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

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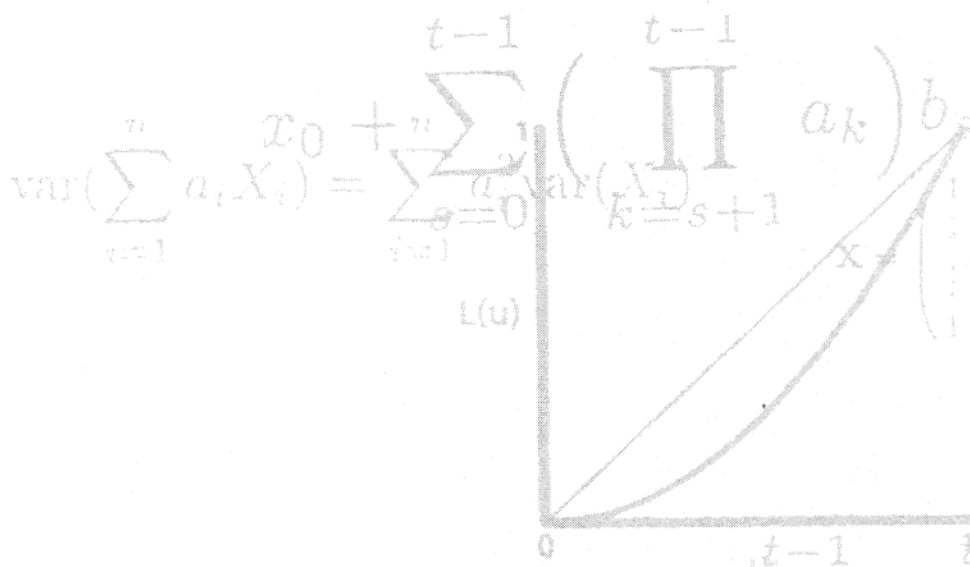
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**Income Inequality and Income
Mobility in the Scandinavian
Countries Compared to the
United States**



$$+ \frac{2}{dt} \sum_{i>j} \sum_{j=1} \text{Cov}_a(X_i, X_j) \beta = \begin{pmatrix} \beta_0 \\ \beta_1 \\ \vdots \\ \beta_m \end{pmatrix}$$



$$\text{var}\left(\sum_{i=1}^n a_i X_i\right) = \sum_{i=1}^n a_i^2 \text{var}(X_i) + \sum_{i=1}^n \sum_{j=1}^n a_i a_j \text{Cov}(X_i, X_j)$$

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

Abstract:

This paper compares income inequality and income mobility in the Scandinavian countries and the United States during the 1980's. The results demonstrate that inequality is greater in the United States than in the Scandinavian countries and that the ranking of countries with respect to inequality remains unchanged when the accounting period of income is extended from one to 11 years. The pattern of mobility turns out to be remarkably similar despite major differences in labor market and social policies between the Scandinavian countries and the United States.

Keywords: Income inequality, income mobility.

JEL classification: D31

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1 Introduction*

Social scientists have for a long time strived for making international comparisons of income distributions. Thanks to the Luxembourg Income Study (LIS) such comparisons have recently acquired much more credibility than earlier efforts, since the researchers behind LIS have invested heavily in bridging gaps in comparability. The recent study published by the OECD, Atkinson, Smeeding & Rainwater (1995), documents both the levels of annual income inequality in the LIS countries and the large number of comparability issues that such a study raises. One of the findings in this, and other LIS -based studies is that the Nordic countries (except Denmark, which is not included) are ranked among those countries with the lowest degree of annual income inequality and the United States as one of the countries with the highest degree of inequality.

Many economists argue that the inequality of incomes received during one single year is a special, albeit important case. It has long been recognized that there may be high annual income inequality even if individuals are given equal opportunities. This can be due to e.g. a non-uniform structure of life-cycle earnings. The more individuals (or households) move over time up or down the income ladder, the more income inequality in a single year will deviate from that found when income is measured over a longer time period. It is both relevant and interesting to know what happens to inequality when the accounting period is extended.

Even though the picture of income inequality can change when income mobility is taken into account by extending the accounting period, there is – as Atkinson, Bourguignon & Morrisson (1992) put it – “no total agreement whether income mobility is good or bad”. Those who have claimed that income mobility is good have argued that it enhances both equity and efficiency, in that it provides economic incentives. Milton Friedman has expressed this view in a passage in *Capitalism and Freedom* (Friedman 1962):

A major problem in interpreting evidence on the distribution of income is the need to

*This paper was first presented at the NEF Workshop on Income Distribution, 26-27 September 1994, Aarhus, Denmark.

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. Non-capitalist societies tend to have wider inequality than capitalist, even as measured by annual income, in addition, inequality in them tends to be permanent, whereas capitalism undermines status and introduces social mobility.

This passage captures most 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. This has also been emphasized by Peter Hart (1981) who writes: "it is mobility which provides the sticks for those who do not wish to move down the distribution and the carrots for those who wish to move up". 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 as it otherwise would be. Third, high income mobility will, all else equal, make lifetime income more equal. The counter argument recognizes that lifetime income is not necessarily a complete measure of inequality. If it is costly for the individual to transfer income from one period to another and if there is uncertainty about the future, the income received in a given period will also matter for his or her welfare. 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

The discussion above demonstrates the importance of comparing income inequality across nations based also on longer time periods than one year and for comparing income mobility along with income inequality across countries. As the LIS-project 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 data based on income tax records for the Scandinavian countries and interview data for the United States, this study explores the following questions:

1. What is the ordering of countries with respect to income inequality and does this ordering change when the accounting period for income is lengthened from one to several years?
2. What is the ordering of countries with respect to income mobility?

We study these questions using longitudinal data sets from four countries: Denmark, Norway, Sweden and the United States. We study the income mobility of individuals by use of three income concepts: earnings, family market income and disposable family income. We observe the incomes from 1980 to 1990, as well as conducting some analyses on more complete data from 1986 to 1990.

