequality. It is important to note that we are measuring the dispersion of *household* earnings, while most existing work on this issue uses either hourly wages or individual earnings. It is hence possible that some of the changes we capture are due to variations in the prevalence of households with no earnings or in the correlation of earnings across household members. We will consider this question in Section 6.

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[11]Similar trends appear when we look at gross income inequality. In this case we have data for the U.S. in 1969, and we find that (gross income) inequality fell throughout the decade; see García-Peñalosa and Orgiazzi (2011).

TABLE 1

FACTOR DECOMPOSITION OF INCOME INEQUALITY: U.S. AND U.K.

	Year	Overall	Earnings	Self-Emp. Income	Capital Income	Taxes & Transfers
U.S.						
Inequality	1974	0.256	0.473	12.732	9.417	9.184
	1979	0.218	0.466	10.790	6.537	8.997
	1991	0.246	0.535	11.406	6.534	20.938
	2000	0.352	0.711	16.929	6.552	10.527
	2004	0.319	0.668	14.846	8.044	38.745
Absolute contribution	1974		0.267	0.057	0.027	-0.095
	1979		0.249	0.031	0.025	-0.086
	1991		0.265	0.027	0.043	-0.089
	2000		0.420	0.046	0.035	-0.149
	2004		0.373	0.030	0.033	-0.116
Factor shares in disposable income (market income)	1974		0.946 (0.864)	0.092 (0.084)	0.056 (0.051)	-0.094
	1979		0.961 (0.864)	0.083 (0.075)	0.068 (0.061)	-0.113
	1991		0.918 (0.852)	0.075 (0.070)	0.084 (0.078)	-0.078
	2000		0.979 (0.872)	0.070 (0.063)	0.073 (0.065)	-0.122
	2004		0.936 (0.886)	0.060 (0.057)	0.060 (0.057)	-0.056
% changes in source contribution	1974–91	-3.8	-0.6	-11.8	6.3	2.3
	1991–04	29.8	43.6	1.3	-4.3	-10.9
U.K.						
Inequality	1974	0.201	0.422	9.589	9.887	1,526.48
	1979	0.204	0.488	11.514	8.891	21,969.07
	1991	0.292	0.752	11.120	6.169	95.803
	1999	0.332	0.805	11.493	9.151	200.557
	2004	0.327	0.816	10.646	9.769	153.508
Absolute contribution	1974		0.196	0.047	0.014	-0.057
	1979		0.240	0.021	0.009	-0.066
	1991		0.296	0.071	0.041	-0.115
	1999		0.315	0.075	0.025	-0.083
	2004		0.318	0.086	0.020	-0.098
Factor shares in disposable income (market income)	1974		0.879 (0.874)	0.088 (0.088)	0.039 (0.038)	-0.006
	1979		0.904 (0.906)	0.060 (0.060)	0.034 (0.034)	0.002
	1991		0.855 (0.823)	0.098 (0.094)	0.086 (0.082)	-0.038
	1999		0.820 (0.844)	0.101 (0.104)	0.051 (0.053)	0.029
	2004		0.827 (0.852)	0.100 (0.103)	0.044 (0.045)	0.030
% changes in source contribution	1974–91	-2.8	6.7	-6.3	1.9	-5.1
	1991–04	8.4	-2.7	3.3	1.1	6.7

There are some notable differences between the U.K. and the U.S. The first concerns the timing: in the U.S., the largest increase in inequality took place in the 1990s, while in the U.K. it occurred during the 1980s. Second, self-employment income plays a much more important role in the U.K. The contribution of self-employment to the increase in inequality between 1979 and 2004 was of 0.065, i.e. half of the total increase, while more dispersed earnings account for almost two thirds of the increase (recall that, since the contribution of taxes–transfers is negative, the contribution of factor incomes adds up to more than 1). The large contribution of self-employment to rising inequality is due to the sharp rise of the share of self-employment in total household income. During this period, the share of earnings fell from 90 to 83 percent while that of self-employment income rose from 6 to 10 percent. In contrast, in the U.S., the earnings share was stable while that for self-employment income fell by two points, implying that it tended to reduce inequality. In fact, increased earnings inequality accounts for virtually the entire change in the SCV of income, whether we look at the period 1979–2004 or 1991–2004. During the latter period we also observe a small reduction in the contribution of capital income and an offsetting increase in (the absolute value of) the contribution of taxes–transfers, both of which partly offset the increase in the contribution of earnings.

Two remarks are in order concerning capital income. In both countries the capital share is well below those obtained from national accounts, which attribute about 60–70 percent of national income to labor and the rest to capital, and we will obtain the same pattern for the other economies in our study. Part of the answer lies in that standard estimates from national accounts define the labor share as the ratio of payments to employees to output and attribute the remainder to capital. This method of accounting ignores self-employment income, thus overstating the share of capital. When self-employment income is accounted for properly, the capital share falls substantially: from 40 to 23 percent in the U.S. and from 43 to 19 percent in the U.K.[12] This adjustment still leaves a substantial discrepancy between our capital shares and those obtained from aggregate data. There are various likely causes. First, a substantial fraction of the capital income generated by a firm is retained in order to finance future investments and hence not distributed as interest and dividends to households. Second, capital gains are not included in the LIS definition of capital income and hence not accounted for. Lastly, some under-reporting is likely given that capital incomes tend not to be paid on the same regular basis as wages and salaries, leading to imprecise recall. These aspects imply that our measures probably understate the share of capital in household incomes.

The second comment concerns the returns to capital. As argued by van den Noord and Heady (2001), capital income is defined as the nominal return on capital rather than the real one, which should be adjusted for inflation. As a result, periods of high inflation that are accompanied by high nominal interest rates would yield large shares of capital income even if the real incomes generated by those assets were no different from those obtained in periods of low inflation and

[12]See Gollin (2002, table 2); the figures refer to the 1990s. Similar changes are reported for Norway and Sweden, the data for Canada and Germany not being available.

nominal interest rates. Unfortunately, it is not possible to correct for this problem with the available data.

The contribution of taxes–transfers is of similar magnitude in the U.S. and the U.K., oscillating between −0.06 and −0.15. Note the substantial increase in the reduction of inequality due to this factor in the U.S., which peaked in 2000 and then started declining. In the U.K., this term is also of greater magnitude in the 1990s and 2000s than at the start of the period, indicating that in both countries public policy played a significant role in containing the increase in household income inequality. However, given the wide range of income sources included in this term, these patterns could reflect either changes in the extent of redistribution, or an increase in the share of pensions in household income associated with an aging population. In the U.K., the share of this income source in household income rose substantially (from −3.8 percent in 1991 to 3 percent in 2004), indicating that earlier in the period households were, on average, paying taxes while later on they were, on average, receiving benefits or pensions.

The first panel of Table 2 performs the factor decomposition for Canada. As we saw earlier, it presents a very different pattern than the other two Anglo-Saxon economies. After a decline during the 1970s, inequality rose slightly after 1981, and remained stable until it experienced a sharp increase in 2000 (from 0.217 to 0.252). The initial decline was largely driven by changes in the absolute contribution of earnings, which in turn was the result of lower earnings inequality and a reduction in their share. After 1981 earnings dispersion started increasing, reaching roughly the same level as in the U.S. by the end of the period. However, the increase in the contribution of this factor was smaller than in the U.S. due to a reduction in the share of earnings in household income. The contribution of self-employment income increased by two thirds over the entire period, and accounted for 40 percent of the increase in inequality. In contrast, the contribution of capital income fluctuated over the period, increasing in the 1980s, falling in the next decade, and rising again at the end of the period, with these changes being the result of an increase in dispersion of this factor and a reduction in its share. As is the case in the U.K., the share of taxes–transfers became positive by the end of the period.

The results for Germany, reported in the second panel of Table 2, are unfortunately for a shorter period due to data availability, going from 1984 to 2004. The SCV of disposable income was stable over the first 15 years and increased moderately between 2000 and 2004, being 5 percent higher in the latter year than in 1984. This stability hides substantial changes in factor income inequality. Earnings dispersion increased by more than in the U.S.: in Germany the SCV of earnings went from 0.565 in 1984 to 0.706 in 2004, while in the U.S. it increased from 0.551 to 0.668 over the period 1986–2004. As is the case for Canada, the share of earnings in household income is lower in Germany than in the U.S. and, furthermore, it declined by 6 percentage points over the period, resulting in a small increase in their contribution to overall inequality of 4 percent (as compared to an increase of 31 percent for the U.S. over the same period). A reduction in the absolute value of the contribution of taxes–transfers accounted for the other percentage point increase in overall inequality, while a decrease in the contribution of self-employment was offset by an increase in that of capital incomes.

