Income Inequality and Income Mobility in the Scandinavian Countries Compared to the United States *

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Abstract

This paper compares income inequality and income mobility in the Scandinavian countries and the United States during 1980-90. The results suggest that inequality is greater in the United States than in the Scandinavian countries and that this inequality ranking of countries remains unchanged when the accounting period of income is extended from one to eleven years. The pattern of mobility turns out to be remarkably similar, in the sense that the proportionate reduction in inequality from extending the accounting period of income is much the same. But we do find evidence of greater dispersion of first differences of relative earnings and income in the United States. Relative income changes are associated with changes in labour market and marital status in all four countries, but the magnitude of such changes are largest in the United States.

JEL Key Words: D31 Personal Income and Wealth Distribution

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1 Introduction

Social scientists have for a long time strived for making international comparisons of income and earnings distributions. Until recently, sufficiently comparable cross-country data have not been available. Thanks to the efforts put into the Luxembourg Income Study (LIS), such comparisons have recently acquired much more credibility, since the researchers behind LIS have invested heavily in bridging gaps in comparability. Recent surveys, such as Gottschalk and Smeeding (1997), that document the levels of inequality of annual disposable income in the LIS member countries find that the Nordic countries are ranked among the countries with the lowest annual income inequality while the United States is among the countries with the highest degree of inequality.

There is also a growing, more labor economics oriented literature, on international comparisons of annual and hourly earnings inequality (see e.g. Freeman and Katz 1995). These comparisons are based on national data sets that have not been subject to the same kind of standardization as those in LIS. The results, however, are quite similar: the United States ranks very high and the Nordic countries very low in terms of inequality.

Many economists, however, question the appropriateness of examining the inequality of single-year incomes (and earnings) and would rather observe the inequality of permanent income. It has long been recognized that there could be high annual income inequality even if the inequality of permanent income is very low. This could occur e.g. because of a non-uniform structure of life-cycle earnings. The more individuals, or households, move over time up or down the income ladder, the more single-year inequality will deviate from the inequality of income measured over a longer period of time. If there are differences in income mobility across countries, single-year inequality rankings may yield a misleading picture of the long-term income inequality ranking. Therefore, it is both relevant and interesting to study cross-country inequality rankings when the accounting period is extended.

There is not, however, complete agreement as to whether income mobility is good or bad (cf. Atkinson et al. 1992). Those who claim that income mobility is good have argued that it enhances both equity and efficiency, in that it provides economic incentives. Milton Friedman (1962) has expressed this view in a passage in Capitalism and Freedom:

> A major problem in interpreting evidence on the distribution of income is the need to distinguish two basically different kinds of inequality; temporary, short-run differences in income, and differences in long-run income status. Consider two societies that have the same distribution of annual income. In one there is great mobility and change so that the position of particular families in the income hierarchy varies widely from year to year. In the other, there is great rigidity so that each family stays in the same position year after year. Clearly, in any meaningful sense, the second would be the more unequal society. The one kind of inequality is a sign of dynamic change, social mobility, equality of opportunity; the other of

a status society. The confusion behind these two kinds of inequality is particularly important, precisely because competitive free-enterprise capitalism tends to substitute the one for the other.

This passage captures many of the arguments that have been raised in favor of income mobility. First, it is a sign of a dynamic and hence more flexible, or efficient, economy. Second, Friedman emphasizes that income mobility contributes to social mobility or equality of opportunity. No doubt, this is correct in the sense that the income history of an individual will not be as important for the future income stream as it would otherwise be. Finally, high income mobility will, everything else being equal, make the distribution of lifetime income more equal. A counter argument is that lifetime income is not necessarily a complete measure of inequality. If e.g. it is costly for the individual to transfer income from one period to another and with uncertainty about the future, the income received in a given period will also matter for the welfare of the individual. Amartya Sen concludes a discussion of the issue by saying that cross-section and lifetime inequality "supplement each other, reflecting two different aspects of it".[1]

For these reasons, it is important to compare income inequality across countries based also on longer time periods than one year and to compare also income mobility across countries. As the LIS has demonstrated, attaining comparability in a single year is a time-consuming and demanding task. Doing so for multi-year studies has only rarely been attempted.[2] Using longitudinal data sets from four countries – Denmark, Norway, Sweden and the United States – the present study explores the following questions:

1. What is the ordering of countries with respect to inequality of earnings and income, and does this ordering change when the accounting period is extended from one to several years?

2. What is the ordering of countries with respect to the mobility of earnings and income?

3. Which factors are associated with changes in relative income?

We study the mobility of individuals using three income concepts: individual earnings, family market income and family disposable income. Data are available for the 1980s. More complete data are available for the 1986–1990 period than for the longer time period, so separate analyses are made for the 1980-90 and for the years 1986 to 1990. To get some idea of what accounts for individual mobility, we explore the magnitude of changes in relative earnings (1980-90) and disposable income (1986-90) that are associated with shifts in labor market and marital status using regression techniques.

A comparison between these Scandinavian countries and the United States is, in our view, particularly relevant. Because previous studies of annual income (and earnings) inequality have placed the Scandinavian countries at the top

[1] See his contribution to the stimulating discussion of the issue in Krelle and Shorrocks (1978).

[2] Fritzell (1990), Burkhauser and Poupore (1997), Burkhauser et al. (1998) and OECD (1996) are examples of cross-national longitudinal income distribution comparisons. We discuss their findings in the concluding section of this paper.

in terms of equality and the United States at the bottom, evidence from these countries is ideal in order to determine whether there is a tradeoff between inequality of annual income and mobility. There are several reasons to believe that the Scandinavian countries might differ from the United States in terms of mobility. The macroeconomic background and the institutional settings differ between those four countries. Labor market trends and public sector policies regarding benefits and taxes influence the distribution of all three income concepts, both in any given cross-section as well as dynamically.

The unemployment experience of the four countries differed in many respects in the 1980s. Until the mid-1980s, unemployment profiles were similar and at a high level in Denmark and the United States. They were also quite similar, but at a lower level in Norway and Sweden. In the second period of our analysis, from 1986 to 1990, unemployment was increasing in Denmark and Norway but decreasing in Sweden and the United States. The distributional impact of unemployment depends on the dynamic structure of unemployment, on the importance of tenure for earnings and on the coverage and replacement rates of income transfer schemes. As tenure accounts for a sizeable part of earnings in the United States (Topel 1991), displaced workers will experience a significant reduction in post- compared to pre-unemployment wages. The Scandinavian countries differ in this respect as the tenure effect could be small (Westergård-Nielsen 1996). Denmark stands out as the country having the highest level of long-term unemployment during the period. As tenure effects are small in Denmark, losses for displaced workers appeared more as the consequence of more unemployed people either leaving the labor force or being employed temporarily in labor market programs with a compensation lower than the pre-unemployment wage. At the same time, however, a recent Danish study (Bingley et al. 1995) on mobility of wages between deciles in the distribution based on panel data for 1980 to 1990 found that unemployment was the single most important obstacle to upwards wage mobility.

These observations may partly be explained by the much lower wage dispersion and the higher level of the minimum wage in the Scandinavian countries. This is reinforced by the much higher public sector share of employment in the Scandinavian countries, as the variance in the earnings distribution is smaller in the public than in the private sector, cf. Pedersen et al. (1990) and Zetterberg (1990). Thus, unemployment seems to induce some downward mobility in the income distribution, but since the earnings distribution is much more compressed in the Scandinavian countries, the effect is much smaller than in the United States.

Related to differences in the sectoral distribution of employment are differences in the participation rate among married women. Transition rates between employment and non-participation are lower for married women in the Scandinavian countries than in the United States OECD (1991). With married women predominantly working in the public sector – which is more resistant to cyclical chocks – the higher and more stable level of female participation in the Scandinavian countries tends to stabilize average market income per person in the household.

Finally, the impact from unemployment on disposable income is expected to differ between Scandinavia and the

United States because of the differences in unemployment insurance and social welfare. On all parameters, i.e. coverage, benefits relative to pre-unemployment wages and benefit duration, the Scandinavian unemployment insurance systems are much more generous. The risk of large income losses due to unemployment is thus much reduced in the Scandinavian countries.

Gottschalk and Moffitt (1994) analyze a number of factors that might explain the increase in earnings instability found in recent empirical studies with US data. No single factor emerges as being the most important, but some of the factors they view as likely candidates for an explanation were present in the Scandinavian countries in the 1980s (Gottschalk and Moffitt 1994, pp. 218–219). This is the case with the decline in regulation, the disappearance (or decline in the extent) of administered prices and the general increase in competition. Another factor mentioned by Gottschalk and Moffitt (1994), the decline in unionization, clearly is irrelevant in the Scandinavian context.

The rest of the paper is structured as follows. We give in Section 2 precise definitions of income concepts, research population and time periods. Because we use micro data from each country, we employ identical definitions of the basic units. Indeed, our choice of definitions are to a large extent motivated by the need for comparability between the countries we study. We also present the methods we use in Section 2. Section 3 contains the results on inequality and mobility orderings. Section 4 presents our approach to exploring the correlates of income mobility. The main results are summarized and discussed in Section 5.

2 Data and methods

Data

There are a large number of specific choices to make in a study of this sort, in the making of which the need for similarity across countries has to be borne in mind. We must specify the time period(s) to cover, the relevant income receiving unit (individual, family or household) and the appropriate unit of analysis (individual, family or household, again). We must also decide on what income concepts to study, how to delimit and choose the populations to be researched, and, depending on what income and analysis units are chosen, we have to specify an (at least implicit) equivalence scale.