The precise definitions of income concepts and population and time units are given in Section 2. Since country-specific micro data have been available we have been able to employ identical definitions of basic units. Indeed, our choices of definitions are to a large extent motivated by the need for comparability between the countries we study.

The paper is structured as follows. We discuss in Section 2 the nature of the problems involved in doing a cross-national comparison using longitudinal data and briefly present the data sets as well as the methods we use. In Section 3, we briefly sketch some relevant differences in the macro-economic environment between the countries. Section 4 contains the results which are summarized and discussed in Section 5.

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

²Burkhauser & Poupore (1995), Burkhauser & Holtz-Eakin (1995) and Burkhauser, Holtz-Eakin & Rhody (1994) are examples of cross-national longitudinal income distribution comparisons. We compare our findings with theirs.

2 Data and methods

2.1 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 need to 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 also need to 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. Theory gives little guidance for choosing among alternatives. As most international comparisons of income inequality to date deal solely with comparisons of incomes over one year, we can not rely on an established tradition either.

Institutions differ between countries in ways that complicate all choices. For instance, how should (and can) cohabiting couples be treated: as a married couple or as two unrelated individuals? To exemplify the difficulties one encounters in choosing among such alternative definitions in a cross-national study, consider the following. In Denmark and Norway, homosexual couples can enter a legal relationship, and should on at least as good grounds as cohabiting couples be treated as a family. However, in most countries we have no information about the relationship between two adults of the same sex who share their living arrangements.³

The income concepts we use are described below. The most important difference to some common practices 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 defined separately.

³A few words on the process we used to arrive at the particular choices might illuminate issues. The authors of this paper have convened for three meetings to discuss the definitions to be used, each time iterating between what we *wanted* to do and what we *could* do, given the constraints of the particular data sets to be used. It is in a study of this sort very important that income and other concepts are highly comparable. One therefore often has to back away from the ideal definitions to feasible ones, where feasibility is defined in terms of the least common denominator.

We study the distribution of: (1) earnings of those who had strictly positive earnings in every year;⁴ (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. For (2) and (3), the unit of analysis is the individual but the income receiving unit is the family. 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)). Again, the exclusion of certain transfers is data-driven. We study two time periods, namely period 1980 to 1990 (Period 1) and the period 1986 to 1990 (Period 2).

We have chosen to assign the market (and disposable) income per adult member to the individuals we study, rather than to assign a (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.

Our choice not to use an equivalence scale - other than that implied by the procedure above - is in part practical and in part a principle. A choice of some particular equivalence scale involves well-known problems (see, e.g., Jenkins & Lambert (1993)). The main reason, however, is that 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 unsatisfactory and pragmatic solution, described above. For the period 1986 to 1990, we could partially adjust for family size. However, in order to preserve comparability with the longer time period, we use the

⁴In including only those with positive earnings, we use the same criterion as Gottschalk & Moffitt (1994) in their study of earnings mobility among males in the United States over the 1980s.

same procedure there.

There is another way of viewing this problem. Use of an equivalence scale is motivated by the wish to compare levels of welfare across households with different structures (“needs”). Thus, to compare mobility in equivalent income is to aspire to compare mobility in welfares. While this is interesting in its own right, we have here settled for comparing the mobility in incomes, i.e., mobility in money that accrues to the adult members of the household. Note also, that to be able to interpret mobility in equivalent income as mobility in welfares, one has to have a high degree of confidence that the equivalence scale used is, indeed, the correct and true one. To put it mildly, such a consensus can not be found in the literature.

Negative disposable or market incomes are censored at zero in each year.⁵ 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 cohorts that we study are as follows. In the first period we study individuals born between 1927 and 1951. 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. These choices are primarily to enable the study of the working-age population, those expected to be responsible for their standard of living. 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.

When comparing the results reported here with the results of other studies, differences in choices of definitions should be borne in mind. Note also that this study differs from the conventional income inequality study in that we also report standard errors for our estimated Gini coefficients.

⁵Incomes are first added up in the family and then censored at zero if they are negative.

2.2 Detailed data descriptions

Denmark

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. The sample is a panel sample, but it has been supplemented with additional observations (mainly from young generations) during the years in order to keep it representative for 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 Danish Statistical Bureau.⁶ The master sample is described in greater detail in Westergård-Nielsen (1984).

The calculation of Gini coefficients for Denmark are based on two sub-samples from the 5 percent master sample. The Gini coefficients of earnings are based on a random 1 per cent sample of the Danish population. Since the calculation of Gini coefficients are based on a sample which contains only individuals having a positive wage income or unemployment payments in each of the years, the 1 per cent sample reduces to only 7997 individuals in these calculations. The information on income distribution based on the household as the income unit come from a 0.5 per cent random sample of the Danish population.

Earnings. The annual wage income (*lønindkomst*) and the unemployment payments (*arbejdsløshedsdagpenge*) are defined as the amounts registered by the tax authorities. The registration of wage income 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, implying that the Gini coefficients for these years underestimate inequality.

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 from working as self-employed or assisting spouse.

⁶Thus, the sample does not suffer from the traditional types of sample attrition.

Market income. The 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. Disposable household income is calculated as the market income of the household, 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 only sources of public transfers which are 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, but since 1987, child allowances have been flat rate, only dependent on the number and the age of the children.

Norway

The Norwegian estimates are based on 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 labour and taxes. The estimated inequality and mobility indices are based on data from 2047 persons in the IDS and 621804 persons in the TAF. Both surveys are panels. The TAF covers years beginning in 1967 and the IDS covers the years 1986-1990, corresponding to our long and short periods.

Earnings. The Norwegian earnings variable is *lønnsinntekt* – wage and salary income and taxable workrelated income transfers such as unemployment and sickness payments.