TABLE 2

FACTOR DECOMPOSITION OF INCOME INEQUALITY: CANADA AND GERMANY

	Year	Overall	Earnings	Self-Emp. Income	Capital Income	Taxes & Transfers
Canada						
Inequality	1975	0.228	0.422	17.401	5.708	41.543
	1981	0.205	0.399	13.862	4.137	29.509
	1991	0.216	0.511	13.487	5.821	442.291
	2000	0.252	0.623	12.873	9.301	130.705
	2004	0.265	0.651	13.218	13.191	749.729
Absolute contribution	1975		0.243	0.034	0.014	−0.063
	1981		0.208	0.028	0.029	−0.059
	1991		0.243	0.034	0.021	−0.082
	2000		0.291	0.045	0.015	−0.101
	2004		0.288	0.049	0.022	−0.094
Factor shares in disposable income	1975		0.925 (0.893)	0.061 (0.059)	0.050 (0.048)	−0.035
(market income)	1981		0.892 (0.857)	0.061 (0.058)	0.088 (0.085)	−0.041
	1991		0.884 (0.871)	0.067 (0.067)	0.063 (0.062)	−0.015
	2000		0.906 (0.878)	0.081 (0.078)	0.046 (0.044)	−0.033
	2004		0.863 (0.875)	0.081 (0.082)	0.042 (0.043)	0.013
% changes in source contribution	1975–91	−5.4	0.0	−0.1	3.0	−8.3
	1991–04	22.7	20.8	7.2	0.2	−5.6
Germany						
Inequality	1984	0.208	0.565	11.435	9.994	62.865
	1989	0.201	0.571	11.191	14.881	32.207
	2000	0.205	0.638	10.065	7.364	87.162
	2004	0.219	0.706	10.804	6.537	460,502.25
Absolute contribution	1984		0.199	0.079	0.029	−0.099
	1989		0.212	0.066	0.033	−0.110
	2000		0.189	0.084	0.035	−0.104
	2004		0.207	0.073	0.035	−0.096
Factor shares in disposable income	1984		0.899 (0.853)	0.108 (0.102)	0.048 (0.045)	−0.054
(market income)	1989		0.928 (0.821)	0.101 (0.094)	0.049 (0.046)	−0.079
	2000		0.868 (0.827)	0.120 (0.115)	0.062 (0.059)	−0.051
	2004		0.838 (0.838)	0.103 (0.103)	0.059 (0.059)	−0.001
% changes in source contribution	1984–89	−2.8	6.7	−6.3	1.9	−5.1
	1989–04	8.4	−2.7	3.3	1.1	6.7

Decompositions for Norway and Sweden are reported in Table 3. As discussed above, these two economies experienced increases in disposable income inequality, although of smaller magnitude than those observed in the U.K. and the U.S., with the SCV increasing by 0.038 points in Norway and by 0.025 points in Sweden between the mid/late 1970s and 2004/05. These changes were largely the result of a more dispersed distribution of earnings. Starting in 1979/81, the SCV of earnings rose by 18 and 19 percent in Norway and Sweden, respectively. Although this was a smaller increase than that experienced by the U.S. and the U.K., by the end of the period earnings inequality was similar to that observed in the Anglo-Saxon economies, notably in Sweden. For example, in 2004 the SCV of earnings was 0.668 in the U.S. and 0.660 in Sweden. Its contribution to overall inequality is, however, much smaller in the Scandinavian economies because the share of earnings is about 5 percentage points lower than in the Anglo-Saxon ones.[13]

There are two important differences between the two Scandinavian economies. In Sweden, the increase in overall inequality that started in 1981 was mainly due to greater earnings dispersion, and the impact on overall inequality of this increased dispersion was partly offset by a reduction in the contribution of capital income. The Swedish data illustrate the importance of factor shares. Recall that the contribution of factor f depends both on the SCV of that factor and on the share of the factor in total household income (see equation (6)). We can see from Table 3 that the contribution of earnings was roughly the same in 1975 as in 2004, 0.251 and 0.255, respectively. However, in 1975 this was the result of a moderate degree of earnings dispersion (0.508) and a high earnings share (1.021) while in 2004 the same contribution was due to substantially higher inequality (0.660) but a lower earnings share (0.875).

In Norway two factors played a role in the increase in inequality observed between 1979 and 2004—a more dispersed distribution of earnings and a greater contribution of capital income inequality—which were partly offset by a reduction in the contribution of self-employment incomes (their contribution fell from 0.114 to 0.039). The increase in the contribution of capital income was particularly large: it rose by 0.067 points while the SCV of overall income increased by 0.037, and this was the result of both a more dispersed distribution of capital income (the SCV of capital income rose from 5 to almost 17) and a greater share of this factor in household incomes (3.6 percent in 1979 and 6.2 percent by 2004). As has been documented,[14] the increase in the contribution of capital income inequality was largely due to fiscal reforms that took place in the early 1990s. These reforms increased the incentives of households to realize capital gains on financial assets and those of firms to pay dividends. Note, however, that the LIS data do not include capital gains; hence our measure of inequality captures only the impact of the tax reforms through increased dividend payments. We are hence probably underestimating the increase in the actual contribution of capital income caused by the reform.

[13]See Gustavsson (2008) on the evolution of the distribution of earnings in Sweden, and Aaberge and Atkinson (2010).

[14]See Aaberge *et al.* (2000) and Fjærli and Aaberge (2000).

TABLE 3
FACTOR DECOMPOSITION OF INCOME INEQUALITY: NORWAY AND SWEDEN

	Year	Overall	Earnings	Self-Emp. Income	Capital Income	Taxes & Transfers
Norway						
Inequality	1979	0.195	0.478	9.662	5.140	9.703
	1991	0.205	0.522	7.627	4.592	104.624
	2000	0.227	0.537	10.597	13.014	82.719
	2004	0.232	0.564	12.171	16.858	474.661
Absolute contribution	1979		0.173	0.114	0.003	−0.095
	1991		0.212	0.050	0.028	−0.086
	2000		0.231	0.044	0.052	−0.101
	2004		0.215	0.039	0.070	−0.091
Factor shares in disposable income	1979		0.937 (0.836)	0.147 (0.132)	0.036 (0.032)	−0.120
(market income)	1991		0.860 (0.833)	0.103 (0.100)	0.070 (0.067)	−0.033
	2000		0.894 (0.858)	0.087 (0.083)	0.061 (0.059)	−0.042
	2004		0.843 (0.857)	0.078 (0.079)	0.062 (0.063)	0.017
% changes in source contribution	1979–91	5.1	20.4	−32.7	13.0	4.4
	1991–04	13.6	1.3	−5.6	20.5	−2.6
Sweden						
Inequality	1975	0.164	0.508	13.400	3.739	12.116
	1981	0.203	0.555	12.054	52.249	6,646.517
	1992	0.202	0.628	110.189	3.099	11.886
	2000	0.214	0.665	24.873	10.383	28,949.885
	2005	0.190	0.660	20.366	10.069	64.560
Absolute contribution	1975		0.251	0.005	0.004	−0.095
	1981		0.204	−0.001	0.063	−0.062
	1992		0.225	0.023	0.016	−0.062
	2000		0.284	0.014	0.030	−0.114
	2005		0.255	0.010	0.020	−0.095
Factor hares in disposable income	1975		1.021 (0.904)	0.067 (0.059)	0.041 (0.036)	−0.129
(market income)	1981		0.916 (0.911)	0.051 (0.051)	0.038 (0.038)	−0.005
	1992		0.814 (0.913)	0.017 (0.019)	0.060 (0.068)	0.108
	2000		0.919 (0.917)	0.032 (0.031)	0.052 (0.052)	−0.002
	2005		0.875 (0.921)	0.030 (0.032)	0.045 (0.047)	0.050
% changes in source contribution	1975–92	22.8	−15.8	11.0	7.3	20.3
	1992–05	−6.0	15.1	−6.8	2.3	−16.6

If we compare these two economies with the U.S. and the U.K., we see that, by the end of the period, earnings inequality was of similar magnitude (the SCV of earnings is almost identical in the U.S. and Sweden), while the two Scandinavian countries exhibit greater dispersion of capital incomes and, in the case of Sweden, much more dispersed self-employment incomes. The major difference is that the share of earnings in household income is lower in the Scandinavian than in the Anglo-Saxon economies. A surprising feature is that Norway and Sweden do not exhibit a much more redistributive tax–transfer component. Its contribution to overall inequality oscillates between −0.06 and −0.11, in line with those observed for the U.K. and the U.S.

4.2. *Relative Factor Contributions*

A convenient way of examining the sources of changes in inequality is to consider the evolution of relative factor contributions. These are captured by the term s_f, as given by equation (5), which measures the share of inequality that is due to inequality in factor f.