We study the distribution of: (1) earnings of those who had strictly positive earnings in every year; (2) the market income of individuals over the time period and (3) the disposable income of individuals. We define earnings, (1), as the individuals' earnings plus work-related transfers, such as unemployment insurance, sick pay and part-time pensions. The restriction to positive earnings is quite standard in the earnings mobility literature (see e.g. Gottschalk and Moffitt 1994). For (2) and (3), the income receiving unit is the family but the unit of analysis is the individual. Market income consists of factor incomes. Disposable income is: market income – taxes paid + non-work-related social transfers

excluding social assistance and income in-kind. The exclusion of certain transfers is data-driven. Because we use the same sample to analyze market income and disposable income, we can use the first-order incidence method to examine the impact of taxes and transfers on income inequality and mobility.

We assign the market (disposable) income per adult member to the individuals we study, rather than (conventional) equivalent income (defined over all members in the household). I.e., for a married couple, we divide the sum of each spouse's market (disposable) income by two and assign the resulting number to each spouse. The "family" we define as consisting of the head and the spouse, if they are married, and as the individual in all other cases. We ignore income from other household members, adults and children alike. This means that we also ignore the income of the partner in a co-habiting couple. This is a choice that is dictated by the need for comparability across countries.[3] To examine the sensitivity of our results to this choice we conduct also a more conventional analysis for three countries.

Negative disposable or market incomes are censored at zero in each year.[4] The proportions of zero and negative incomes (available from the authors on request) vary somewhat from country to country and by income concept, but are at the very largest below 5 percent. All incomes are expressed in 1990 prices in each country's own currency, using the consumer price indices. Since it is income inequality, rather than the level of living we are comparing, we have not used any method for converting domestic currencies into comparable units.

The most important difference to some common practices in our income definitions is that we gross count capital income instead of subtracting interest paid on loans. We have also settled for including all work-related social transfers in earnings. Public sector transfers that are not work-related, but either universal or means-tested, are included in disposable income.

We study two (overlapping) samples in two time periods, namely 1980 to 1990 (Sample 1) and 1986 to 1990 (Sample 2). The samples that we study are as follows. In the first period we study individuals born between 1927 and 1951 (Sample 1). The youngest sample members are 29 in 1980 and the oldest are 63 in 1990. In the second period, we include persons born between 1927 and 1961, which makes the age range 25 to 63 (Sample 2; which thus includes all those who are in Sample 1 and those born between 1952-1961). These choices are primarily to enable the study of the working-age population. Also, we want to use consistent age groups within each of the two time periods. For all samples we only include those who lived in the country during the whole period.

Detailed data descriptions

The Danish data are based on the Longitudinal Data Base (LDB), which is a 5 per cent random sample of the Danish adult population, covering the years 1976-1990. It has been supplemented with additional observations (mainly from

[3] We are not always able to find out the structure of the household an individual lives in. For some countries, for some years, we do not know the number of children in the household, nor do we know the number of other adults. We have, therefore, settled for the somewhat unconventional solution, described above.

[4] Incomes are first added up in the family and then censored at zero if they are negative.

young generations) during the years in order to keep it representative of the population. The information in the sample is register based and stems from tax and income registers, unemployment insurance registers, educational registers etc. administered by the Statistics Denmark. Thus, the sample does not suffer from the traditional types of sample attrition. The master sample is described in greater detail in Westergård-Nielsen (1985). We use data from two sub-samples of the LDB. The analysis of earnings uses a random 1 per cent sample of the Danish population. As the earnings data include only those individuals who had positive wage income or unemployment payments in each of the years, the 1 per cent sample reduces to 11,734 individuals in these calculations. The household sample stems from a 0.5 per cent random sample of the Danish population.

The annual **earnings** (*lønindkomst*) and the unemployment payments (*arbejdsløshedsdagpenge*) are defined as the amounts registered by the tax authorities. The registration of earnings is based on the employers' pay-rolls. Unfortunately, for confidentiality reasons, all income variables have been censored at 200,000 DKK for the years 1980-1981. As a consequence, income inequality for these years are underestimated. The income as self-employed or assisting spouse is not included in the wage income concept. Thus, wage income is not equal to "labor income". In the Danish data it is not possible to separate out labor income earned working as self-employed or as assisting spouse.

Household **market income** (*bruttoindkomst*) includes wage income, capital income (positive or negative), income as self-employed or assisting spouse, unemployment insurance payments and taxable public transfers (public pensions, public grants for students etc.). **Disposable income** is calculated as the market income of the family, net of income taxes, but including some non-taxable transfers. Income taxes are calculated by applying the Danish tax rules for each of the years on the variable taxable income (*skattepligtig indkomst*) which is included in the LDB. The public transfers included in the disposable income concept are child allowances (*børnetilskud* + *børnefamilieydelse*) and housing subsidies to renters (*boligsikring*). Until 1986, child allowances were means-tested against household income. Child allowances have been flat rate since 1987 and depend only on the number and the age of the children.

For Norway we use data from Statistics Norway's Income Distribution Survey (IDS) and Tax Assessment Files (TAF). These data sources are based on filled in and approved tax reports. The IDS provides detailed information about reported incomes, legal deductions, taxes paid and transfer payments received. The TAF contains income from labor and taxes. Our analyses are based on data from 2,047 persons in the IDS and 621804 persons in the TAF. The TAF covers years beginning in 1967 and the IDS covers the years 1986-1990, corresponding to our long and short periods.

The Norwegian **earnings** variable is *lönnsinntekt* – wage and salary income. **Market income** adds self-employment income and capital income to earnings, *markedsinntekt = lönnsinntekt + netto näringsinntekt (för fradrag for avskrivningar og fondsavsetninger) + brutto kapitalinntekt (för fradrag for geldsrenter og underskud i borettslag).* **Disposable income** adds to market income all social transfers and deducts direct taxes, *disponibel inntekt = markedsinntekt +*

overföringer (ytelser fra folketrygden + tjenestepensjon + livrenter o.l. + bidrag o.l. + barnetrygd + bostötte + stipendier + försörgerfradrag) - skatt.

All Swedish data are taken from the Level of Living Surveys (see Erikson and Åberg 1987). All income variables that we use originate from tax-based registers, not interviews. The exact definition of **earnings** is *inkomst av tjänst* – income from labor. This income concept consists of wage and salary income paid by the employer. In addition, taxable work-related income transfers, such as unemployment insurance and sickness payments are included, as well as part-time pensions and maternity leave payment. The income that self-employed get from their business is not included.

Market income adds to earnings other sources of income. These are: (1) capital, (2) own business, (3) real estate and (4) farm income. The Swedish income concept is *sammanräknad inkomst* – total income – with the exception that we exclude capital gains (*Inkomst av tillfällig förvärvsverksamhet*) to achieve comparability with the other countries. **Disposable income** is obtained by adding the income (market income) of both spouses. From this total factor income we subtract income taxes and add the largest non-taxable transfers, namely child allowances. We are unable to include the non-taxable housing allowance (*bostadsbidrag*) or social assistance (*socialbidrag*), which are fairly small compared to the child allowances.

The U.S. data are taken from the Panel Study of Income Dynamics (PSID) (Morgan et al. 1992). The PSID is a panel of households that was started in 1968 and consisted at that time of about 5000 households. The most complete information in the PSID, and the information that we use, is about the household head and the spouse. All information in the PSID is collected by interviews, mostly by telephone. Validation studies have found the income data in the PSID to be of quite high quality (see e.g. Bound and Krueger 1991).

The U.S. data differ in some respects from those available for the other countries. The income data are based on interviews and (especially non-random) measurement error is likely to be more of an issue. Also, the concept of disposable income is less complete. For instance, the PSID only has information on federal, not on local or state, income taxes. We only use information about the head and the spouse, i.e., income from other household members is ignored. In calculating the various statistics, we use sample weights, the use of which yields population level statistics.

The PSID has complete information on **earnings** for heads and wives. We use the variables total labor income for each spouse separately. Unfortunately, this includes the estimated labor part of business income. Wages and salaries, a variable free of such estimated numbers, is not available for the wife. The estimated part of business income is likely to increase measurement error and thus leads us to overestimate mobility of earnings in the United States.

We use the PSID variable "total taxable income" of head and wife as our **market income**. **Disposable income** is arrived at by adding non-taxable transfers, such as e.g. Aid to Families with Dependent Children, to market income and by subtracting taxes from this. Only federal taxes are subtracted. Local and state taxes, however, are quite small

relative to federal.

Measurement of income inequality and income mobility

In general, income inequality is expected to decrease when the the accounting period is extended. The extent of inequality decline depends on the frequency of shifts in relative positions within the annual income distributions as well as on the magnitude of changes in annual relative incomes. In order to reflect this relationship between income mobility and income inequality, measures of income mobility should depend on the magnitude of the changes in annual incomes arising from shifts in the individuals' position over time. Note that conventional measures of mobility that are based on transitions between deciles or quintiles lack this property and are therefore less appropriate measures of income mobility. This is because even minor changes in annual incomes may result in frequent shifts between deciles or quintiles, suggesting a high degree of mobility.

Shorrocks (1978) introduced as an alternative to the transition matrix approach a family of mobility measures that incorporates the close relationship between income mobility and income inequality. The state of no mobility occurs if the annual individual income *shares* are constant over time. The present study, however, defines immobility to occur if the annual *rankings* of all individuals are constant over time. Our approach could indicate that there is no mobility even though the individual income shares change over time. The advantage of our definition, over that proposed by Shorrocks (1978), is that it allows for a measure of income mobility based on the Gini coefficient. The normative implications of using the Gini coefficient to measure inequality have been discussed, among others, by Sen (1974) and Yaari (1988).

Our approach is similar to that of Shorrocks in that both define mobility in terms of the relation between single-year and multi-year inequality. Mobility is measured as the relative reduction in the weighted average of single-year inequality when the accounting period of income is extended. The Shorrocks approach has previously been used by e.g., Björklund (1993) who used the coefficient of variation to define a measure of income mobility, while Aaberge and Wennemo (1993) and Gustafsson (1994) used the Gini coefficient as basis for measuring income mobility. Burkhauser and Poupore (1997) used both the Gini and the Theil index of inequality.