Market income. Market income adds self-employment income and capital income to earnings, $\text{markedsinntekt} = \text{lønnsinntekt} + \text{netto næringsinntekt (før fradrag for avskrivninger og fondsavsetninger)} + \text{brutto kapitalinntekt (før fradrag for gjeldsrenter og underskudd i borettslag)}$

Disposable income. Disposable income adds to market income all social transfers except social assistance and deducts direct taxes, *disponibel inntekt = markedsinntekt + overføringer (ytelser fra folketrygden + tjenestepensjon + livrenter o.l. + bidrag o.l. + barnetrygd + bostøtte + stipendier + førsørgerfradrag) - skatt.*

Sweden

All Swedish data are taken from the Level of Living Surveys (See Erikson & Åberg (1987)). All income variables that we use originate from tax-based registers and not from the interviews.

Earnings. Like all other Swedish income variables, earnings stem from tax-based registers. The exact definition is *inkomst av tjänst* – income from labour. 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. 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 gains⁷ to achieve comparability with the other countries.

Disposable income. The measure of 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*).

⁷*Inkomst av tillfällig förvärvsverksamhet.*

United States

The U.S. data are taken from the Panel Study of Income Dynamics (PSID) (Morgan, Duncan, Hill & Lepkowski 1992, Hill 1993). 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 is about the household head and the spouse. Children of PSID heads who move and form their own households are also followed over time, i.e., they are interviewed annually. 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 & Krueger (1991)). Non-response, which can be a very serious problem in long panels, appears not to be very high and can, by and large, be considered random.

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 and the concept of disposable income 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.

Earnings. The PSID has complete information on labor income 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 lead us to overestimate mobility of earnings in the United States.

Market income. We use the PSID variable "total taxable income" of head and wife as our market income. Since some parts of taxable income are recorded jointly, we assign each spouse one half of the value of this variable.

Disposable income. Our measure of 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. As described above, only federal taxes are subtracted, local and state income taxes are ignored since they are not available. Local and state taxes, however, are quite small relative to federal.

2.3 Measurement of income inequality and income mobility

The Lorenz curve captures the essence of inequality when inequality is defined as the deviation from the state of equality and restricted to satisfy the principles of transfers and scale invariance. This implies that inequality depends only on relative incomes and, moreover, will decrease if income is transferred from a richer to a poorer individual without changing their mutual positions within the income distribution. As a method for ranking income distributions the Lorenz curve is incomplete, since no unambiguous ranking of intersecting Lorenz curves can be attained without weighting the deviations between Lorenz curves at different parts of the distribution. This problem is the major motivation for deriving summary measures of inequality explicitly in terms of the Lorenz curve. A prominent example is the Gini coefficient which is employed in this study. The Gini coefficient G is related to the Lorenz curve L in the following way:

$$G = 1 - 2 \int_0^1 L(u) du. \quad (1)$$

The normative implications of using the Gini coefficient have been discussed by, e.g., Sen (1973) and Yaari (1988).

In general, income inequality may be expected to decrease when the length of the accounting period is increased. The extent to which inequality decreases will depend on the frequency of shifts in the relative positions within the distributions of annual incomes as well as on the magnitude of changes in the annual relative incomes. Thus, 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 the conventional measures based on transitions between deciles or quintiles lack this property and are therefore less appropriate measures of income mobility. This follows from the fact that even minor changes in annual incomes may result in frequent shifts between deciles or quintiles, suggesting a high degree of mobility.

As an alternative to the transition matrix approach, Shorrocks (1978) introduced a family of mobility measures which incorporates the close relationship between income mobility and income inequality. This approach defines the state of no mobility to occur if the annual individual income shares are constant over time. The present study, however, rests on a slightly different definition which states no mobility if the annual ranking positions of every individual remain constant over time. As opposed to the definition proposed by Shorrocks (1978), our alternative definition allows for the introduction of a measure of mobility based on the Gini coefficient. Note, however, that both approaches relate mobility to inequality by measuring mobility as the degree of reduction in inequality when the accounting period of income is extended. The Shorrocks approach has previously been used by Björklund (1993) who used the coefficient of variation to define a measure of income mobility, while Aaberge & Wennemo (1993) and Gustafsson (1994) used the Gini coefficient as basis for measuring income mobility.

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,

$$G \leq \sum_{t=1}^T \frac{\mu_t}{\mu} G_t, \quad (2)$$

and

$$G = \sum_{t=1}^T \frac{\mu_t}{\mu} G_t \quad (3)$$

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 change their annual rank positions equations (2) and (3) suggest that M defined by

$$M = 1 - \frac{G}{\sum_{t=1}^T \frac{\mu_t}{\mu} G_t}, \quad (4)$$

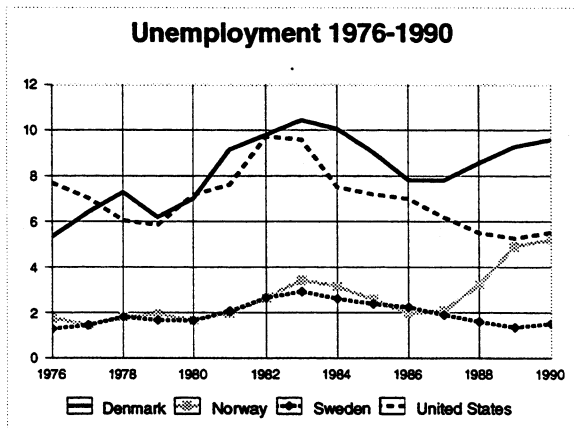
is an appropriate measure of mobility. The minimum value of M , zero, is attained if and only if there is no mobility. The maximum attainable value of M , one, occurs when complete equality in the distribution of the T -year incomes arises from income mobility. The mobility index M provides guidance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