Figure 2 depicts the relative factor contributions for all six countries in our sample. We can see that in the U.S. earnings are by far the most important source of inequality, and that their relative contribution has increased over time, while that of other factors has diminished. Canada presents a similar pattern to that observed in the U.S.: a high relative contribution of earnings and moderate contributions of capital and self-employment incomes. In the U.K., there is greater variability in factor contributions over time. The contribution of earnings increased over the first decade, fell in the 1980s, and increased again in the 1990s, but never reached its peak in 1979. The role of capital income also exhibits fluctuations over the period. We can observe the increase in its contribution to overall inequality between 1979 and 1991, consistent with the result obtained by Jenkins (1995) of a rising contribution of investment income over the period 1981–86, but its relative contribution fell subsequently. The contribution of self-employment also presents substantial variation over the sample period, and has been particularly high since 1991, well above those observed in the U.S. and Canada. Jenkins (1995) argues that the "increasing incidence of self-employment in the 1980s may also have led to a greater accumulation of assets and hence investment income." Although the data for 1979, 1986, and 1991 seem to support this hypothesis, it is not consistent with those for latter years. The data for 1994, 1999, and 2004 exhibit an even higher relative contribution of self-employment inequality, accompanied by a reduction in the contribution of capital income inequality. An alternative explanation, which would also be consistent with the movements of the capital share reported in Table 1, is that the pattern in capital income is due to the high interest rates of the 1980s and early 1990s. Indeed, between 1979 and 1992 the interest rate on 3-month Treasury bills was between 9 and 15 percent, and declined afterwards, lying between 3.5 and 6.8 percent in the period 1993–2004.

The last three panels of Figure 2 depict the factor decompositions for the three continental European countries. In the case of Germany and Norway we can observe the smaller contribution that earnings inequality has compared to the
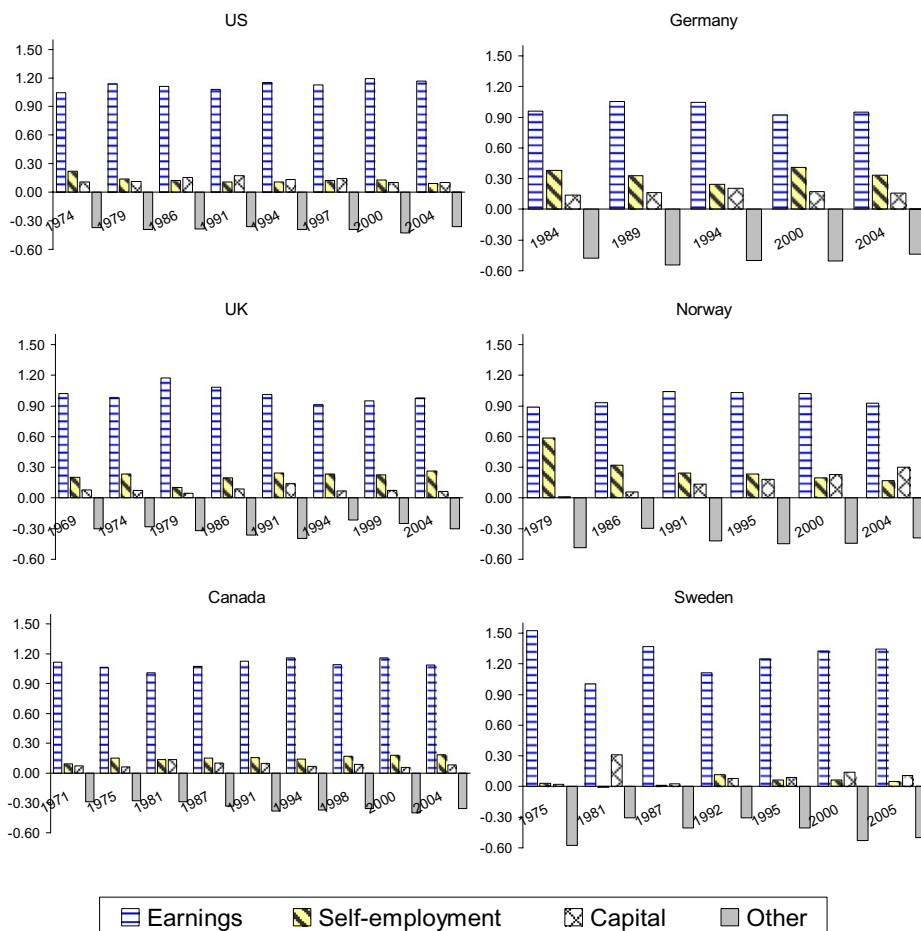
Figure 2. Relative Factor Contributions

Anglo-Saxon economies. For example, in Norway in 1979 and in 2004, earnings accounted for 89 and 93 percent of overall inequality, while in the U.S. their contribution was 114 and 117 percent, respectively. Both Norway and Sweden experienced a reduction in the contribution of self-employment income (since the 1990s in Sweden but throughout the period in Norway), but differ in that the former experienced a large increase in the contribution of capital income inequality that we do not observe in Sweden.

Figure 3 depicts the relative factor contributions for all countries, and illustrates the differences across them in the most recent year available, 2004/05. We observe large differences across countries. Earnings inequality is most important in the U.S. and Sweden (117 and 134 percent, respectively) and lowest in Germany and Norway (95 and 93 percent, respectively). The first two countries also exhibit a particularly low contribution of self-employment income (9 and 5 percent), while for the other countries it ranges between 15 and 33 percent. The contribution of

Figure 3. Relative Factor Contributions: All Countries 2004–06

capital income ranges from 9 to 30 percent (the U.K. and Norway, respectively). A striking feature of the data is that there do not seem to be patterns common to the countries within each of the two groups—Anglo-Saxon, versus "European." The contribution of earnings is high in the Anglo-Saxon economies, but also in Sweden. The two Scandinavian countries exhibit very different decompositions, with capital and self-employment income playing a much more important role in Norway than in Sweden. Lastly, note that the role of taxes and transfers does not conform with common priors: it is strongest in Germany and Sweden (44 and 50 percent), while the contribution in Norway (39 percent) is closer to those observed in the Anglo-Saxon countries than to those found in the other continental economies.

5. Decomposition by Age Group

5.1. *The Anglo-Saxon Economies*

5.1.1. Trends in Inequality by Age

As we have argued, there are two main reasons why a decomposition by age can help us understand the forces that drive inequality changes. First, we have seen that capital income inequality has played an important role, and in some cases, such as for Norway, a crucial one in changes in inequality. If differences in wealth—and hence in capital income—are mainly due to life-cycle considerations, then the data should show that capital income inequality is largely due to differences across age groups and not within age groups. Second, the increase in earnings dispersion has also played a central role in inequality changes. A number of authors have shown that, at least in the U.S. and the U.K., greater wage dispersion has been partly the result of increased returns to experience. This would imply that we should observe an increase in earnings inequality across age groups. A further question concerns self-employment. There is evidence that self-employment is more frequent amongst mature workers, and this too should be reflected in pattern across age groups.[15]

[15]See, for example, Evans and Leighton (1989).
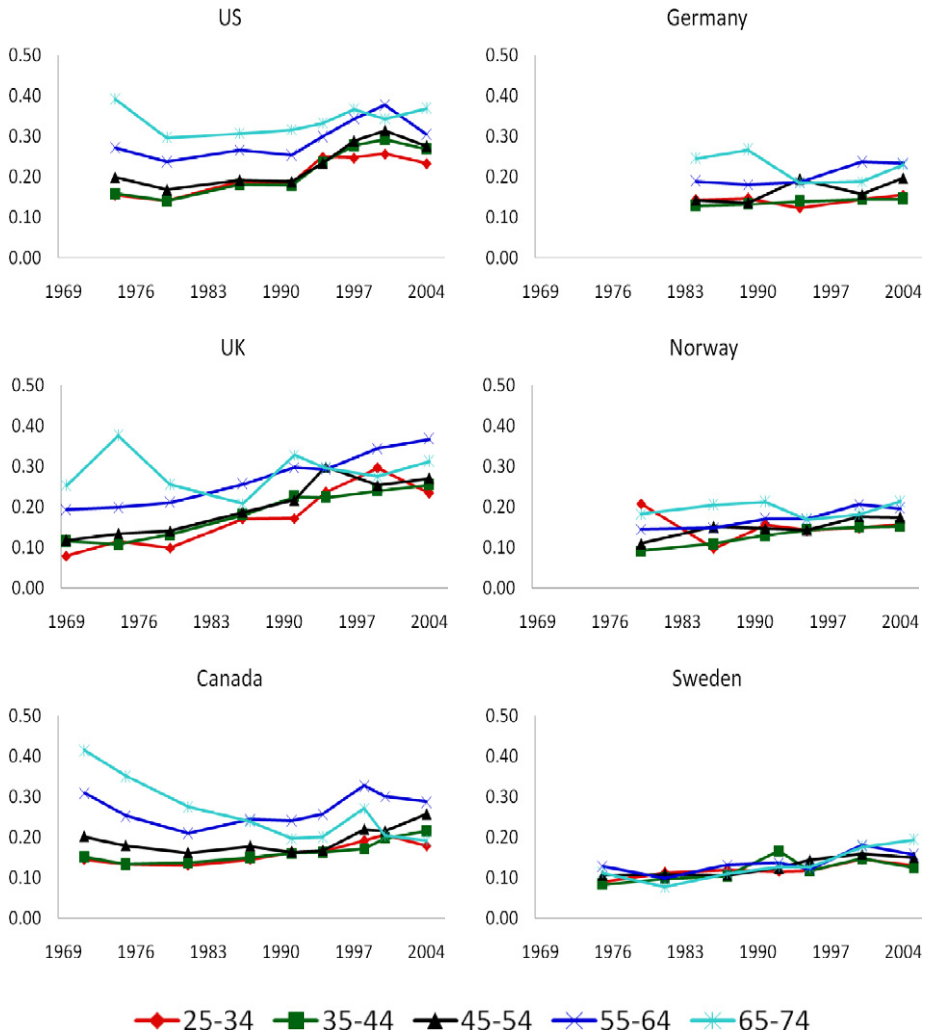
Figure 4. Income Inequality by Age Group

In order to examine these questions, we decompose the population in each country–year in subgroups by age of the household head. We consider seven subgroups: <25, 25–34, 35–44, 45–54, 55–64, 65–74, and >74 years. Figure 4 depicts the evolution of total disposable income inequality, measured by the SCV, for each age subgroup in each of the six countries (to make the figures easier to read, we do not depict the two end groups, <25 and >74).