Consider a period of T years and let G and μ be the Gini coefficient and the mean of the T-year distribution of income. Furthermore, let G_t and μ_t be the Gini coefficient and the mean of the distribution of income in year t. To arrive at a measure of mobility, it appears useful to introduce the "natural" decomposition of the Gini coefficient (see Rao 1969), from which the following inequality can be easily derived:

$$G \leq \sum_{t=1}^{T} \frac{\mu_t}{\mu} G_t, \tag{1}$$

with strict equality if and only if all individuals maintain their position within the distribution of annual income in all years. The T-year inequality is strictly less than the weighted average of the inequality within the separate years unless no individual position shifts take place. Thus, when individuals do change their annual rank positions, equation 1 suggests that M, defined by

$$M = 1 - \frac{G}{\sum_{t=1}^{T} \frac{\mu_t}{\mu} G_t}, \tag{2}$$

is an appropriate measure of mobility. The minimum value of M, zero, is attained if and only if there is no mobility. The maximum attainable value of one occurs when complete equality in the distribution of the T-year incomes arises from income mobility. The mobility index M provides guidance to the second of our questions, namely the ordering of countries with respect to the mobility of incomes.

3 Income inequality and mobility

We start the presentation of our results by looking at inequality of annual incomes. Figure 1(a) shows the time-series of our Gini coefficient for earnings for Sample 1, Figure 1(c) the same information for market income, and Figure 1(e) the same information for disposable income (these data are also shown in Table A 1). Further, the time-series of inequality for earnings, market income and disposable income for Sample 2 are shown in Figure 1(b), 1(d) and 1(f) (see also Table A 2).

In both samples and with all three income concepts, the United States has much higher inequality than the Scandinavian countries. For earnings, the difference in the Ginis between United States and the Scandinavian countries exceeded 0.1 during the years 1980–1990 (Figure 1(a)). The differences are of comparable orders of magnitude for disposable income and market income.[5] There is also a marked trend in inequality of all income concepts.[6] Both of these findings are in line with earlier research and lend credibility to our choices of populations and income concepts; e.g., the discrepancy between the United States on one hand and Sweden and Norway on the other has been found in analyses of the LIS data (see e.g. Gottschalk and Smeeding 1997). That inequality increased substantially in the United States throughout the 1980s is well established.

The differences between the Scandinavian countries are small compared to the differences between these countries and the United States. The largest inter-Scandinavian differences are found for market income in the last two years of Sample 2 when the differences between Sweden and Norway are .07. For no other income concept or sample does the difference exceed .05.

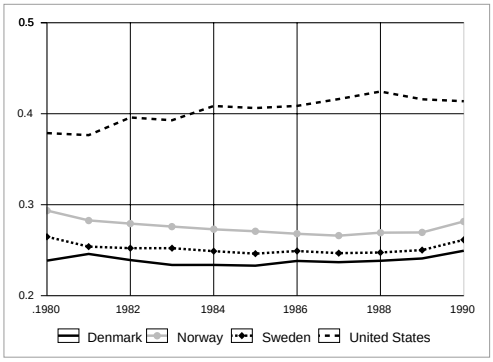
[5] In judging whether these differences are "small" or "large", the reader can use the property that the Gini coefficient equals half the expected income difference relative to the mean between two randomly drawn individuals in the population.

[6] In looking at the trend in earnings inequality in the United States, it should be recalled that our sample is different from commonly used samples. In particular, our sample differs from those in many other studies because we include both men and women (most study men and women separately) and we restrict the analysis to a balanced panel of those who had positive earnings in *every* sample year (rather than an unbalanced panel or series of cross-section).

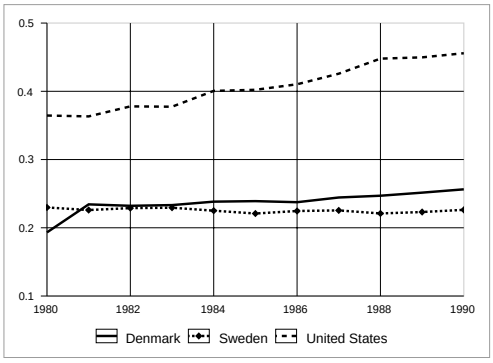
Figure 1 Gini coefficients for annual income, Sample 1 (1980–1990) and Sample 2 (1986–1990)

Sample 1 (1980–1990)

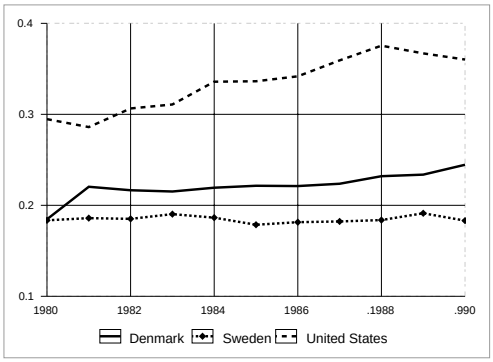
(a) Earnings



(c) Market income

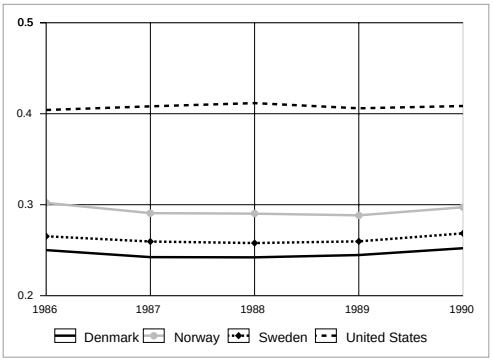


(e) Disposable income

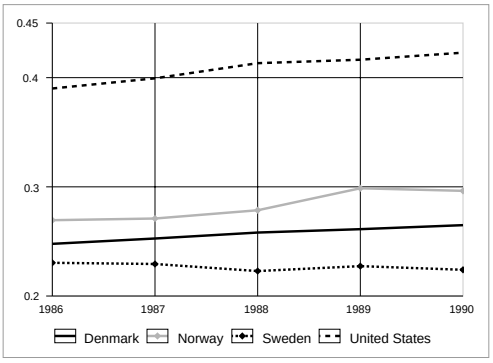


Sample 2 (1986–1990)

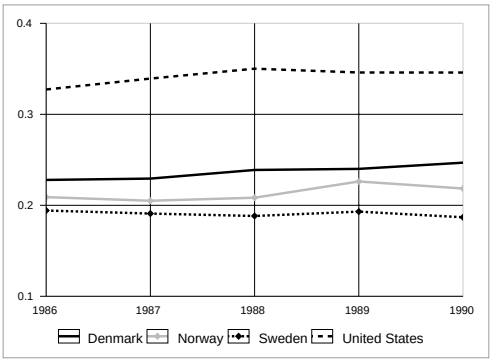
(b) Earnings



(d) Market income



(f) Disposable income



Source: Authors' calculations from Danish, Norwegian, Swedish and U.S. longitudinal data.
Note: See section 2 for details on sample and variable definitions.

Table 1 Gini coefficients of over-time average income

(a) Sample 1 average income (1980–1990)

		Average		
		Earnings	Market income	Disposable income
Denmark	Gini	0.220	0.219	0.204
	SE(Gini)	(0.002)	(0.004)	(0.003)
Norway	Gini	0.256		
	SE(Gini)	(0.000)		
Sweden	Gini	0.234	0.200	0.156
	SE(Gini)	(0.004)	(0.004)	(0.003)
United States	Gini	0.378	0.368	0.305
	SE(Gini)	(0.013)	(0.010)	(0.009)

(b) Sample 2 average income (1986–1990)

		Average		
		Earnings	Market income	Disposable income
Denmark	Gini	0.232	0.245	0.224
	SE(Gini)	(0.002)	(0.003)	(0.003)
Norway	Gini	0.278	0.263	0.197
	SE(Gini)	(0.000)	(0.007)	(0.006)
Sweden	Gini	0.250	0.211	0.172
	SE(Gini)	(0.004)	(0.004)	(0.003)
United States	Gini	0.389	0.383	0.321
	SE(Gini)	(0.010)	(0.007)	(0.007)

Source: Authors' calculations from Danish, Norwegian, Swedish and U.S. longitudinal data.
Note: Standard errors in parentheses. See section 2 for details on sample and variable definitions.

Table 2 Mobility indices

(a) Sample 1 (1980–1990)

	Mobility		
	Earnings	Market income	Disposable income
	Gini	Gini	Gini
Denmark	0.080	0.076	0.078
Norway	0.069	***n.a.***	***n.a.***
Sweden	0.073	0.115	0.154
United States	0.065	0.097	0.092

(b) Sample 2 (1986–1990)

	Mobility		
	Earnings	Market income	Disposable income
	Gini	Gini	Gini
Denmark	0.057	0.046	0.054
Norway	0.053	0.070	0.075
Sweden	0.045	0.071	0.097
United States	0.051	0.062	0.060

Source: Authors' calculations from Danish, Norwegian, Swedish and U.S. longitudinal data.
Note: Standard errors in parentheses. See section 2 for details on sample and variable definitions.

By comparing the inequality of market and disposable income, we also get an estimate of the equalizing effect of taxes and child allowances, albeit under the assumption of no behavioral responses. Our results indicate that taxes and transfers in Norway and the United States lead to the by-far greatest reduction in inequality. The difference between the Gini coefficient of market and disposable income clusters around .07 for Norway and the United States in Sample 2. The difference in Sweden is around .04, whereas in Denmark the differences are smaller.[7] It should be be kept in mind, though, that a larger number of transfers are included in disposable income in Norway and in the United States than in the other two countries. Moreover, the U.S. transfers are in general means-tested and are therefore strongly redistributive as measured by the first-order incidence method.