3 Macroeconomic background - with special reference to income inequality and mobility

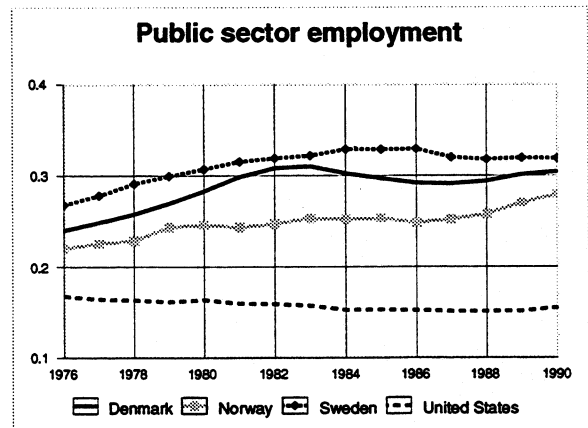
Beyond the obvious difference in the sheer size of the economies, the four countries between which we compare recent trends in the distribution of income differ in a number of respects. The present section summarizes some of the differences which are expected to be of special relevance regarding income inequality and mobility. The main emphasis is on differences in labour market trends from 1976 to 1990, which covers the two time periods we study.

Labour market trends and public sector policies regarding benefits and taxes influence the distribution of all our three income concepts, i.e. earnings, market income and disposable income. The major difference in unemployment performance shown in Figure 1a has a potential impact

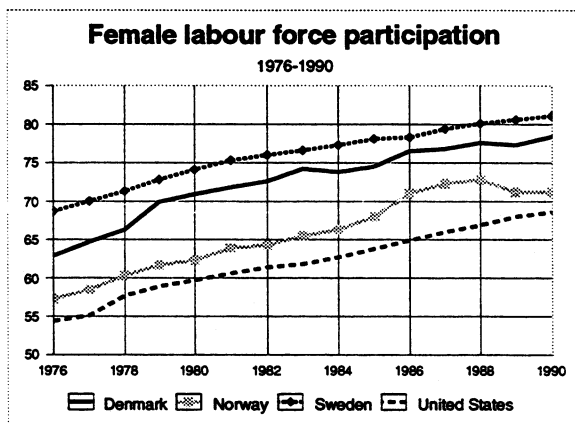
Figure 1 Macroeconomic indicators, 1976-1990



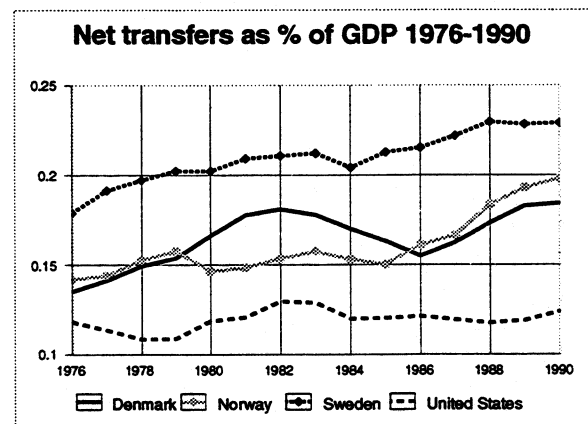
(a) Rate of Unemployment in the United States and the Scandinavian Countries, 1976-1990



(b) Public Sector Employment Share, 1976-1990



(c) Participation Rates for Women, 1976-1990



(d) Income Transfers Received by Households relative to GDP, 1976-1990

Source: OECD (1993a).

on both earnings inequality and earnings mobility. Until the mid-1980s unemployment profiles resemble each other in Denmark and the United States – at a high level – and in Norway and Sweden – at a low level.

As seen from Figure 1(a), national unemployment profiles show a completely different pattern from 1986 to 1990 (period 2 in our analysis), with increasing unemployment in Denmark and Norway, and decreasing unemployment in Sweden and the United States.

The impact of unemployment on earnings inequality depends on the dynamic structure of

unemployment. Consider a situation where most of the inflow to unemployment is displaced workers with a low outflow rate to employment, i.e. a situation where unemployment duration is long. If tenure is an important factor in explaining the distribution of earnings, the displacement losses of laid off workers will be high. In the United States, both inflow and outflow rates are high in international comparison implying on average short unemployment duration. On the other hand, since tenure is an important factor in explaining earnings inequality, cf. Topel (1991), a number of workers will experience a significant reduction in post- compared to pre-unemployment wages. The Scandinavian countries differ in this respect as the tenure effects are small (Westergård-Nielsen 1995).

There were major differences in unemployment dynamics between the Scandinavian countries. In Sweden, where unemployment remained low throughout the period covered by the present study, the inflow rate to unemployment was very low while the outflow rate was only slightly lower than in the United States (Hartog & Theeuwes 1995), implying a short average duration of unemployment. Combined with a small impact of tenure on the level of earnings, the consequences of unemployment for earnings inequality and mobility are expected to be small in Sweden in the years before the large increase in unemployment in the 1990s. Denmark was in a different situation, having a much higher level of long-term unemployment in the 1980s than the other Scandinavian countries. As tenure effects are small also in Denmark, displacement losses appeared more as the consequence of more unemployed people either leaving the labour force or being employed temporarily in labour market programs, with a compensation lower than the pre-unemployment wage.

The generally lower level of displacement losses in the Scandinavian countries due to unemployment is also related to the major difference regarding union density compared with the United States. In Denmark and Sweden union density is about 80 per cent, in Norway about 60 per cent, while union density in the United States has declined to about 10-15 per cent. Both Freeman (1988) and OECD (1993*b*) suggest that the low inequality in the distribution of earnings in the Scandinavian countries might be due to the combination of high union density and – until recently

– a centralized system of collective bargaining. Furthermore, the high union density is accompanied by high minimum wages for adult workers, which will restrict the impact from unemployment on the inequality of earnings.

Another factor that is likely to have a large influence on earnings inequality and mobility is the public sector share of total employment. Earnings differentials are smaller in the public than in the private sector (Pedersen, Schmidt-Sørensen, Smith & Westergård-Nielsen 1990, Zetterberg 1990). Furthermore, public sector employment is less exposed to cyclical and structural changes that in turn generate earnings mobility. Figure 1(b) shows the difference in the period 1976 to 1990 between the Scandinavian countries, where the share of public sector employment increased to about .30 at the end of the 1980s, and the stable U.S. level around .15.