In general, although not always, inequality is lower for young (25–34) and prime-age households (35–54) and higher for older households (55–74). This pattern is clearly present for the U.S. and Canada, as can be seen in the three left panels of Figure 4. In both countries, the decline in inequality in the 1970s was largely driven by lower inequality for older households, while all age groups

experienced an increase in inequality in the last two decades of the century. As a result, differences in within-group inequality were smaller in 2004 than at the start of our sample period. For example, in the U.S. in 1979 inequality in the 65–74 age group was 2.1 times that in the 25–34 age group, while this ratio had fallen to 1.6 by 2004 (see Table A.2 in the Appendix). Note also that in Canada inequality fell substantially for older households (those between 65 and 74 years) in the late 1990s, so that all groups except the 55–64 age group, had similar degrees of inequality by the end of the period. As we discussed earlier, our observation for 2004 indicates a reduction in overall inequality in the U.S. (see Table 1). We can see that all groups except for the oldest cohorts experienced such a reduction, and it was particularly sharp for those in the 55–64 age group. This age group seems to have been affected by a large reduction in inequality in self-employment income, for which the absolute contribution was over 0.050 in the 1990s but had dropped to 0.026 by 2004, a change that could be related to the burst of the dot-com bubble. In Canada, overall inequality increased slightly in the first years of the twenty-first century, but different groups had different experiences, with inequality falling for the young and the old and increasing for prime-age workers (35–54).

The U.K. also exhibits higher inequality for older households. With the exception of the oldest cohort, all age groups experienced an increase in inequality from 1979 onwards. Inequality for the oldest age-group fluctuates substantially, and the data indicate large changes in the role played by the various factors. For example, the contribution of capital income inequality doubled between 1979 and 1991 and fell again to its initial value by 2004 (not reported), consistent with the hypothesis that interest rates affect the income of this group substantially.

5.1.2. Factor Contributions

We further decompose inequality for each age group by income source (see Table A.2 in the Appendix, which reports the absolute contributions of the four factors for the U.S. and the U.K. in the years 1979 and 2004). In the U.S. we observe the increase in income inequality for all age groups (except the under 25s and over 74s) depicted in Figure 4, with inequality increasing by between 11 percent (for the over 75s) and 91 percent (for those 35–44). The same pattern is observed for almost all age groups: the increase in overall inequality was the result of a large increase in earnings inequality and a moderate increase in inequality in capital income. For the oldest cohort there was also a significant increase in the contribution of taxes–transfers, probably due to a less progressive pension system.

In the U.K. there is much greater variation across age groups. Inequality increased more than twofold for those aged 25–34, almost doubled for the 35–54 age group, but barely changed for households above 75. The contribution of earnings inequality rose for all groups except those above 65. The contributions of both capital income and self-employment inequality increased for all groups. The increase in the contribution of self-employment is particularly large, and is important for all age groups. For example, for the 35–44 age group the percentage contribution of this source of income to the overall increase was 34 percent, and it accounted for 59 percent and 48 percent of the overall increase for the 45–54 and

55–64 age groups, respectively. A possible explanation is that the development of IT technologies increased entrepreneurship in the U.K.

Absolute factor contributions by age groups for Canada indicate that the increase in inequality for those between 25 and 64 reported in Figure 4 is driven by an increase in earnings and, to a lesser extent, by an increase in self-employment income inequality (see Table A.3 in the Appendix). Meanwhile, the reduction in inequality for older households (over 65 years) was driven by reductions in inequality in all three markets incomes, with the contribution of capital income being particularly important.

5.2. *The Continental Economies*

5.2.1. Trends in Inequality by Age

The evolution of inequality in the continental economies is depicted in the three right-hand panels of Figure 4. A common pattern for all three countries is that differences across age groups are smaller than in the Anglo-Saxon economies, especially in the Scandinavian economies. Germany exhibits an age-group pattern with some fluctuations but no clear trends. A notable difference with other countries is that although inequality increased markedly for the older cohorts (those above 45), it rose much less for the younger ones.

In both Norway and Sweden, differences across age groups have remained relatively stable over time, and they are much smaller than in the Anglo-Saxon economies. For example, by the end of the period the SCV by age group in Sweden ranged between 0.125 and 0.194, implying a much smaller gap than that observed in the U.S. (in 2004, the difference between the SVC of the least and the most unequal age-groups was 0.136). In Norway, inequality increased for all groups except the youngest and the oldest, for which there are substantial fluctuations over the period. Note, nevertheless that the two oldest groups experienced a particularly large increase in inequality between 1995 and 2004. In Sweden we observe a small increase in inequality for all groups starting in 1981. The increase was particularly marked for the eldest cohort over the period 1995–2005.

5.2.2. Factor Contributions

The decomposition across age groups for inequality in Germany (Table A.3) indicates a marked increase in inequality for the 45–64 group and a much smaller one for those under 45, with inequality falling only for those over 65. An increase in the contribution of earnings inequality is the driving force for the youngest cohorts. In contrast, those between 45 and 64 experienced an increase in the contribution of all three sources of market income. For example, for those in the 55–64 group, inequality increased by 23 percent, and the contributions of earnings, self-employment income, and capital income were, respectively, 16, 13, and 12 percent, with the increase in market income inequality being partially offset by greater redistribution coming from taxes and transfers.

When we decompose inequality by factor in each group, both Sweden and Norway exhibit the same main feature: the increase in inequality observed for (virtually) all groups was largely due to a higher contribution of earnings

inequality for all groups except the oldest two cohorts in Norway (see Table A.4 in the Appendix). The contribution of self-employment income fell substantially in Norway while it rose in Sweden. Both countries experienced an increase in the contribution of capital incomes for all age groups (except for the 25–34 age group in Sweden). As we saw earlier, the increase in the contribution of capital income inequality was large in Norway, and our decomposition by groups indicates that this occurred for all age groups, including the young. The contribution of capital income increased about tenfold for those between 35 and 64, and between fourfold and sixfold for older households (not reported). The increase in the contribution of capital income for young and prime-age households, for whom this source of income was a minor or even negative contribution in 1979, can be due to either an increased ability of younger households to accumulate assets or to transfers across generations that result in a perpetuation of wealth inequality. For older households the increase in the importance of this source of income is striking. The percentage changes in source contribution were 50 percent for the 65–74 group and 79 percent for the oldest cohort, being the main source of the increase in inequality, which was then offset by reductions in the contributions of other market incomes.

5.3. Within-Group and Between-Group Inequality

In order to understand the importance of differences across age groups, we compute measures of within and between age groups inequality. Recall that we can express the inequality index as the sum of the within and between components, either for the aggregate index, i.e. $I = wg + bg$, or for each of the factor components, $I_f = wg_f + bg_f$. Alternatively, we can compute the contribution of within-group and between-group inequality, according to the expression $I = \sum_f S_f = \sum_f (\alpha_f wg_f + \alpha_f bg_f)$. The term wg_f represents within-group inequality in factor f, while $\alpha_f wg_f$ captures the contribution of within-group inequality in factor f to overall inequality. Similarly bg_f represents between-group inequality in factor f, and $\alpha_f bg_f$ is the contribution of between-group inequality in factor f to overall inequality.

Table 4 presents a decomposition of within-group and between-group inequality for the U.S., the U.K., Norway, and Sweden, with the top four lines of each panel reporting within- and between-group inequalities, wg_f and bg_f, and the four bottom lines reporting their contributions to overall inequality, that is, $\alpha_f wg_f/I \cdot 100$ and $\alpha_f bg_f/I \cdot 100$.