We continue with comparing single-year inequality with multi-year inequality, our Question 1. Table 1(a) contains the numbers for Sample 1 and Table 1(b) those for Sample 2. For Sample 1 the results are quite clear; inequality is

[7]The differences we estimate for Sweden are only about one half as large as those estimated by Björklund et al. (1995). The most likely reason for this discrepancy is that they take the number of children into account when calculating equivalent income. In particular, the equalizing effect of child allowances is larger in doing so.

highest in the United States for all income concepts and the differences against the Scandinavian countries are fairly large. There is, however, a slight tendency for the differences to be smaller when incomes are averaged over several years than in single-year inequality comparisons. For example, the difference in the Gini coefficients between the United States and Denmark of the eleven year average of disposable income is .10, but around .12 for annual disposable income. The differences between the Scandinavian countries are relatively small and their ordering depends on the income concept. The pattern for Sample 2 is similar in the sense that inequality is higher for the United States than for the Scandinavian countries.

An interesting finding is that the equalizing impacts of taxes and transfers, in the mechanical sense used above, are of similar magnitudes when the time period is extended from 1 to 5 or 11 years. This means that extending the accounting period does not deprive the "welfare state" of its equalizing effect.

Finally, we turn to the comparison of income mobility, our Question 2. The numbers in Table 2(a) for the 1980–90 period suggest that mobility of earnings is lower in the United States than in the Scandinavian countries. By contrast, mobility of market and disposable income is higher in the United States than in Denmark. However, mobility in the distribution of market and disposable income in Sweden is higher than in the United States. Turning to Table 2(b), we can see that the mobility indices, as expected, are lower for the 1986–90 period. The ordering of countries with respect to earnings mobility is different in this period, but the cross-country differences are very small.

It should noted that mobility ordering by market and disposable income is consistent across the two periods, in the sense that no ordering of countries in the 1980-90 analysis is changed in the 1986-90 period. E.g., Sweden is more mobile on market and disposable income than the United States, which in turn is more mobile on market and disposable income than Denmark. The estimated mobility indices for Sample 2 suggest that the United States has less mobility than Sweden and Norway, followed only by Denmark.

We are somewhat surprised to see that mobility in the distribution of disposable income is higher than in that of market income for all countries, except the United States, in both samples. We had expected that the "welfare state" in terms of taxes and transfers would smooth income over longer periods and thus reduce mobility even more for disposable income than for market income. In the light of these results, this does not appear to be the case. To understand this particular aspect of our results requires further study. One possible reason could be that we do not adjust incomes to reflect changes in, e.g., the number of children living in the household, a possibility we examine in our sensitivity analysis.

Sensitivity analyses

There is always a risk in a study of this type that the conclusions are sensitive to some specific choices. We have chosen to study whether the following issues, if handled differently, would lead us to draw different conclusions:

Table 3 Male earnings inequality and mobility – 1980–1990 and 1986–1990

		Denmark	Norway	Sweden	United States
1980-1990	Average Gini	0.183	0.192	0.200	0.336
	SE(Gini)	(0.002)	(0.000)	(0.005)	(0.017)
	Mobility	0.097	0.090	0.078	0.080
1986-1990	Average Gini	0.208	0.221	0.250	0.357
	SE(Gini)	(0.002)	(0.000)	(0.004)	(0.013)
	Mobility	0.063	0.066	0.045	0.055

Source: Authors' calculations from Danish, Norwegian, Swedish and U.S. longitudinal data.
Note: Standard errors of Gini coefficients in parentheses. Samples include only men with positive earnings in sample period. See text for definition of earnings and other sample restrictions.

1. whether restricting the sample to only men, rather than both men and women would alter the pattern of earnings inequality and mobility;

2. whether the restriction to only treat married couples as families (and hence aggregate their income), rather than to similarly treat cohabiting couples, in combination with not using a traditional equivalence scale affects our results;

3. whether the inequality and mobility rankings of the United States is sensitive to the inclusion of racial minorities;

4. whether the treatment of unemployment benefits as part of earnings influences the extent of earnings inequality and mobility in the United States.

We deal with each of these questions in turn.

There are larger inter-country differences in the patterns of female than in male labor force participation. These differences affect both inequality and mobility. Instead of attempting to control for different sources of mobility, we compare the mobility of male earnings in the four countries. This comparison is likely to be less sensitive to the interaction of inter-country differences in male and female labour markets, work-related public policies and our sample selection criteria.

In Table 3, we show the inequality and mobility indices of earnings estimated only for males. The ranking of countries by earnings inequality is similar to that found for the sample of all positive earners, except that the earnings of men are slightly more equal in Norway than in Sweden. The ordering of countries with respect to mobility is perhaps more interesting. It turns out that the mobility of male earnings in the United States is less than in Denmark and Norway in both time periods, while Sweden turns out to have slightly lower earnings mobility than the United States.

We were surprised by the fact that the mobility of both market and disposable income were so high in the Scandinavian countries. One possible explanation could be that cohabitation without formal marriage is fairly common in the

Table 4 Long-run income inequality and mobility treating cohabiters as married

Country	Statistic	Market income	Disposable income
	A. Sample 1 (1980–90)		
Sweden	Gini	.232	.222
	SE(Gini)	(.004)	(.004)
	Mobility	.130	.129
United States	Gini	.392	.334
	SE(Gini)	(.010)	(.010)
	Mobility	.096	.086
	B. Sample 2 (1986–90)		
Norway	Gini	.264	.198
	SE(Gini)	(.006)	(.006
	Mobility	.074	.082
Sweden	Gini	.251	.216
	SE(Gini)	(.004)	(.003)
	Mobility	.063	.068
United States	Gini	.429	.363
	SE(Gini)	(.011)	(.011)
	Mobility	.061	.055

Source: Authors' calculations from country data files.
Note: For the main results, couples had to be legally married, and we divided family income by the number of adults. The numbers in this table stem from a sample where cohabiters are treated as being married and family income is divided by the square root of family size.

Scandinavian countries. Our choice to restrict the pooling of husband's and wife's income to legally married couples and treat two cohabiting persons as forming two families would tend to overstate income inequality and mobility.[8] Also, our choice to assign one half of the market and disposable income of a couple to each spouse departs from conventional analyses, where equivalent income is defined in terms of the whole family.

In order to address these issues, we show in Table 4 for three of our countries – Norway, Sweden and the United States – long-run income inequality and mobility indices obtained when treating cohabiters as being married and dividing the family income variables by the square root of family size – a commonly used equivalence scale. The inequality of long-run income is always higher when we equivalize using the square root scale and treat cohabiters as married couples. The differences are substantial. For instance, in the 1980-1990 sample in the U.S. the long-run Gini was .334 compared to .305 in our main analysis (see Table 1(a)). However, the ordering of countries is not affected by this change in methods. The mobility indices are estimated to be lower than in the main analysis (with the exception of Norway 1986–1990). However, the mobility ordering of countries is unaffected by this sensitivity check. Thus, cross-national differences in the prevalence of marriage and cohabiting and the choice of equivalence scale do not lead us to revise our main results.

[8] Mobility would be higher both because transitory income shocks, if imperfectly correlated within couples, would tend to be smaller relative to permanent components of income and in as far as cohabiting couples marry during the observation period.

Table 5 Inequality of average income and mobility for households with white heads in the United States 1980–1990 and 1986–1990

		Earnings	Earnings -- male	Market income	Disposable income
1980-1990	Gini	0.336	0.335	0.357	0.298
	SE(Gini)	(0.015)	(0.018)	(0.011)	(0.010)
	Mobility	0.112	0.080	0.103	0.096
1986-1990	Gini	0.358	0.353	0.368	0.311
	SE(Gini)	(0.010)	(0.014)	(0.008)	(0.008)
	Mobility	0.059	0.056	0.065	0.063

Source: Authors' calculations PSID data files.
Note: Standard errors of Gini coefficients in parentheses. The sample only includes those persons who in every sample year lived in a household with a white head. Other restrictions as for main results (see section 2).

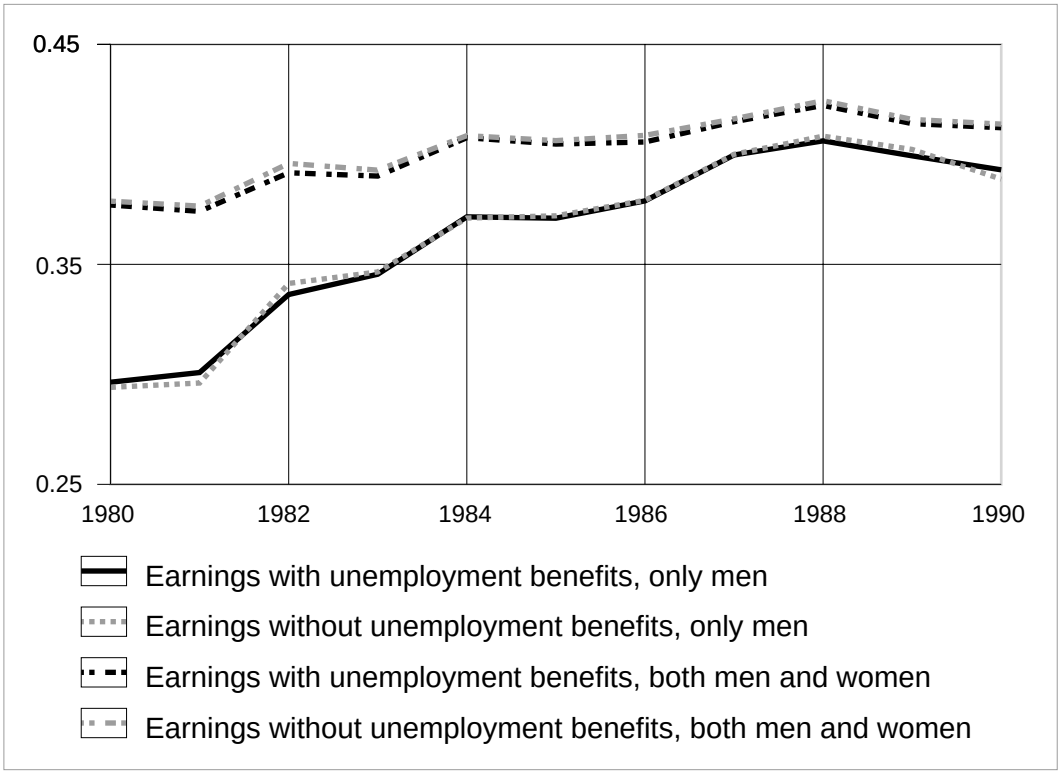
It is also possible that the results for the United States are driven by differences in population composition. In particular, the U.S. population is more heterogeneous than the populations of the Scandinavian countries, and racial minorities in the United States are economically disadvantaged. This heterogeneity may account for the observed higher inequality and lower mobility in the United States, but is difficult to control for.[9] However, we can examine whether the exclusion of racial minorities would alter our results. Specifically, we include in this sensitivity analysis only those individuals who in every sample year lived in a household with a white head.