Related to the sectoral distribution of employment, there are also large inter-country differences in the participation rates of women, shown in Figure 1(c), partly reflecting the importance of the public sector as a major employer of female labour. Female labour force participation increased in all four countries. The difference in female labour force participation between the Scandinavian countries and the United States is smaller if the number of hours worked is taken into account – the frequency of part-time work is about .40 among Scandinavian female participants compared to about .25 in the United States (Drobnic & Wittig 1994, Rosenfeld & Birkelund 1994).

The participation rate of married women may affect the inequality of household market and disposable income. Transition rates between employment and non-participation are lower for married women in the Scandinavian countries than in the United States (OECD 1991). Since married women in Scandinavia predominantly work in the public sector – which is more resistant to cyclical shocks – the higher and more stable level of female participation in the Scandinavian countries will exert a stabilizing influence on average market as well as disposable income per person in the household.

Finally, the big difference in the relative size of public income transfers between Scandinavia and the United States has an impact on the inequality of average disposable income per person in

the household. We show in Figure 1(d) the ratio of public income transfers to households relative to GNP. Again, the shares in the Scandinavian countries are higher and increase over time, in contrast to the stable, lower level found in the United States.

Taking unemployment insurance as a case, the impact from unemployment on disposable income differs very much between Scandinavia and the United States, and to a lesser degree also between the individual Scandinavian countries. On all parameters, i.e. coverage, benefits relative to pre-unemployment wages and benefit duration, the Scandinavian unemployment insurance systems are more generous. The extent to which unemployment reduces disposable income is thus much smaller than in the United States. At the same time, however, a recent Danish study on wage mobility based on panel data from 1980 to 1990 (Bingley, Bjørn & Westergård-Nielsen 1995) found that unemployment was the single most important obstacle to upwards wage mobility.

Gottschalk & Moffitt (1994) analyze a number of factors that might explain the increase in earnings instability found in recent empirical studies with U.S. data. No very clear results are reached, but some of the factors mentioned as likely candidates for an explanation are present in the Scandinavian countries in the 1980s (Gottschalk & Moffitt 1994, 218–219). Like the United States, the Scandinavian countries experienced a decline in regulation, a disappearance (or decline in the extent) of administered prices and a general increase in market competition, while another factor mentioned by Gottschalk and Moffitt, declining unionization, did not occur in the Scandinavian countries.

After this discussion of potentially important factors in explaining differences in income inequality and mobility in the four countries, we proceed in the next section to our empirical results.

4 Results

4.1 Main results

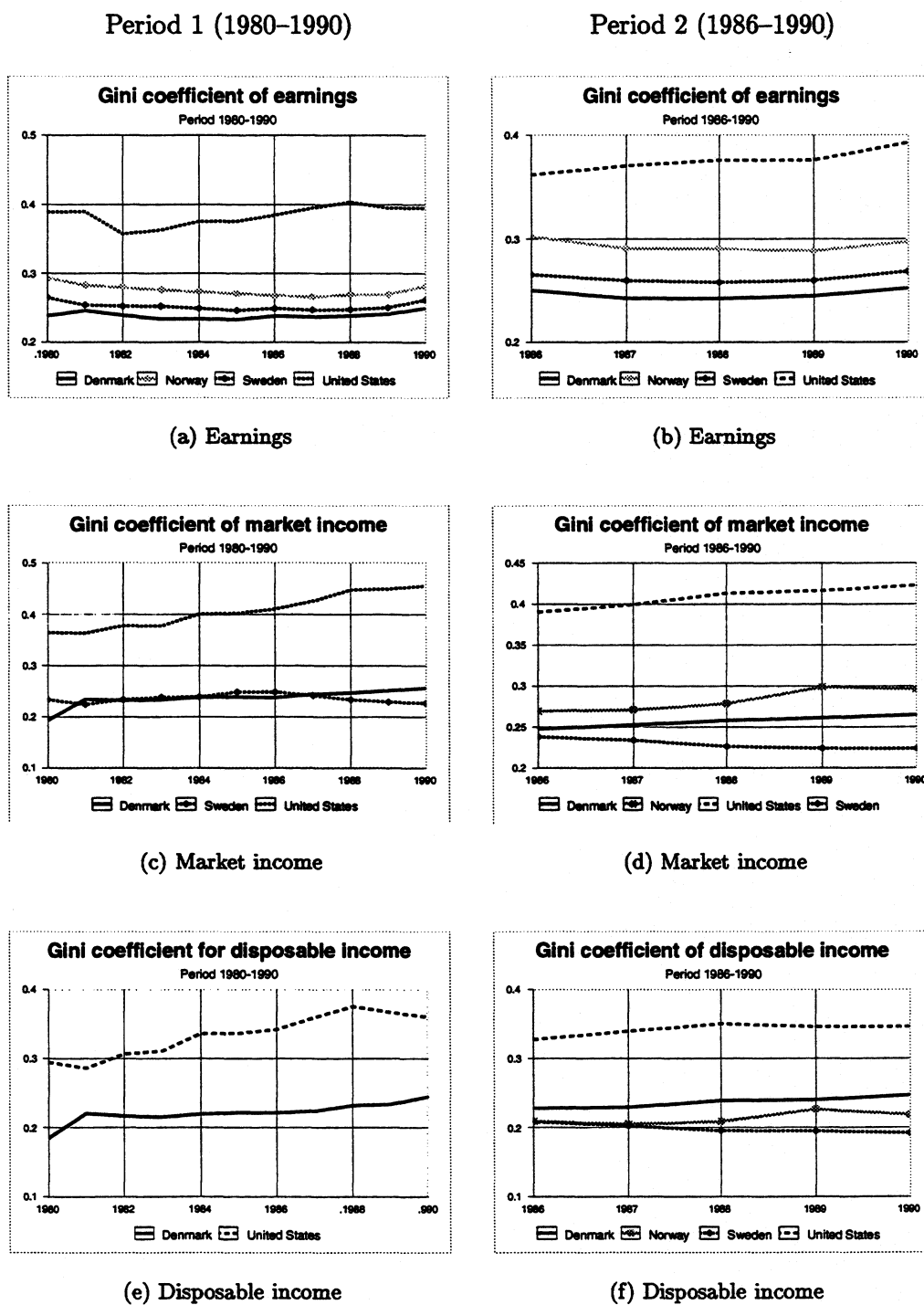
We start the presentation of our results by looking at inequality of annual incomes. Figure 2(a) shows the time-series of our Gini coefficient for earnings during Period 1, Figure 2(c) the same information for market income, and Figure 2(e) the same information for disposable income (all also shown in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