Table 4 shows that in the U.S., within-group inequality accounts for between 86 and 93 percent of overall inequality, while inequality between age groups explains at most 14 percent. Throughout the entire period, the fraction of inequality due to between-group differences has declined steadily from 13 percent in 1979 to 7 percent in 2004. Moreover, the absolute contribution of between-group inequality fell (from 0.035 to 0.024), implying that all the increase in inequality has been due to greater within-group inequality. There are, however, important differences depending on the source of income. Between-group inequality accounts for a larger fraction of inequality in earnings (between 14 and 22 percent) than it does for self-employment and capital income (about 1 percent for self-employment

TABLE 4

INEQUALITY WITHIN AND BETWEEN AGE GROUPS: U.S., NORWAY, U.K., AND SWEDEN

	Year	Overall	Earnings	Self-Emp.	Capital Income	Taxes & Transfers
U.S.						
Within-group inequality	1979	0.190	0.364	10.663	6.267	7.004
	2004	0.295	0.569	14.753	7.894	30.908
Between-group inequality	1979	0.028	0.101	0.126	0.269	1.993
	2004	0.024	0.099	0.093	0.150	7.837
% Contribution of within-group inequality to overall inequality	1979	87.1	89.1	13.9	10.8	−30.6
	2004	92.6	99.5	9.3	10.0	−29.0
% Contribution of between-group inequality to overall inequality	1979	12.9	24.8	0.2	0.5	−8.7
	2004	7.4	17.3	0.1	0.2	−7.3
Norway						
Within-group inequality	1979	0.157	0.330	9.519	5.046	6.415
	2004	0.194	0.413	11.927	16.744	341.293
Between-group inequality	1979	0.037	0.149	0.142	0.095	3.289
	2004	0.039	0.151	0.244	0.114	133.368
% Contribution of within-group inequality to overall inequality	1979	80.7	61.2	57.6	1.3	−32.1
	2004	83.4	67.8	16.3	29.9	−28.2
% Contribution of between-group inequality to overall inequality	1979	19.3	27.6	0.9	0.0	−16.5
	2004	16.6	24.7	0.3	0.2	−11.0
U.K.						
Within-group inequality	1979	0.159	0.340	11.300	8.737	15,964.569
	2004	0.294	0.642	10.492	9.541	112.732
Between-group inequality	1979	0.045	0.148	0.215	0.154	6,004.498
	2004	0.033	0.174	0.154	0.228	40.777
% Contribution of within-group inequality to overall inequality	1979	77.9	81.8	10.2	4.4	−23.4
	2004	89.9	76.6	26.0	6.1	−22.0
% Contribution of between-group inequality to overall inequality	1979	22.1	35.6	0.2	0.1	−8.8
	2004	10.1	20.8	0.4	0.1	−8.0
Sweden						
Within-group inequality	1981	0.167	0.356	11.786	51.617	4,507.574
	2005	0.155	0.488	20.198	9.805	47.653
Between-group inequality	1981	0.036	0.199	0.268	0.632	2,138.943
	2005	0.034	0.172	0.168	0.265	16.907
% Contribution of within-group inequality to overall inequality	1981	82.2	64.5	−0.7	30.6	−20.8
	2005	81.8	99.5	5.0	10.4	−37.0
% Contribution of between-group inequality to overall inequality	1981	17.8	36.0	0.0	0.4	−9.9
	2005	18.2	35.0	0.0	0.3	−13.1

income and between 2 and 4 percent for capital income). Moreover, between-group earnings inequality rose slightly up to 2000, and this could well be the consequence of the increase in the returns to experience observed in the U.S. labor market. In contrast, the small magnitude of between-group inequality in capital income and the fact that its contribution to overall inequality is virtually zero (see bottom panel) implies that life-cycle patterns of saving play a minor role in explaining the contribution of wealth inequality to household inequality.

The next panel in Table 4 presents the decomposition for Norway, which we compare to that for the U.S. since we have observations for both 1979 and 2004 for the two countries, allowing us to compare them over the same period. In Norway, the SCV rose from 0.195 to 0.232, a much smaller increase than that observed in the U.S. (from 0.218 to 0.319). A salient difference between the two countries is that although the levels of between-group inequality are of similar magnitude, within-group inequality is much larger in the U.S. For example, in 2004, between-group inequality was slightly higher in Norway (0.039 versus 0.024), while within-group inequality was 50 percent higher in the U.S. (0.295 versus 0.194). As a result, between-group inequality accounts for a much larger fraction of overall inequality in Norway than in the U.S., amounting to between 16 and 20 percent. Similarly, when we consider earnings inequality, the between-group component is about one third of total earnings inequality in Norway and as low as 15 percent in the U.S. for 2000 and 2004.

Table 4 also shows that, as is the case for the U.S., the cause of the increase in inequality in Norway was higher within-group inequality, with inequality between age groups experiencing virtually no change. We find increases in within-group inequality for all market incomes. When we consider inequality in capital income, both countries exhibit much greater within-group than between-group inequality in capital incomes. The latter accounts for at most 4 percent of the SCV of capital incomes, indicating that life-cycle savings are not an important cause of the dispersion in this source of income. Moreover, there seem to be no marked differences between the two countries in the role of between-age group inequality in capital income despite the fact that Norway has a generous public pension system while the U.S. does not.

The decomposition for the U.K. is reported in the third panel of Table 4. Between-group inequality was more important than in the U.S. at the beginning of the period. It accounted for 22 percent of overall inequality in 1979, and declined slightly over the period from 0.045 to 0.033. In contrast, within-group inequality almost doubled between 1979 and 2004, implying that all the increase in inequality observed in the U.K. is attributable to within-group inequality. The within-group component of earnings inequality rose during the period, in line with what we observe in the U.S., and the between-group component experienced a moderate increase, rising from 0.122 in 1974 to 0.174 by 2004.

Lastly, the bottom panel of Table 4 reports the decomposition for Sweden. As is the case for Norway, the between-group component of inequality accounts for a larger fraction of overall and of earnings inequality than in the Anglo-Saxon economies. In the case of overall inequality, it was 18 percent in both 1981 and 2005. This stability of the share hides substantial fluctuations over time (not reported), with the between-group component ranging between 18 and 31 percent

for the years in our sample. The within- and between-groups contributions exhibit very different patterns depending on the factor we consider. For earnings and self-employment income the former increased and the latter fell, while capital income exhibits a reduction in both within- and between-group inequality.

6. Decomposing Earnings Inequality

Tables 5 to 7 report the decomposition of earnings for selected years. As we discussed earlier there are three key elements that affect earnings inequality across households: the fraction of households with no earnings, the number of earners in a household, and earnings inequality for a particular type of earner. We will hence first compute the relative contribution to earnings inequality of non-earners and earners, and then divide this second term in the share of inequality due to inequality amongst household-heads, amongst spouses, and amongst other earners in the household.

The first panel of each table gives population proportions. Columns 2 and 3 report the proportion of households with no earners and with at least one earner, while the next three columns report those that have positive household-head earning, positive spouse earnings, and earnings by other household members. The second panel reports earnings inequality measures (the SCV) by group: the first three columns give inequality amongst all households, amongst non-earners (obviously zero), and amongst households with at least one earner, while the next three report for each subgroup (head, spouse, and other) inequality amongst individuals in that category with positive earnings. The last column reports the correlation between the head's and the spouse's earnings. The bottom panel gives the relative contribution of each group to household earnings inequality. It can be read in two ways. On the one hand, columns 2 and 3, which add up to one, give the contributions of households with earnings and those without. On the other hand, columns 2, 4, 5, and 6 decompose earnings inequality into that due to non-earners, and that due to each type of earner; it hence corresponds to decomposing earning inequality into the terms s_n, s_h, s_s, s_o given in equation (12).

We start with the decomposition for the U.S., reported in Table 5. For the first year we have data on the earnings of the head but not those of the spouse, hence we have grouped the last two components together. The data show a relative stability in the share of households not receiving any earnings and an upwards trend in the share with spousal earnings, capturing well-established trends in female labor force participation. In contrast, the fraction of households where the head had positive earnings declined, a trend that could be caused either by an aging population or by shifts towards either self-employment or unemployment.[16] Inequality measures, whether for earners, heads, or spouses, follow the same trend as overall earnings inequality, increasing up to 2000 and falling in 2004. Up to 2000 inequality is substantially higher for spouses than for heads, probably reflecting the greater prevalence of part-time employment of women. Inequality is

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[16]See Autor and Wasserman (2013) on the deteriorating labor market performance of American men.

TABLE 5
EARNINGS DECOMPOSITION BY EARNER: U.S. AND U.K.