The results, reported in Table 5, do not lend much support to the thesis that our results are driven by the inclusion of racial minorities. The inequality of all income variables is somewhat lower in both time periods than for the main analysis, but the differences are at most around .015. Inequality of all income variables in the United States is well above that in the Scandinavian countries. Income mobility among whites is slightly larger than for the whole population. The differences are small and in only one case, that of earnings in 1986–1990, is the ranking of the United States changed.

Our U.S. data on earnings differ in some respect from both what is customary in U.S. studies and how we have defined earnings in the Scandinavian countries, which naturally raises some questions about the sensitivity of the inequality and mobility of earnings in the United States. The PSID only records unemployment benefits as a separate variable for the household head in the early 1980s. Thus, for 1980–1990 we are only able to include unemployment benefits in the definition of earnings for the Scandinavian countries. We examine the sensitivity of this by defining two earnings variables, one which includes unemployment benefits and one which does not. Further, we estimate the inequality and mobility indices for both of these variables for the sample as defined "normally", i.e., including both

[9] See, however, Björklund and Freeman (1997) for an attempt to do that. In particular, the authors compared earnings inequality of Swedish males living in Sweden with that of U.S. males who in the Census report having Swedish ancestry. The results are that U.S. males of Swedish ancestry have more or less the same degree of inequality as other U.S. males. Thus, they conclude that the heterogeneity of population would not necessarily account for much of the difference in earnings inequality between the two countries.

Figure 2 The sensitivity of earnings inequality to inclusion and exclusion of unemployment benefits – United States 1980–1990



Source: Authors' calculations PSID data files.
Note: See section 2 for sample definition. For the variable "Earnings with unemployment benefits", UB and workers compensation are available in only part of the sample years for the spouse. We include these in the earnings variable when possible.

men and women, and for the sample consisting solely of men. The results for annual inequality are shown in Figure 2 and for mobility and inequality of average income in Table 6.

Looking at Figure 2, we see that the inclusion of unemployment benefits has a negligible effect on the magnitude of earnings inequality in the United States. The series which include and exclude unemployment benefits appear to be closely related. This does not preclude that the inequality of average income and/or mobility would be affected by the discrepancy in the definition of earnings. As Table 6 shows, however, the sample definition matters much more than the treatment of unemployment benefits. The differences in the Gini coefficients of average income are in the third decimal and are small, and the differences in the mobility indices are negligible. Mobility, as measured by the Gini mobility index, appears to be lower for men than for men and women combined.

Table 6 The sensitivity of average earnings inequality and mobility to definition of earnings variable and sample in the United States 1980–1990

		Earnings without unemployment benefits, both men and women	Earnings with unemployment benefits, both men and women	Earnings without unemployment benefits, only men	Earnings with unemployment benefits, only men
		Gini	Gini	Gini	Gini
United States	Average	0.342	0.340	0.336	0.335
	Mobility	0.109	0.108	0.080	0.080

Source: Authors' calculations PSID data files.
Note: Standard errors of Gini coefficients in parentheses. See section 2 for sample definition. For the variable "Earnings with unemployment benefits", UB and workers compensation are available in only part of the sample years for the spouse. We include these in the earnings variable when possible.

Interpreting mobility indices

Interpreting the magnitudes of the estimated mobility, or inequality, indices is not easy. Are the differences between annual and long-run inequality indices small or large? To form some idea of what a particular level of mobility leads to, we compare inequality in the observed distribution of earnings over the period 1980–1990 in Norway with the hypothetical distribution that has the same level of inequality in each year but no mobility. Recall that by definition, there is no mobility if the annual rank ordering of each individual in the income distribution remains the same throughout the time period. I.e., the individual with the lowest average earnings over the whole time period receives the lowest earnings in every year, the second lowest in the average earnings distribution receives the second lowest in every year etc.

We have created a hypothetical distribution, based on the actual Norwegian earnings distribution, in which we assign to each individual the same rank in each year that they have in the distribution of over-time average income. This procedure keeps the *distribution* of annual income unchanged, but it attaches different individuals to the same incomes. The income distribution obtained by aggregating these hypothetical distributions over time will give a different distribution of over-time average income than what actually occurred, enabling us to examine the "effect" of mobility by the differences in the two distributions.

We simplify the comparison by looking at the mean income of every income decile in the two distributions. The hypothetical distribution of annual earnings over the 1980–1990 period is displayed in Table 7. The comparison of the observed and the hypothetical distribution of average annual earnings demonstrates that the observed mobility in Norway during the 1980–1990 period had a substantial effect on the bottom decile and a modest effect on the

Table 7 Observed and hypothetical sum of earnings by decile groups over the 1980–1990 period for Norway

	Total earnings 1980-1990		
	Observed	Hypothetical	Change
1	5659	4105	-37.9
2	10285	9529	-7.9
3	13526	13322	-1.5
4	16277	16385	0.7
5	18253	18370	0.6
6	20018	20146	0.6
7	21928	22103	0.8
8	24323	24554	0.9
9	27882	28287	1.4
10	38946	40296	3.3
All	19710	19710	-0.0

Source: Authors' calculations from the TAF files.
Note: The sum of the lowest actual annual earnings in each year defines the lowest earnings in the hypothetical hypothetical distribution, the sum of the second lowest earnings the second lowest hypothetical earnings and so on.

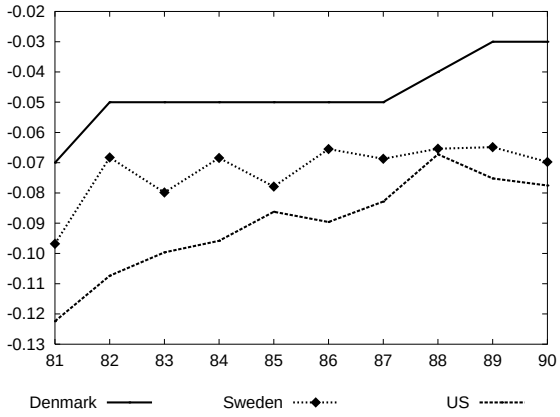
remaining deciles. Compared to the hypothetical immobile distribution, the bottom decile gained 38 percent and the second decile gained almost 8 percent. The top decile lost 3.3 percent and the ninth decile 1.4 percent. The remaining deciles lost less than one percent. The Gini coefficient of the immobile hypothetical distribution was 7 percent higher than that of the observed distribution. Thus, when the mobility index takes values around or below 0.1, which is the case for the countries we study, we may tentatively conclude that income mobility is quite low and has only modest effects on the overall distribution of income.

4 The codeterminants of income mobility – regression analyses

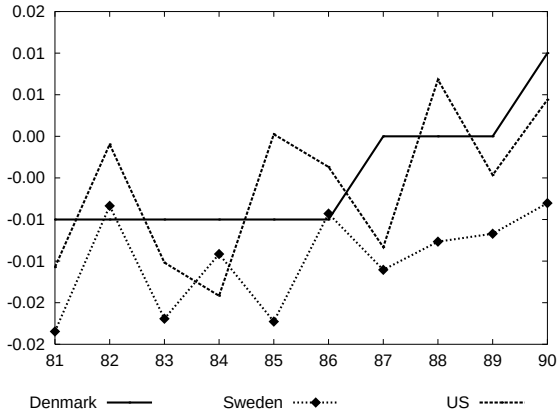
To gain further insights into the processes that generate, for four so different countries, largely similar patterns of income mobility as measured by the summary mobility index, we take a closer look at the micro-level income changes in each country. In order to keep things tractable, we examine two income definitions in two periods, namely *earnings* in 1980–90 and *disposable income* in 1986–90. In this analysis, we include unemployment benefits in earnings for all countries. We define a variable that measures the change in relative income for each individual between year $t-1$ and

Figure 3 The distribution of changes in relative income – earnings 1980-1990

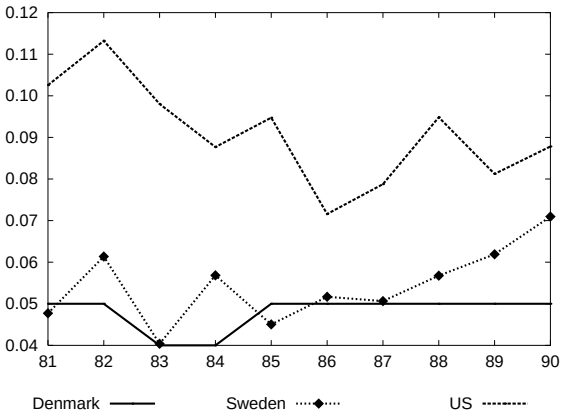
(a) 25. percentile



(b) 50. percentile



(c) 75. percentile



Source: Authors' calculations from Danish, Swedish and U.S. longitudinal data.
Note: Graphs show the 25th, 50th and 75th percentile of the annual distribution of the change in relative earnings between $t-1$ and t, (see equation 3).

t, defined as

$$d_{i;t-1,t} = \frac{y_{i,t}}{y_t} - \frac{y_{i,t-1}}{y_{t-1}}, i = 1, \ldots, n \tag{3}$$

where $y_t = \sum_i y_{i,t}/n$ is average income in year t. Thus, the average of d equals by definition zero. The distribution of d, however, can and does vary between years and countries. We summarize for each country the distribution by the 25th, 50th and 75th percentile of d in each year – shown in Figures 3 and 4. It appears that this way of displaying income mobility reveals interesting differences between the countries. The 25th percentile of the change in relative earnings is slightly lower and the 50th percentile a little higher in the United States than in Denmark and Sweden. The 75th percentile is, also, clearly higher, suggesting the distribution of d is wider in the United States and that it has a fatter right-hand tail. The same pattern is present for the change in relative disposable income.