In both periods 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 2(a)). The differences are of comparable orders of magnitude for disposable income and market income.⁸ There is also a marked trend in inequality of all income concepts.⁹ 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. Atkinson et al. (1995)). That inequality increased substantially in the United States throughout the 1980s is well established.

⁸In judging whether these differences are “small” or “large”, the reader can use the property that the Gini coefficient equals half the expected percentage difference between two randomly drawn individuals in the population.

⁹In looking at the trend in earnings inequality in the United States, it should be recalled that our sample is very different from commonly used samples. In particular, the fact that we include both men and women, and restrict the analysis to those who had positive earnings in every sample year, leaves us with a sample that is quite different from commonly used samples, that are cross sections (disregarding the restriction to a balanced panel) or restricted to men.

Figure 2 Gini coefficients for distributions of annual earnings, market income and disposable income. Period 1 (1980–1990) and Period 2 (1986–1990)



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

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 Period 2 when the differences between Sweden and Norway are .075 and .072. For all other income concepts and periods the differences never exceed .05.

Table 1 Gini coefficients of over-time average income

(a) Period 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 | 0.204 | |
| | SE(Gini) | (0.004) | (0.004) | |
| United States | Gini | 0.342 | 0.369 | 0.305 |
| | SE(Gini) | (0.014) | (0.010) | (0.009) |

(b) Period 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 | 0.183 |
| | SE(Gini) | (0.004) | (0.003) | (0.003) |
| United States | Gini | 0.356 | 0.383 | 0.321 |
| | SE(Gini) | (0.011) | (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.

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 Period 2. The

difference in Sweden is around .03, whereas in Denmark the differences are smaller.¹⁰ It should 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 Period 1 and Table 1(b) those for Period 2. For Period 1 the results are quite clear; inequality is 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 absolute difference in the Gini coefficients for disposable income between the United States and Denmark is .1 when the average of income over eleven years is used. The differences in the Gini coefficients of annual disposable incomes are larger. The differences between the Scandinavian countries are relatively small and the ordering of the Scandinavian countries depends on the income concept. The pattern for Period 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 longer period show that mobility of earnings is higher in the United States than in the Scandinavian countries. The United States also has higher mobility than Denmark in market and disposable income for this period. However, mobility in the distribution of market income in

¹⁰The differences we estimate for Sweden are only about one half as large as those estimated by Björklund, Palme & Svensson (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.

Table 2 Mobility indices

(a) Period 1 (1980-1990)

| | Mobility | | |
|---------------|----------|---------------|-------------------|
| | Earnings | Market income | Disposable income |
| | Gini | Gini | Gini |
| Denmark | 0.080 | 0.076 | 0.078 |
| Norway | 0.069 | | |
| Sweden | 0.073 | 0.135 | |
| United States | 0.109 | 0.097 | 0.092 |

(b) Period 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 | 0.078 | 0.094 |
| 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.

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 shorter period. The mobility order of countries is consistent with the long period, in the sense that the countries that were ordered using data from Period 1 are not re-ordered in Period 2 – e.g., Sweden is more mobile on market income than the United States, which in turn is more mobile on market and disposable income than Denmark. The estimated mobility indices for Period 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 periods. 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.

4.2 Sensitivity analyses

There is always a risk in a study of this type that the conclusions are sensitive to some specific choices. Given the large number of choices to be made, it is for all practical purposes infeasible to examine the effect of altering these choices on the conclusions. Thus, we have chosen to study whether a few specific issues, if handled differently, would lead us to draw different conclusions.

These are

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, rather than similarly treat cohabiting couples, as families (and hence aggregate their income) is responsible for the fairly high extent of mobility observed in Sweden;
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 labour force participation. These differences affect both inequality and mobility. Given the restriction that only those with positive earnings in every year will be included in the sample, different kinds of public policies will exclude different types of persons. For instance, compare two high-earning women in Sweden and the United States, who receive the same wage in every year they are employed. The American woman is on maternal leave for three months following the birth of a child, an event which will be associated with some earnings mobility. The Swedish woman again might be

on maternal leave for more than a year, an event which will exclude her from the sample. It is difficult to disentangle such effects from other types of mobility. Instead of attempting to control for different sources of mobility, we compare the mobility of male earnings in the four countries, a comparison that in our view is less sensitive to the interaction of inter-country differences in work-related public policies and our sample selection criteria.

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.

In Table 3 we show the inequality and mobility indices of earnings estimated only for males. The results are quite striking. The ranking of countries by earnings inequality is similar to that found for the sample of all positive wage earners; except that for men, earnings are more equal in Norway than in Sweden. The ordering of countries with respect to mobility is perhaps more interesting. It turns out that male earnings in the United States are less mobile than those in Denmark and Norway in both time periods, whilst 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 Sweden. One possible explanation could be that cohabitation without formal marriage is fairly common in Sweden, as also in the other 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.¹¹ We are able to experiment with a broader definition of the family, namely we are able to treat those cohabiting couples as married who have at least one common child who is under the age of 18 (Swed. *samtaxerade*). In the second half of the 1980s, the “marriage rate” thus formed was 3–4 percentage points higher than the rate of formal marriages.