Year	All Households	Non-Earners	Earners	Head	Spouse	Other Earners	Head–Spouse Correlation
U.S.							
Share of group in the population							
1974	1	0.220	0.780	0.707	0.291	0.213	
1979	1	0.224	0.776	0.699	0.348	0.202	
1991	1	0.250	0.750	0.662	0.435		
2000	1	0.228	0.772	0.663	0.375	0.194	
2004	1	0.244	0.756	0.640	0.366	0.174	
Inequality in earnings (SCV)							
1974	0.473	0	0.259	0.248	0.330	0.580	.
1979	0.466	0	0.250	0.232	0.318	0.577	0.075
1991	0.535	0	0.277	0.268	0.433		0.140
2000	0.711	0	0.435	0.560	0.623	0.629	−0.016
2004	0.668	0.000	0.382	0.478	0.467	0.610	−0.022
Relative contribution to earnings inequality							
1974	1	0.298	0.702	0.517	0.123	0.083	
1979	1	0.309	0.691	0.485	0.175	0.062	
1991	1	0.311	0.689	0.453	0.186		
2000	1	0.207	0.793	0.457	0.295	0.041	
2004	1	0.242	0.758	0.420	0.296	0.041	
U.K.							
Share of group in the population							
1974	1	0.276	0.724	0.634	0.326	0.192	
1979	1	0.318	0.682	0.593	0.317	0.168	
1991	1	0.410	0.590	0.476	0.313	0.204	
1999	1	0.413	0.587	0.477	0.308	0.203	
2004	1	0.399	0.601	0.520	0.296	0.188	
Inequality in earnings (SCV)							
1974	0.422	0	0.167	0.147	0.231	0.253	0.110
1979	0.488	0	0.174	0.140	0.253	0.223	0.078
1991	0.752	0	0.239	0.201	0.289	0.743	0.087
1999	0.805	0	0.266	0.246	0.301	0.654	0.111
2004	0.816	0	0.291	0.292	0.297	0.770	0.154
Relative contribution to earnings inequality							
1974	1	0.453	0.547	0.370	0.085	0.093	
1979	1	0.478	0.522	0.318	0.092	0.112	
1991	1	0.461	0.539	0.372	0.107	0.060	
1999	1	0.437	0.563	0.374	0.134	0.054	
2004	1	0.407	0.593	0.408	0.145	0.040	

even higher for other earners, and again is likely due to part-time or occasional employment for many individuals in this category such as teenagers or university students with summer jobs. When we look at the decomposition of earnings, we find a substantial increase in the contribution of earners (from 69 to 79 percent between 1979 and 2000), which follows closely the patterns in the distribution amongst households with positive earnings. The contribution of household heads has fallen and that of spouses increased over time, reflecting movements in the shares of individuals in each group that has positive earnings. The correlation between heads' and spouses' earnings presents a rather puzzling pattern: the correlation is positive and increasing in the earlier years, and negative and increasing in magnitude in the latter ones. The evidence is consistent with Burtless (1999), who finds an impact on inequality of the increased correlation between the earnings of husband and spouse over the period 1979–96. Our decompositions (not reported) indicate that this correlation was high between the mid-80s and the mid-90s (with a value of 0.14 for both 1986 and 1994) but started to decline thereafter (with a value of 0.09 in 1997). Again, a possible interpretation is that there was a move of household heads towards self-employment, which was facilitated by higher female participation and earnings.

The lower part of Table 5 presents the decomposition for the U.K. In this case we observe a sharp increase in the fraction of non-earners, which increased from 27.6 percent in 1974 to 39.9 percent by the end of the period, and which was accompanied by a reduction in the fraction of households with positive earnings for both the head and the spouse. As is the case for the U.S., inequality amongst households with positive earnings and amongst the three earners categories went up. We had previously seen that by the end of the period earnings inequality was higher in the U.K. than in the U.S. In contrast, when we consider only households with positive earnings, inequality is substantially lower in the U.K. (0.291 in 2004 compared to 0.382 in the U.S.). The reason for this difference is the higher and increasing fraction of households without earnings that we observe in the U.K. Despite the increase in the fraction of non-earners, the relative contribution of this group fell over the period as higher inequality amongst earners resulted in a more pronounced increase in the contribution of the latter (however, the absolute contribution increased for both). The relative contribution of both head and spouse grew over the period at the expense of that of other earners. Note also that, after a decline between 1974 and 1979, the correlation between head's and spouse's earnings increased steadily during the period.

Canada (see Table 6) presents patterns close to those in the U.S. The fraction of non-earners is moderate (between 20 and 26 percent) and relatively stable, while there is an upward trend in the fraction of spouses with positive earnings. Earnings inequality rose both for households with positive earnings and for each category of earners. The increase is similar in magnitude across the two countries (e.g., inequality amongst heads doubled between 1979/81 and 2004) but Canada had lower initial, and hence end-of period, inequality. Another similarity is that the relative contribution shifted away from non-earners and towards earners. The main difference between the two countries is the moderate increase in spousal inequality, which rose by 12 percent in Canada and by 41 percent in the U.S. between 1979/81 and 2004. As a result the increase in inequality in the former was

TABLE 6

EARNINGS DECOMPOSITION BY EARNER: CANADA AND GERMANY

Year	All Households	Non-Earners	Earners	Head	Spouse	Other Earners	Head–Spouse Correlation
Canada							
Share of group in the population							
1975	1	0.214	0.786	.650	.293	.271	
1981	1	0.213	0.787	0.659	0.351	0.225	
1991	1	0.245	0.755	0.687	0.323	0.209	
2000	1	0.261	0.739	0.696	0.324	0.212	
2004	1	0.255	0.745				
Inequality in earnings (SCV)							
1975	0.422	0	0.225	.170	.283	.553	0.186
1981	0.399	0	0.208	0.254	0.287	0.540	0.165
1991	0.511	0	0.264	0.316	0.285	0.518	0.290
2000	0.623	0	0.330	0.344	0.316	0.525	0.309
2004	0.651	0	0.357				
Relative contribution to earnings inequality							
1975	1	0.322	0.678	.371	.151	.140	
1981	1	0.339	0.661	0.426	0.172	0.085	
1991	1	0.317	0.683	0.503	0.149	0.064	
2000	1	0.283	0.717	0.520	0.155	0.062	
2004	1	0.263	0.737				
Germany							
Share of group in the population							
1984	1	0.362	0.638	0.557	0.245	0.199	
1989	1	0.347	0.653	0.567	0.283	0.206	
2000	1	0.343	0.657	0.562	0.320	0.175	
2004	1	0.357	0.643	0.543	0.321	0.124	
Inequality in earnings (SCV)							
1984	0.565	0	0.179	0.156	0.241	0.793	−0.018
1989	0.571	0	0.199	0.179	0.411	0.749	−0.077
2000	0.638	0	0.247	0.247	0.288	1.208	−0.038
2004	0.706	0	0.276	0.281	0.328	0.816	−0.045
Relative contribution to earnings inequality							
1984	1	0.502	0.498	0.345	0.098	0.055	
1989	1	0.466	0.534	0.320	0.158	0.056	
2000	1	0.410	0.590	0.375	0.186	0.029	
2004	1	0.392	0.608	0.375	0.214	0.019	

mainly driven by a more dispersed distribution amongst household heads, with their relative contribution going from 37 to 52 percent.

The German data exhibit a large fraction of non-earning households, although their share has been relatively stable over the period. This, combined with greater dispersion amongst earners, resulted in a reduction in the relative contribution of this group. Note, however, that the relative contribution of non-earners was throughout the period much higher than those observed in the U.S. or Canada: in Germany it accounted for between 40 and 50 percent of the overall dispersion, while in the north American economies it varied between 20 and 34 percent. This explains the high degree of household earnings inequality observed in Germany despite a moderate dispersion of earnings amongst earners. The proportional increase in inequality amongst earners is of similar magnitude to that observed in the U.S. (around 50 percent in both cases) but the *level* of inequality is much lower. The gap is particularly large for household heads, and at the peak of U.S. inequality (in 2000) the SCV for heads was twice as high in that country as in Germany. Patterns for spouses differ from those observed in other countries, with inequality amongst spouses falling from 1989 onwards and head and spouse earnings being systematically negatively correlated.

Table 7 reports the results for the Scandinavian economies. Both countries present similar patterns and are characterized by greater stability in factor contributions than the other four economies. Earnings inequality amongst households is mainly due to inequality amongst earners, which accounts for between 60 and 75 percent of inequality throughout the period, in line with what we observe in Canada and the U.S. Population proportions changed little over the period, although in Norway the fraction of spouses with earnings grew by 4 percentage points over the period. Inequality amongst earners grew by 22 percent in Sweden and by 40 percent in Norway (between 1979/81 and 2004/05), and in both countries it was driven by a greater dispersion of household head earnings, with the contribution of spousal earnings playing a moderate role. Note also that both countries have a positive and large correlation between the head's and spouse's earnings, going up to 0.39 in the case of Sweden, a correlation well above those observed in the Anglo-Saxon economies. This is clearly an important factor in generating substantial dispersion amongst households with positive earnings despite moderate degrees of inequality for heads and spouses.