To gain insight into the kind of states and events that are associated with changes in an individual's relative income, we estimate regression equations of the form:

$$d_{i;t-1,t} = Z_{i;t-1,t}\beta + \alpha_i + \varepsilon_{i;t-1,t}, \tag{4}$$

where the covariates $Z_{t-1,t}$ include age (and age^2), marital status and labor market status. We allow for intertemporal covariance. This is in equation 4 represented by the term α.[10] To capture the association of both states and events with relative income changes, the covariate vector contains indicator variables for marital status and labor market status in both $t-1$ and t. We are interested in comparing the difference in income mobility between all four possible states in (t-1,t): (married, married),(married, not married),(not married, married),(not married, not married). We are also interested in learning the magnitude of relative income change associated with labor market status over the pair of years: (employed, employed),(employed, unemployed),(unemployed, employed), (unemployed, unemployed).[11]

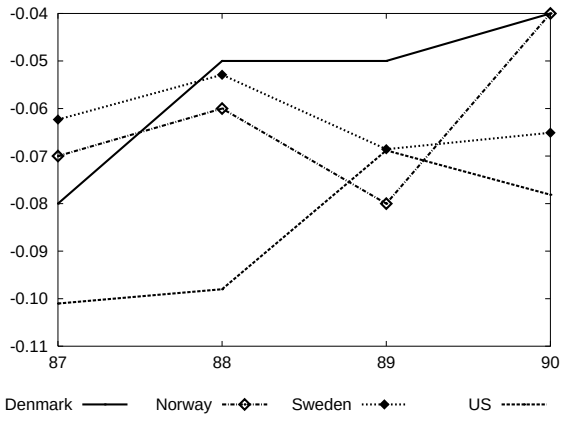
We estimate the parameters in equation 3 using the Generalized Estimating Equations [GEE] approach, a longitudinal extension of GLIM (Zeger and Liang 1986). The GEE estimates are robust to misspecifications of the intertemporal covariance structure of the errors. The purpose of the present exercise is to gain insight in what covariates are associated with large or small changes in relative income. While it is possible that a fixed-effect formulation would be more appropriate, doing so would throw away information of this descriptive nature. It would, for instance, not be possible to compare the average changes in relative income between, say, those who are employed in both years with those who are unemployed in both years if a fixed effects formulation were to be used. Further, these processes may be very different for men and women, so rather than controlling for gender, we estimate separate regressions. The parameter estimates for earnings in 1980-90 are shown in Table 8 and for disposable income in 1986-90 in Table 9.

[10] Our estimated coefficients are robust w.r.t. to misspecifications of the intertemporal covariance structure. See below.

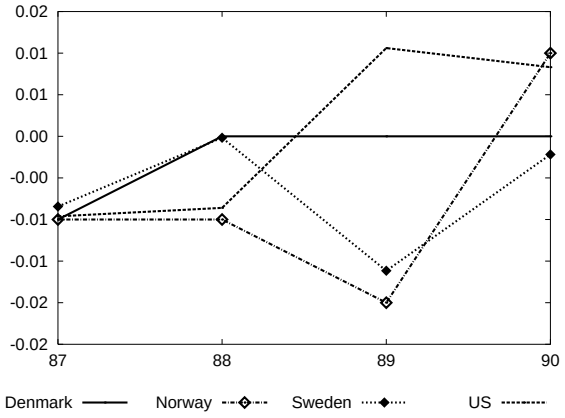
[11] Marital status is defined as in the data in the previous sections. Employment status is in the Nordic countries defined by whether or not the individual has received unemployment benefits. In the United States, we use the survey answer on employment status. Thus, our definitions are slightly different and our results should be viewed with some caution.

Figure 4 The distribution of changes in relative income – disposable income 1986-1990

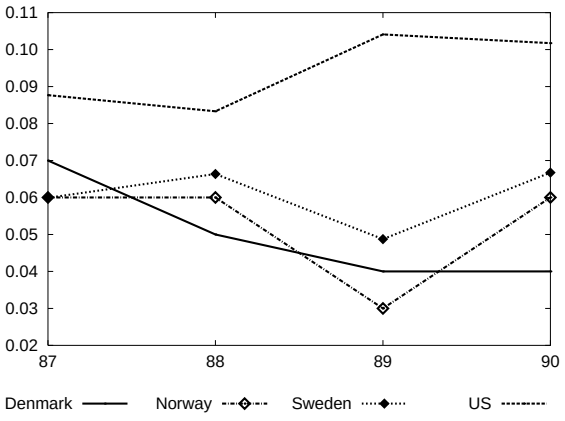
(a) 25. percentile



(b) 50. percentile



(c) 75. percentile



Source: Authors' calculations from Danish, Norwegian, Swedish and U.S. longitudinal data.
Note: Graphs show the 25th, 50th and 75th percentile of the annual distribution of the change in relative disposable income between $t - 1$ and t, (see equation 3).

Table 8 Regression results – first difference in relative earnings 1980-1990, men and women

Covariate in $t-1$	t	Denmark	Sweden	U. S.	Denmark	Sweden	U. S.
			Men			Women	
Intercept		0.022	0.066	–0.039	–0.088	–0.058	–0.073
		(0.015)	(0.041)	(0.028)	(0.017)	(0.033)	(0.017)
Age		0.000	–0.001	0.007	0.005	0.004	0.005
		(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Age^2		0.000	0.000	0.000	0.000	0.000	0.000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Employment							
t–1	t						
Employed	Employed						
Employed	Not employed	–0.073	–0.045	–0.297	–0.024	–0.001	–0.266
		(0.004)	(0.015)	(0.036)	(0.005)	(0.011)	(0.013)
Not employed	Employed	0.013	0.013	0.121	0.005	–0.018	0.189
		(0.003)	(0.014)	(0.034)	(0.004)	(0.011)	(0.011)
Not employed	Not employed	–0.013	–0.015	0.001	0.000	0.011	–0.022
		(0.001)	(0.009)	(0.013)	(0.002)	(0.008)	(0.005)
Marital status							
t–1	t						
Married	Married						
Married	Not married	–0.015	0.020	–0.003	–0.004	0.074	–0.018
		(0.008)	(0.019)	(0.038)	(0.012)	(0.014)	(0.022)
Not married	Married	0.007	0.008	0.003	–0.034	–0.081	–0.144
		(0.007)	(0.015)	(0.045)	(0.009)	(0.013)	(0.024)
Not married	Not married	–0.001	–0.009	–0.009	–0.008	–0.014	–0.001
		(0.001)	(0.003)	(0.008)	(0.001)	(0.003)	(0.005)

Source: Authors' calculations from Danish, Swedish and U.S. longitudinal data.
Note: Dependent variable is the change in relative earnings (see equation 3 between $t-1$ and t. Parameters have been estimated using GEE.

The magnitude of change in the relative earnings of men associated with labour market and marital status change yields few surprises (see first three columns in Table 8). It does not come as a great surprise that the loss in relative earnings on becoming unemployed is largest in the United States. The coefficient estimate, -.297, is six times that of Sweden and four times that in Denmark. The gain in relative earnings on becoming employed is, again, much larger in the U.S. than in Denmark or Sweden. On the other hand, remaining non-employed is in Denmark and Sweden associated with a continued small decline in relative earnings (in the latter, insignificantly), but with no change in the United States. Changes in marital status are not associated with changes in the relative earnings of men.

Becoming unemployed is in most cases associated with smaller changes in the relative earnings of women than for men (last three columns in Table 8). In the United States, becoming non-employed is associated with an almost as large a change as it is for men. The negative changes in Denmark and Sweden are smaller in absolute magnitude. Becoming employed is in these two Scandinavian countries associated with almost no change whereas it is associated with a change that is larger than that for men in the U.S. Changes in marital status are associated with larger changes in relative earnings than is the case for men. Ceasing to be married is associated with an *increase* in earnings in Sweden (relative to remaining married) but a small, statistically insignificant *decrease* in the U.S. Becoming married is in all cases associated with a decline in relative earnings for women. The magnitude of this change is larger in the U.S. than in Sweden and smallest in Denmark.

We now turn to the correlates of changes in disposable income, reported in Table 9. We need to keep in mind that, although earnings are an important constituent of disposable income, changes in the latter are likely less pronounced as some degree of income smoothing comes about from the less than perfect correlation of spouses' incomes. Becoming unemployed is associated with negative relative income changes for males. Again, the magnitude of this change is by far the largest for the U.S. For Norway and Sweden, the coefficient is insignificant. Ceasing to be unemployed is associated with an increase in income in Denmark and the U.S. Remaining out of employment is associated with an income decline in Denmark and little change in the others. Divorce is for U.S. males associated with little change in income, while marrying and remaining single are associated with declines. Divorce is associated with fairly large increases in the relative incomes of Norwegian and Swedish men while marrying is associated with large declines. In Denmark, effects are small and mostly insignificant, although marrying is associated with income increases.