As can be seen in Table 4, our estimated mobility patterns for Sweden are affected very little by this experiment. Estimated mobility indices for market income differ only at the third decimal number from our main results in Table 2. Mobility of disposable income turns out to be slightly higher than what was found for our main sample. However, no re-ranking of Sweden follows from these sensitivity analyses.

Table 4 The sensitivity of average inequality and mobility in Sweden to changes in the definition of marital status

| | | Market income | Disposable income |
|-----------|----------|---------------|-------------------|
| 1980-1990 | Gini | 0.213 | |
| | SE(Gini) | (0.004) | |
| | Mobility | 0.137 | |
| 1986-1990 | Gini | 0.212 | 0.184 |
| | SE(Gini) | (0.003) | (0.003) |
| | Mobility | 0.078 | 0.100 |

Source: SLLS data files.

Note: For the main results, couples had to be legally married. The numbers in this table stem from a sample where cohabitation without formal marriage is treated similarly.

There is the possibility that the results for the United States are to a large extent driven by the fact that the U.S. population is more heterogeneous than the populations of the Scandinavian countries, or that the fact that racial minorities in the United States are disadvantaged on economic terms accounts for both higher inequality and low mobility. The heterogeneity of the U.S. population is difficult to control for¹² but what we are able to test if the exclusion of racial

¹¹Mobility would be higher both because transitory income shocks, if uncorrelated across couples, would tend to be smaller relative to permanent components of income and in as far as cohabiting couples marry during the observation period.

¹²See, however, Björklund & Freeman (1994) 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

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. 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).

minorities would in some way affect our results. Specifically, we include 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 periods than for the full sample, but the differences are at most around .015. The United States is well above the Scandinavian countries with respect to all income variables. Income mobility among whites is slightly larger than for the full sample, but also here, the differences are in general small and in only one case, that of earnings in the period 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. Recall that the PSID only records unemployment benefits as a separate variable for the household head in the early 1980s. Thus, we are only able to include unemployment benefits in the definition of earnings for the long period 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.

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.

Further, we estimate the inequality and mobility indices for both of these variables for the sample as defined “normally”, i.e., including both men and women, and for the sample consisting solely of men. The results for annual inequality are shown in Figure 3 and for mobility and inequality of average income in Table 6.

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

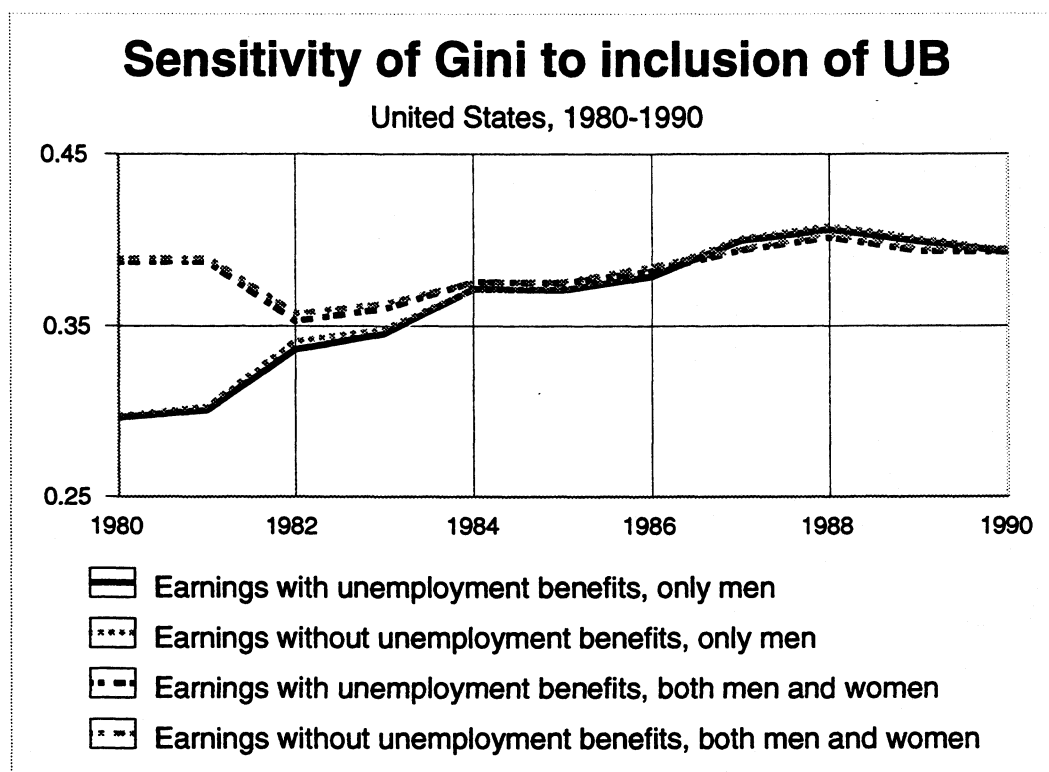
| | | Earnings without unemployment benefits, both men and women | Earnings with unemployment benefits, both men and women | Earnings without unemployment benefits, only men | Earnings with unemployment benefits, only men |
|---------------|----------|--|---|--|---|
| | | Gini | Gini | Gini | Gini |
| 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 earnings with unemployment benefits we have included for those years data are available this variable in earnings.

Looking at Figure 3, we can see that the drop in earnings inequality between 1980 and 1983, which in light of previous research on earnings inequality in the United States is peculiar, is due to our inclusion of both men and women (see footnote 9). The Gini coefficient estimated for the sample of men reveals a steady rise in inequality over time. We also 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 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.

Figure 3 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 earnings with unemployment benefits we have included for those years data are available this variable in earnings.