7. Conclusions

This paper has examined the contribution of various factors and population subgroups to changes in inequality in six industrial countries in the late twentieth century and first years of the twenty-first century. A central question in our analysis has been to examine to what extent a more dispersed distribution of earnings has been responsible for the increase in household income inequality. As has been well documented by a large literature, during the 1980s and 1990s inequality in individual earnings rose in a number of countries, and it is natural to ask how this higher dispersion affected the distribution of household earnings and income. We find that household earnings inequality rose in all countries in our sample. Nevertheless, the impact of this increase on household income inequality

TABLE 7
EARNINGS DECOMPOSITION BY EARNER: NORWAY AND SWEDEN

	Year	All Households	Non-Earners	Earners	Head	Spouse	Other Earners	Head–Spouse Correlation
Norway								
Share of group in the population	1979	1	0.271	0.729	0.682	0.336	0.123	
	1991	1	0.254	0.746	0.677	0.318	0.212	
	2000	1	0.258	0.742	0.677	0.362	0.141	
	2004	1	0.249	0.751	0.688	0.377	0.119	
Inequality in earnings (SCV)	1979	0.478	0	0.213	0.192	0.299	0.976	0.227
	1991	0.522	0	0.262	0.246	0.189	0.488	0.202
	2000	0.537	0	0.270	0.259	0.168	0.642	0.224
	2004	0.564	0	0.299	0.279	0.227	0.714	0.242
Relative contribution to earnings inequality	1979	1	0.388	0.612	0.421	0.160	0.031	
	1991	1	0.326	0.674	0.423	0.169	0.082	
	2000	1	0.324	0.676	0.430	0.196	0.050	
	2004	1	0.294	0.705	0.450	0.220	0.035	
Sweden								
Share of group in the population	1975	1	0.255	0.745	0.716	0.313	0.042	
	1981	1	0.277	0.723	0.683	0.314	0.112	
	1992	1	0.282	0.718	0.681	0.315	0.040	
	2000	1	0.298	0.702	0.663	0.314	0.098	
	2005	1	0.292	0.708	0.676	0.304	0.092	
Inequality in earnings (SCV)	1975	0.508	0	0.251	0.218	0.246	0.610	0.238
	1981	0.555	0	0.262	0.216	0.190	1.328	0.278
	1992	0.628	0	0.310	0.264	0.178	0.827	0.330
	2000	0.665	0	0.318	0.275	0.204	0.882	0.354
	2005	0.660	0	0.321	0.269	0.213	0.941	0.394
Relative contribution to earnings inequality	1975	1	0.337	0.663	0.465	0.192	0.005	
	1981	1	0.346	0.654	0.434	0.216	0.004	
	1992	1	0.312	0.688	0.448	0.238	0.002	
	2000	1	0.319	0.681	0.447	0.212	0.022	
	2005	1	0.255	0.745	0.716	0.313	0.042	

varied. In the U.K. and the U.S. it was associated with a sharp increase in the contribution of earnings inequality to overall inequality, while in Germany and Sweden this contribution barely rose. The reason for this was that the continental Europe economies experienced a reduction in the share of earnings in total income that offset the impact of increased earnings dispersion. For example, in the U.S., an increase of the SCV of earnings of 41 percent between 1974 and 2004 and a stable earnings share resulted in an increase in the contribution of this factor of 40 percent. In contrast, in Sweden earnings inequality rose by 30 percent between 1975 and 2005, but a sharp decline in the share of earnings in household incomes implied no change in their contribution to overall inequality. It is interesting to note that in the 1950s it was the U.S. that experienced an increase in earnings dispersion that did not result in higher income inequality (see Atkinson, 2008a, 2008b).

The increase in earnings inequality was by far the most important contribution to greater income inequality in the U.S., but this was not the case in all countries. Canada and, especially, the U.K. experienced increases in earnings dispersion but also declines in the share of earnings that dampened the contribution of this factor to the increase in inequality. In both countries a higher share of self-employment income seems to have been an important force, while the contribution of capital income is also important in the U.K., particularly up to the mid-1990s. The experience of the U.K. indicates that the forces driving inequality may vary over time, even in the medium term. Jenkins (1995) showed that, in the early 1980s, the increase in income dispersion was partly driven by an increase in the contributions of self-employment income and income from property, a result that we also obtain over the period 1979–91. However, over the subsequent 13 years the contribution of inequality in property incomes fell (probably due to lower interest rates), and by 2004 was half of what it had been in 1991. Meanwhile the contribution of inequality in self-employment income kept growing, and rose from 2 percent to almost 9 percent during the period 1979–2004.

Germany exhibits little change in overall inequality, yet this stability hides substantial changes. Earnings dispersion increased while capital income inequality fell sharply, but since the share of the former fell and that of the latter rose, their contributions barely changed. Earnings exhibit a similar pattern in Norway and Sweden, with dispersion increasing but their share falling, resulting in a moderate impact on overall inequality. In contrast, increased capital income inequality was a major force, particularly in Norway. The time pattern contrasts with our findings for the U.K., where the contribution of capital income inequality increased and then decreased, roughly in line with changes in interest rates. We do not observe such behavior in the Scandinavian economies, where the increase in capital income inequality is likely to have been related to tax changes concerning this source of income.

When we decompose earnings inequality amongst non-earners, household heads, and spouses, we obtain some surprising results. All countries experienced an increase in household earnings inequality but the causes differed. In the U.S., Canada, and the U.K. it was the result of an increase in inequality for all types of earners. The latter country witnessed the largest increase in household earnings

dispersion, as greater inequality for heads and spouses was accompanied by a sharp increase in the number of non-earner households. Germany also witnessed a large increase in inequality for all types of earners, but the negative correlation between heads' and spouses' earnings moderated the rise in household earnings dispersion. In contrast, earnings dispersion in the two Scandinavian economies rose moderately for heads and spouses (and fell for the latter in Norway), but a positive, large, and rising correlation between the earnings of the two groups implied a substantial increase in household earnings inequality.

Our decompositions by age groups yield two main conclusions. First, as found in previous work, within-group inequality is much greater than inequality between age groups, with the latter accounting for between 7 and 28 percent of overall inequality (these figures are for the U.S. in 2000 and Sweden in 1975, respectively). When we compare the U.K. and the U.S. with Norway and Sweden, we find that the main difference lies in the degree of within-group inequality, which is much higher in the former, while differences in between-group inequality are small. Nevertheless, all countries have in common that the increase in inequality was driven almost exclusively by an increase in within-group inequality.

Second, we observe different patterns depending on the income source. There is evidence of an increase in between-group inequality in earnings, probably reflecting the increase in the returns to experience. In contrast, age differences play virtually no role in explaining capital income inequality, indicating that life-cycle savings are not the main cause for differences in this source of income. Self-employment is in general the most dispersed factor and between-group inequality represents a very small fraction of inequality for this type of income. We can, nevertheless, observe some changes over the period. In the earlier observations in our sample, self-employment income is particularly important amongst middle-aged households; by the end of the period, it made a contribution to inequality amongst young households too. This could be capturing the fact that the so-called "IT revolution" has been largely driven by small firms set up by young individuals, many of which have been phenomenally profitable.

Our results raise a number of questions for future work. One is to try to understand why in several countries the increase in earnings dispersion was associated with a reduction in the share of this factor in total household income. It is possible that there is a causal relation between the two that would be worth investigating. The second is a better understanding of the role of self-employment, which seems to have been a factor of growing importance in the last two decades of the century. In particular, we would like to understand whether high inequality in this factor is due to dispersion across individuals or to fluctuations over time for a given individual, an analysis that requires the use of panel data. From a theoretical point of view, our understanding of the determinants of self-employment is limited. Obviously, the decision to be self-employed or work as an employee is endogenous and depends both on the return and the variance of income from self-employment as compared to the wage rate and its variability. If increased dispersion in earnings is the result of greater wage uncertainty, it is possible that the increase in dispersion also induced a flow of labor from employment into self-employment, leading to the changes in the shares of these two factors that we have observed in a number of countries.

References

Aaberge, R. and A. B. Atkinson, "Top Incomes in Norway," in A. B. Atkinson and T. Piketty (eds), *Top Incomes: A Global Perspective*, Oxford University Press, Oxford, 2010.

Aaberge, R., A. Bjorklund, M. Jäntti, P. J. Pedersen, N. Smith, and T. Wennemo, "Unemployment Shocks and Income Distribution: How Did the Nordic Countries Fare During their Crises?" *Scandinavian Journal of Economics*, 102, 77–99, 2000.

Achdut, L., "Income Inequality, Income Composition and Macroeconomic Trends: Israel, 1979–93," *Economica*, 63, S1–27, 1996.

Atkinson, A. B., "Bringing Income Distribution in from the Cold," *Economic Journal*, 107, 297–321, 1997.

———, "The Long Run Earnings Distribution in Five Countries: 'Remarkable Stability,' U, V, or W?" *Review of Income and Wealth*, 53, 1–24, 2007.