Employment changes are for U.S. women associated with similar but smaller changes than for men. In Denmark, Norway and Sweden changes in labor market status are for women associated with few significant changes in relative income. The marital status indicators are small and insignificant for Denmark. Divorce is associated with an income decline in Norway but an increase in the U.S. Marrying is, on the other hand, associated with increases in relative income in Norway and Sweden but with a decline in the U.S. There is little difference in changes in relative incomes between those who remain married and those who remain unmarried. Denmark is, again, an exception to this, although

Table 9 Regression results – first difference in relative disposable income 1986-1990, men and women

Covariate in $t-1$	t	Denmark	Norway	Sweden	U. S.	Denmark	Norway	Sweden	U. S.
			Men				Women		
Intercept		0.131	0.239	0.128	0.005	0.145	0.200	0.151	0.029
		(0.012)	(0.113)	(0.036)	(0.061)	(0.013)	(0.118)	(0.038)	(0.042)
Age		–0.005	–0.100	–0.005	0.003	–0.006	–0.099	–0.005	0.001
		(0.001)	(0.060)	(0.002)	(0.004)	(0.001)	(0.053)	(0.002)	(0.003)
Age^2		0.000	0.010	0.000	0.000	0.000	0.010	0.000	0.000
		(0.000)	(0.069)	(0.000)	(0.000)	(0.000)	(0.006)	(0.000)	(0.000)
Employment									
t–1	t								
Employed	Employed								
Employed	Not employed	–0.037	–0.076	–0.008	–0.174	–0.016	0.016	0.012	–0.137
		(0.008)	(0.071)	(0.019)	(0.029)	(0.007)	(0.069)	(0.018)	(0.036)
Not employed	Employed	0.016	0.060	–0.027	0.091	–0.005	0.014	–0.037	0.037
		(0.005)	(0.065)	(0.018)	(0.020)	(0.007)	(0.058)	(0.017)	(0.020)
Not employed	Not employed	–0.018	–0.001	0.019	0.014	–0.006	0.034	0.006	–0.013
		(0.003)	(0.052)	(0.012)	(0.018)	(0.003)	(0.045)	(0.011)	(0.012)
Marital status									
t–1	t								
Married	Married								
Married	Not married	–0.001	0.380	0.333	0.056	–0.003	–0.184	0.107	0.100
		(0.023)	(0.072)	(0.028)	(0.040)	(0.022)	(0.067)	(0.063)	(0.035)
Not married	Married	0.032	–0.343	–0.202	–0.080	0.028	0.190	0.157	–0.075
		(0.015)	(0.055)	(0.016)	(0.029)	(0.015)	(0.061)	(0.018)	(0.029)
Not married	Not married	–0.004	0.003	0.002	–0.035	0.005	–0.004	–0.003	0.004
		(0.002)	(0.015)	(0.004)	(0.009)	(0.002)	(0.014)	(0.004)	(0.007)

Source: Authors' calculations from Danish, Norwegian, Swedish and U.S. longitudinal data.
Note: Dependent variable is the change in relative disposable income (see equation 3 between $t-1$ and t. Parameters have been estimated using GEE.

the coefficients are small (remaining married is positive for men but negative for women). In interpreting these results, however, we need to keep in mind that children are here treated as being costless. Including the costs of children would likely lead to quite different assessments of the costs of divorce. A detailed examination of this issue is, however, beyond the scope of the present paper.

Our regression analysis of changes in relative disposable income bears some resemblance to the ones for the United States in Duncan and Morgan (1981) and for Sweden in Fritzell (1990). Duncan and Morgan regressed the annual growth rate from 1971 to 1978 of needs-adjusted family income on, *inter alia*, family and labour market events. Fritzell regressed the annual growth rate from 1973 to 1980 in needs-adjusted family income on similar events.[12] However, because Duncan and Morgan also included some attitudinal variables, the results are not comparable between the countries.

Our results for the United States are the same as in Duncan and Morgan regarding labour market events, but deviate somewhat regarding family events. Fritzell obtains stronger effects for labour market events than we do, and his results for family events deviate from ours. We note, though, that these two studies used information on the numbers of children to adjust for the needs of the family.

5 Discussion and concluding comments

Our results can be summarized briefly. Firstly, we find that the ordering of countries by inequality of annual income by and large remains unchanged when the accounting period is extended up to 11 years (1980-1990). United States is by far the most unequal country even for this longer period. Second, no unequivocal ordering arises from the comparisons of income mobility between countries. For the shorter period (1986 to 1990), the United States comes third in the mobility ordering for both market and disposable income. In the longer period (Sample 1), the United States has higher mobility for earnings. Sweden seems to have the highest mobility when it comes to market and disposable income. Thirdly, changes in labor force and marital status tend to generate larger changes in relative income in the U.S. than in the Scandinavian countries.

It appears that in all the countries we study, there is quite little income mobility as measured by the reduction in inequality on extending the accounting period. This suggests that a lengthening of the accounting period of income will thus only have minor effects on inter-country differences in income inequality. The differences that arise within countries of lengthening the accounting period are modest compared to the magnitude of inter-country differences. The result that the United States, despite high cross-sectional inequality is not the country with the highest level of such income mobility is similar to the findings of Burkhauser and Poupore (1997) and Burkhauser et al. (1998). These conclude, using methods that are slightly different from ours, that Germany and the United States have “remarkably

[12] Fritzell also estimated models for absolute income changes and changes in the percentile rank of income.

similar" mobility patterns over the period 1983 to 1988. This conclusion holds for both earnings and measures that are closer to disposable income. Further, in comparing mobility of family-size adjusted disposable income between Sweden and the United States, Fritzell (1990) found a remarkable similarity among between the two countries. He studied mobility in Sweden using mobility tables from 1973 to 1980 and compared his results with those obtained by Duncan and Morgan (1981) for the U.S: from 1971 to 1978. OECD (1996) compares earnings inequality and mobility in a larger set of countries. They find quite different results depending on what definition and measure of mobility is used. No unambiguous ordering arises from that study, either.

In order to gain insights into the mechanisms that underlie income mobility, we examined the distribution of first differences in earnings and disposable income relative to their annual averages. The distribution of these changes in relative earnings and income turn out to be more dispersed in the United States, suggesting a greater extent of relative income changes from year to year than in the Scandinavian countries. Our approach to modeling the changes in relative income, suggests that, as hypothesized, changes in unemployment and marital status are in the United States associated with fairly large changes in relative earnings and income. Changes in labor force status lead to similar but smaller shifts in relative income in the Scandinavian countries. The pattern of income shifts associated with changes in marital status is more variable, although such shifts are again largest in the United States. The framework we use is quite simple and should be thought of as indicative. Clearly, much can be learned from further modeling of the income process.

Our inquiry has also highlighted the data problems involved in comparative research like this. We regard improvements of the basic sources of income data as an important task for future work. The treatment of capital income should be improved and there is a need to obtain better data on other household members and their incomes. We are also concerned about household definitions. In the Scandinavian countries it has become increasingly common to live together without being married, or marry after a long period of non-marital cohabitation. Potentially, this might create spurious income mobility in our data. However, our sensitivity test suggests that this is not a major source of cross-country differences in mobility.

Another data quality issue is whether our comparisons are flawed by the fact that the Scandinavian income data stem from administrative records, primarily tax registers, whereas the U.S. data stem from interviews. If random measurement error is greater in the U.S. data than in the data from the Scandinavian countries, this would inflate the estimated income mobility in the United States compared to the Scandinavian countries. One possibility that we have not pursued would be to impose some model of measurement error on the Scandinavian data. The findings from the PSID validation studies (e.g. Bound and Krueger 1991) could be used for such a purpose.

Another important goal for future research is to further examine the sources and causes of income mobility. To what extent is mobility explained by job displacements due to structural changes in the economy? To what extent do

earnings vary over time because of variations in labor supply over the life-cycle? Studies that address these types of questions can help us decide whether income mobility is “good or bad”.

We should emphasize, however, what we believe is an important finding. Recall one of the typical points of departure in studies of income inequality over longer time periods and income mobility, namely the traditional defense of high income inequality, that it is the flip-side of high mobility. We find no evidence of a positive relationship between inequality and mobility. Although the reverse finding does not emerge either, we find this lack of a pattern an important result in itself.

Mobility as measured by annual changes in relative income appears more widely dispersed in the United States. Extending the accounting period this greater mobility does not, however, bring about a greater proportionate reduction in annual inequality than in the Scandinavian countries. Understanding the mechanisms behind that link these two findings is an interesting challenge for future research.

References

Aaberge, R. and Wennemo, T.: 1993, Inntektsulikhet og inntektsmobilitet i Norge 1986–1990, *Sociale og økonomiske studier 82*, Statistisk Sentralbyrå, Oslo.

Atkinson, A. B., Bourguignon, F. and Morrisson, C.: 1992, *Empirical Studies of Earnings Mobility*, Fundamentals in Pure and Applied Economics, Harwood Academic Publisher, Chur.

Bingley, P., Björn, N. H. and Westergård-Nielsen, N.: 1995, Wage mobility in Denmark 1980-1990, *Working Paper 95-10*, University of Aarhus and Aarhus Business School. Centre for Labour Market and Social Research, Centre for Labour Market and Social Research. University of Aarhus and Aarhus Business School.

Björklund, A.: 1993, A comparison between actual distributions of annual and lifetime income, *Review of Income and Wealth* **39**(4), 377–386.

Björklund, A. and Freeman, R.: 1997, Generating equality and eliminating poverty, the Swedish way, *in* R. Freeman (ed.), *Welfare State in Transition*, Chicago University Press, Chicago.

Björklund, A., Palme, M. and Svensson, I.: 1995, Tax reforms and income distribution: An assessment using different income concepts, *Swedish Economic Policy Review* **2**(2), 229–265.

Bound, J. and Krueger, A. B.: 1991, The extent of measurement error in longitudinal earnings data: Do two wrongs make a right?, *Journal of Labor Economics* **9**(1), 1–24.

Burkhauser, R. and Poupore, J. G.: 1997, A cross-national comparison of permanent inequality in the United States and Germany, *Review of Economics and Statistics* **79**(1), 10–17.

Burkhauser, R. V., Holtz-Eakin, D. and Rhody, S. E.: 1998, Mobility and inequality in the 1980s: A cross-national comparison of the United States and Germany, *in* S. P. Jenkins, A. Kapteyn and B. van Praag (eds), *The distribution of welfare and household production*, Cambridge University Press, Cambridge, chapter 6, pp. 111–175.

Duncan, G. J. and Morgan, J. N.: 1981, Persistance and change in economic status and the role of changing family composition, *in* M. S. Hill, D. H. Hill and J. N. Morgan (eds), *Five Thousand American Families: Patterns of Economic Progress*, Vol. 9, Institute for Social Research, University of Michigan, Ann Arbor, MI, pp. 1–44.

Economic Report of the President 1991: 1991, U.S. Government Printing Office, Washington, D.C.

Erikson, R. and Åberg, R.: 1987, *Welfare in Transition*, Clarendon Press, Oxford.

Freeman, R. and Katz, L. (eds): 1995, *Differences and Changes in Wage Structures*, Chicago University Press, Chicago.

Friedman, M.: 1962, *Capitalism and Freedom*, Chicago University Press, Chicago.

Fritzell, J.: 1990, The dynamics of income distribution: economic mobility in Sweden in comparison with the United States, *Social Science Research* pp. 17–46.

Gottschalk, P. and Moffitt, R.: 1994, The growth of earnings instability in the U.S. labor market, *Brookings Papers on Economic Activity* **1994**(2), 217–272.

Gottschalk, P. and Smeeding, T. M.: 1997, Cross-national comparisons of earnings and income inequality, *Journal of Economic Literature* **32**(2), 633–686.

Gustafsson, B.: 1994, The degree and pattern of income immobility in Sweden, *The Review of Income and Wealth* **40**(1), 67–86.

Krelle, W. and Shorrocks, A. (eds): 1978, *Personal Income Distribution*, North-Holland, Amsterdam.

Morgan, J. N., Duncan, G. J., Hill, M. S. and Lepkowski, J.: 1992, *PANEL STUDY OF INCOME DYNAMICS, 1968-1989 [WAVES I-XXII]*, Survey Research Center, Ann Arbor, MI.

OECD: 1991, *Employment Outlook*, OECD, Paris.

OECD: 1996, Earnings inequality, lowpaid employment and earnings mobility, *Employment Outlook*, OECD, Paris, chapter 3, pp. 59–99.

Pedersen, P. J., Schmidt-Sörensen, J. B., Smith, N. and Westergård-Nielsen, N.: 1990, Wage differentials between the public and the private sector, *Journal of Public Economics* **41**(1), 125–145.

Rao, V. M.: 1969, Two decompositions of the concentration ratio, *Journal of the Royal Statistical Society, Series A* **132**(3), 418–425.

Sen, A. K.: 1974, Informational bases of alternative welfare approaches, *Journal of Public Economics* **3**, 387–403.

Shorrocks, A. F.: 1978, The measurement of mobility, *Econometrica* **46**, 1013–1024.

Topel, R.: 1991, Specific capital, mobility, and wages: Wages rise with job seniority, *Journal of Political Economy* **99**(1), 145–176.

Westergård-Nielsen, N.: 1985, A Danish longitudinal database, *in* G. R. Neumann and N. Westergård-Nielsen (eds), *Studies in labor market dynamics*, Springer-Verlag.

Westergård-Nielsen, N. (ed.): 1996, *Wage Differentials in the Nordic Countries*, North-Holland, Amsterdam.

Yaari, M.: 1988, A controversial proposal concerning inequality measurement, *Journal of Economic Theory* **44**(2), 381–397.

Zeger, S. L. and Liang, K.-Y.: 1986, Longitudinal data analysis for discrete and continuous outcomes, *Biometrics* **42**, 121–130.

Zetterberg, J.: 1990, *Wage Growth and Mobility Between Private and Public Sectors in Sweden*, PhD thesis, Uppsala University.

Appendix

Table A 1 Gini coefficients of annual income, Sample 1 (1980–1990)

			Denmark		Norway		Sweden		United States	
			Gini	SE(Gini)	Gini	SE(Gini)	Gini	SE(Gini)	Gini	SE(Gini)
Earnings	Single year	1980	0.239	(0.002)	0.294	(0.000)	0.265	(0.005)	0.379	(0.008)
		1981	0.246	(0.002)	0.283	(0.000)	0.254	(0.004)	0.376	(0.008)
		1982	0.239	(0.002)	0.279	(0.000)	0.252	(0.004)	0.396	(0.012)
		1983	0.234	(0.002)	0.276	(0.000)	0.252	(0.004)	0.393	(0.013)
		1984	0.234	(0.002)	0.273	(0.000)	0.249	(0.004)	0.409	(0.015)
		1985	0.233	(0.002)	0.271	(0.000)	0.246	(0.004)	0.406	(0.013)
		1986	0.238	(0.002)	0.268	(0.000)	0.249	(0.004)	0.409	(0.016)
		1987	0.237	(0.002)	0.266	(0.000)	0.247	(0.005)	0.416	(0.020)
		1988	0.238	(0.002)	0.269	(0.000)	0.247	(0.004)	0.424	(0.021)
		1989	0.241	(0.002)	0.270	(0.000)	0.250	(0.004)	0.416	(0.018)
		1990	0.249	(0.002)	0.282	(0.000)	0.261	(0.005)	0.414	(0.012)
	N		11734	11734	705597	705597	2834	2834	1939	1939
Market income	Single year	1980	0.193	(0.003)			0.230	(0.004)	0.364	(0.012)
		1981	0.234	(0.004)			0.226	(0.005)	0.363	(0.008)
		1982	0.232	(0.004)			0.229	(0.004)	0.378	(0.008)
		1983	0.233	(0.004)			0.229	(0.004)	0.377	(0.009)
		1984	0.238	(0.004)			0.225	(0.004)	0.401	(0.012)
		1985	0.239	(0.004)			0.221	(0.004)	0.402	(0.010)
		1986	0.237	(0.004)			0.225	(0.004)	0.410	(0.010)
		1987	0.244	(0.004)			0.225	(0.005)	0.426	(0.015)
		1988	0.247	(0.004)			0.221	(0.004)	0.448	(0.015)
		1989	0.251	(0.004)			0.223	(0.004)	0.450	(0.012)
		1990	0.256	(0.004)			0.226	(0.005)	0.456	(0.009)
	N		3336	3336	0	0	3228	3228	3119	3119
Disposable income	Single year	1980	0.185	(0.003)			0.184	(0.004)	0.295	(0.011)
		1981	0.220	(0.004)			0.186	(0.005)	0.286	(0.007)
		1982	0.217	(0.004)			0.185	(0.004)	0.306	(0.007)
		1983	0.215	(0.004)			0.190	(0.003)	0.311	(0.008)
		1984	0.219	(0.004)			0.186	(0.003)	0.336	(0.012)
		1985	0.221	(0.004)			0.179	(0.003)	0.336	(0.009)
		1986	0.221	(0.004)			0.181	(0.003)	0.342	(0.010)
		1987	0.224	(0.004)			0.182	(0.003)	0.359	(0.016)
		1988	0.232	(0.004)			0.184	(0.003)	0.375	(0.016)
		1989	0.234	(0.004)			0.191	(0.004)	0.367	(0.011)
		1990	0.245	(0.005)			0.183	(0.003)	0.360	(0.008)
	N		3336	3336	0	0	0	0	3119	3119

Table A 2 Gini coefficients of annual income, Sample 2 (1986–1990)

			Denmark		Norway		Sweden		United States	
			Gini	SE(Gini)	Gini	SE(Gini)	Gini	SE(Gini)	Gini	SE(Gini)
Earnings	Single year	1986	0.250	(0.002)	0.302	(0.000)	0.265	(0.004)	0.404	(0.009)
		1987	0.242	(0.002)	0.291	(0.000)	0.260	(0.004)	0.408	(0.012)
		1988	0.242	(0.002)	0.290	(0.000)	0.258	(0.004)	0.412	(0.012)
		1989	0.245	(0.002)	0.288	(0.000)	0.260	(0.004)	0.406	(0.010)
		1990	0.252	(0.002)	0.297	(0.000)	0.269	(0.004)	0.408	(0.007)
	N		16811	16811	1307540	1307540	3606	3606	5483	5483
Market income	Single year	1986	0.248	(0.004)	0.269	(0.006)	0.230	(0.004)	0.390	(0.007)
		1987	0.253	(0.004)	0.271	(0.006)	0.229	(0.004)	0.399	(0.009)
		1988	0.258	(0.004)	0.279	(0.006)	0.223	(0.004)	0.413	(0.009)
		1989	0.261	(0.004)	0.299	(0.012)	0.227	(0.005)	0.416	(0.008)
		1990	0.265	(0.003)	0.296	(0.008)	0.224	(0.004)	0.423	(0.006)
	N		5455	5455	2047	2047	3828	3828	6712	6712
Disposable income	Single year	1986	0.228	(0.003)	0.209	(0.006)	0.194	(0.003)	0.327	(0.006)
		1987	0.229	(0.003)	0.205	(0.005)	0.191	(0.003)	0.339	(0.010)
		1988	0.239	(0.003)	0.208	(0.006)	0.188	(0.003)	0.350	(0.010)
		1989	0.240	(0.003)	0.226	(0.011)	0.193	(0.004)	0.346	(0.007)
		1990	0.247	(0.004)	0.218	(0.008)	0.187	(0.003)	0.346	(0.005)
	N		5455	5455	2047	2047	3828	3828	6712	6712