———, *The Changing Distribution of Earnings in OECD Countries*, Rodolfo de Benedetti Lecture Series, Oxford University Press, Oxford, 2008a.

———, "Distribution and Growth in Europe—the Empirical Picture: A Long-Run View of the Distribution of Income," in L. Jonung and J. Kontulaine (eds), *Growth and Income Distribution in an Integrated Europe: Does EMU Make a Difference?* European Commission Directorate-General for Economic and Financial Affairs Publications, Brussels, 2008b.

Atkinson, A. B. and A. Brandolini, "Promise and Pitfalls in the Use of Secondary Data-Sets: Income Inequality in OECD Countries as a Case Study," *Journal of Economic Literature*, 39, 771–99, 2001.

Autor, D. and M. Wasserman, "Wayward Sons: The Emerging Gender Gap in Labor Markets and Education," Third Way Report, 2013.

Bourguignon, F., "Decomposable Income Inequality Measures," *Econometrica*, 47, 901–20, 1979.

Brandolini, A. and G. D'Alessio, "Household Structure and Income Inequality in Italy: A Comparative European Perspective," in D. del Boca and M. Repetto (eds), *Women, Work and the Family in a Comparative Perspective*, Peter Lang, New York, 2003.

Brandolini, A. and T. M. Smeeding, "Inequality Patterns in Western Democracies: Cross-Country Differences and Changes over Time," in P. Beramendi and C. J. Anderson (eds), *Democracy, Inequality, and Representation*, Russell Sage Foundation, New York, 25–61, 2008.

———, "Income Inequality in Richer and OECD Countries," in W. Salverda, B. Nolan, and T. Smeeding (eds), *Oxford Handbook of Economic Inequality*, Oxford University Press, Oxford, 2009.

Breen, R. and L. Salazar, "Has Increased Women's Educational Attainment Led to Greater Earnings Inequality in the United Kingdom? A Multivariate Decomposition Analysis," *European Sociological Review*, 26, 143–57, 2010.

———, "Education Assortative Mating and Earnings Inequality in the United States," *American Journal of Sociology*, 117, 808–43, 2011.

Burkhauser, R. V., S. Feng, and S. P. Jenkins, "Using the p90/p10 Index to Measure U.S. Inequality Trends with Current Population Survey Data: A View from Inside the Census Bureau Vaults," *Review of Income and Wealth*, 55, 166–85, 2009.

Burkhauser, R. V., S. Feng, S. P. Jenkins, and J. Larrimore, "Estimating Trends in US Income Inequality Using the Current Population Survey: The Importance of Controlling for Censoring," *Journal of Economic Inequality*, 9, 393–415, 2011.

Burtless, G., "Effects of Growing Wage Disparities and Changing Family Composition on the U.S. Income Distribution," *European Economic Review*, 43, 853–65, 1999.

Checchi, D. and C. García-Peñalosa, "Labour Market Institutions and Income Inequality," *Economic Policy*, 56, 601–49, 2008.

———, "Labour Market Institutions and the Personal Distribution of Income in the OECD," *Economica*, 77, 413–50, 2010.

Cowell, F. A. and S. P. Jenkins, "How Much Inequality Can We Explain? A Methodology and an Application to the United States," *Economic Journal*, 105, 421–30, 1995.

Drescher, J., "Income Inequality Decomposition by Income Source and by Population subgroups: A Theoretical Overview and the Empirical Case of Denmark," LIS Working Paper No. 209, 1999.

Evans, D. S. and L. S. Leighton, "Some Empirical Aspects of Entrepreneurship," *American Economic Review*, 79, 519–35, 1989.

Fei, J. C. H., G. Ranis, and S. W. Y. Kuo, "Growth and the Family Distribution of Income by Factor Components," *Quarterly Journal of Economics*, 92, 17–53, 1978.

Fields, G. S., "Income Inequality in Urban Colombia: A Decomposition Analysis," *Review of Income and Wealth*, 25, 327–41, 1979.

Fjærli, E. and R. Aaberge, "Tax Reforms, Dividend Policy and Trends in Income Inequality Empirical Evidence based on Norwegian Data," Discussion Papers No. 284, Research Department of Statistics Norway, 2000.

Flückiger, Y. and J. Silber, "Income Inequality Decomposition by Income Source and the Breakdown of Inequality Differences Between Two Population Subgroups," *Swiss Journal of Economics and Statistics*, 131, 599–614, 1995.

Fournier, M., "Inequality Decomposition by Factor Component: A 'Rank-Correlation' Approach Illustrated on the Taiwanese Case," *Recherches Économiques de Louvain*, 67, 381–401, 2001.

García-Peñalosa, C. and E. Orgiazzi, "Factor Components of Inequality: A Cross-Country Study," Gini Discussion Paper No. 12, 2011.

———, "Factor Components of Inequality: A Cross-Country Study," AMSE Working Paper No. 2013-18, 2013.

Garner T. I., "Consumer Expenditures and Inequality: An Analysis Based on Decomposition of the Gini Coefficient," *Review of Economics and Statistics*, 75, 134–8, 1993.

Giammatteo, M., "The Bidimensional Decomposition of Inequality: A Nested Theil Approach," LIS Working Paper No. 466, 2007.

Gollin, D., "Getting Income Shares Right," *Journal of Political Economy*, 110, 458–75, 2002.

Gottschalk, P., "Policy Changes and Growing Earnings Inequality in the US and Six Other OECD Countries," in P. Gottschalk, B. Gustafsson and E. Palmer (eds), *Changing Patterns in the Distribution of Economic Welfare. An International Perspective*, Cambridge University Press, Cambridge, 1997.

Gottschalk, P. and S. Danziger, "Inequality of Wage Rates, Earnings and Family Income in the United States, 1975–2002," *Review of Income and Wealth*, 51, 231–54, 2005.

Gottschalk, P. and T. M. Smeeding, "Cross-National Comparisons of Earnings and Income Inequality," *Journal of Economic Literature*, 35, 633–87, 1997.

Gustavsson, M., "A New Picture of Swedish Earnings Inequality: Persistent and Transitory Components, 1960–1990," *Review of Income and Wealth*, 54, 324–49, 2008.

Jäntti, M., "Inequality in Five Countries in the 1980s: The Role of Demographic Shifts, Markets and Government Policies," *Economica*, 64, 415–40, 1997.

Jäntti, M. and S. P. Jenkins, "The Impact of Macroeconomic Conditions on Income Inequality," *Journal of Economic Inequality*, 8, 221–40, 2010.

Jenkins, S. P., "Accounting for Inequality Trends: Decomposition Analyses for the UK, 1971–86," *Economica*, 62, 29–63, 1995.

Jenkins, S. P. and P. van Kerm, "Accounting for Income Distribution Trends: A Density Function Decomposition Approach," *Journal of Economic Inequality*, 3, 43–61, 2005.

Karoly, L. A., "Changes in the Distribution of Individual Earnings in the United States: 1967–1986," *Review of Economics and Statistics*, 74, 107–15, 1992.

Lemieux, T., "The Changing Nature of Wage Inequality," *Journal of Population Economics*, 21, 21–48, 2008.

Lerman, R. I. and S. Yitzhaki, "Income Inequality Effects by Income Source: A New Approach and Applications to the United States," *Review of Economics and Statistics*, 67, 151–6, 1985.

Machin, S., "Wage Inequality in the UK," *Oxford Review of Economic Policy*, 12, 47–64, 1996.

Machin, S. and J. Van Reenen, "Technology and Changes in Skill Structure: Evidence from Seven OECD Countries," *Quarterly Journal of Economics*, 113, 1215–44, 1998.

Mookherjee, D. and A. F. Shorrocks, "A Decomposition Analysis of the Trend in UK Income Inequality," *Economic Journal*, 92, 886–992, 1982.

Mussard, S., "The Bidimensional Decomposition of the Gini Index. A Case Study: Italy," *Applied Economics Letters*, 11, 503–05, 2004.

Parker, S., "The Inequality of Employment and Self-Employment Incomes: A Decomposition Analysis for the UK," *Review of Income and Wealth*, 45, 263–74, 1999.

Podder, N., "The Disaggregation of the Gini Coefficient by Factor Components and Its Applications to Australia," *Review of Income and Wealth*, 39, 51–61, 1993.

Pyatt, G., C. Chen, and J. Fei, "The Distribution of Income by Factor Components," *Quarterly Journal of Economics*, 95, 451–74, 1980.

Shorrocks, A. F., "Inequality Decomposition by Factor Components," *Econometrica*, 50, 193–211, 1982.

———, "The Impact of Factor Components on the Distribution of Family Incomes," *Quarterly Journal of Economics*, 98, 311–26, 1983.

van den Noord, P. and C. Heady, "Surveillance of Tax Policies: A Synthesis of Findings in Economic Surveys," OECD Economics Department Working Papers, No. 303, OECD Publishing, 2001.

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