It is not always easy to interpret the magnitudes of summary measures of inequality and mobility. Are the differences small or large? We illustrate the impact of the level of mobility by comparing the actual distribution of income with a hypothetical distribution, in which we impose no mobility. Specifically, we compare the observed distribution of annual earnings over the period 1980–1990 in Norway with the hypothetical distribution that would occur under the assumption of 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 through time, i.e., the individual with the lowest average earnings over the whole time period receives the lowest observed earnings in every year, the second lowest earnings in the average earnings distribution receives the second lowest observed earnings 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 earnings. This procedure keeps the distributions of annual earnings unchanged. 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 compare the “effects” of mobility as the difference in the two distributions.

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 distribution, the sum of the second lowest earnings the second lowest hypothetical earnings and so on.

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 remaining deciles. Compared to the hypothetical immobile distribution, the bottom decile gained 37.9 percent and the second decile gained 7.9 percent. The top decile lost 3.4 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 0.1 we may tentatively conclude that income mobility is very low and has only modest effects on the distribution of income.

5 Discussion and concluding comments

Our results can be summarized briefly. First, we find that the ordering of countries by inequality of annual incomes by and large remains unchanged when the accounting period is extended from one 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 short period (1986 to 1990), the United States comes third in the mobility ordering for both market and disposable income. For the longer period, the United States has higher mobility for earnings and disposable income. For market income, Sweden seems to be the most income mobile country.

It appears that in all the countries we study, there is quite little income mobility. This means that a lengthening of the accounting period of income will affect inter-country differences in income inequality very little. The differences that arise within countries of lengthening the accounting period are very 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 unambiguously highest income mobility is similar to the findings of Burkhauser & Poupore (1995) and Burkhauser & Holtz-Eakin (1995), who compare Germany and the United States. The methods they employ are different from ours and their main conclusion is that the two countries reveal "remarkably similar" mobility patterns over the period 1983 to 1988. This conclusion holds for both earnings and measures that are closer to disposable income.

The fact that the ordering of countries with respect to inequality varies with the length of the period covered and the income concept that is studied, suggests that such choices are crucial in comparisons of income mobility. Furthermore, it is not clear how a further extension of the time

period to a full lifetime would order the countries we study. One consequence might be that the differences in inequality of lifetime income would be smaller than the ones we have found in our study.

It is a challenge to extend the time period further. Our inquiry has also demonstrated the data problems involved in comparative research like this. Therefore 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 income. 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 for Sweden suggests that this is not the case.

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 we have not pursued is to impose some model of measurement error on the Scandinavian data. The findings from the PSID validation studies (Bound & Krueger 1991) could be used for such a purpose.

Another important goal for future research is to understand 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 labour 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 that one of the typical points of departure in studies of income inequality over longer time periods and income mobility is that a traditional defense of high income inequality is that it is the flip-side of high

mobility. We find no evidence of a positive relationship between inequality on the one hand and mobility on the other. Although the reverse finding does not emerge either, we find this lack of a pattern an important finding in itself.

References

- Aaberge, R. & Wennemo, T. (1993), *Inntektsulikhet og inntektsmobilitet i Norge 1986–1990*, Sociale og økonomiske studier 82, Statistisk Sentralbyrå, Oslo – Kongvinger.
- Atkinson, A. B., Bourguignon, F. & Morrisson, C. (1992), *Empirical Studies of Earnings Mobility*, Fundamentals in Pure and Applied Economics, Harwood Academic Publisher, Chur.
- Atkinson, A. B., Smeeding, T. M. & Rainwater, L. (1995), *Income distribution in the OECD countries: the evidence from the Luxembourg Income Study*, Vol. 18 of *Social Policy Studies*, OECD, Paris.
- Bingley, P., Bjørn, N. & Westergård-Nielsen, N. (1995), *Wage mobility in Denmark 1980-1990*, Working Paper 95-10, Centre for Labour Market and Social Research.
- Björklund, A. (1993), 'A comparison between actual distributions of annual and lifetime income: Sweden 1951-1989', *Review of Income and Wealth* 39(4), 377–386.
- Björklund, A. & Freeman, R. (1994), *Generating equality and eliminating poverty – the Swedish way*, WP 4945, NBER, Cambridge, Ma.
- Björklund, A., Palme, M. & Svensson, I. (1995), 'Tax reform and income distribution: An assessment using different income concepts', *Swedish Economic Policy Review*. forthcoming.
- Bound, J. & Krueger, A. B. (1991), 'The extent of measurement error in longitudinal earnings data: Do two wrongs make a right?', *Journal of Labor Economics* 9, 1–24.
- Burkhauser, R. V. & Holtz-Eakin, D. (1995), *Mobility and inequality in the 1980s: A cross-national comparison of the United States and Germany*, mimeo, Syracuse University.
- Burkhauser, R. V. & Poupore, J. G. (1995), *A cross-national comparison of permanent inequality in the United States and Germany*, mimeo, Syracuse University.
- Burkhauser, R. V., Holtz-Eakin, D. & Rhody, S. (1994), *Labor earnings mobility and inequality in the United States and Germany during the 1980s*.
- Drobnic, S. & Wittig, I. (1994), *Women's part-time employment and family cycle in the United States*, Mimeo. University of Bremen.
- Economic Report of the President 1991 (1991), U.S. Government Printing Office, Washington, D.C.
- Erikson, R. & Åberg, R. (1987), *Welfare in Transition*, Oxford Clarendon Press, Oxford.
- Freeman, R. (1988), 'Labor market institutions and economic performance', *Economic Policy* 6, 63–80.
- Friedman, M. (1962), *Capitalism and Freedom*, Chicago University Press, Chicago.
- Gottschalk, P. & Moffitt, R. (1994), 'The growth of earnings instability in the U.S. labor market', *Brookings Papers on Economic Activity* (2), 217–272.
- Gustafsson, B. (1994), 'The degree and pattern of income immobility in Sweden', *The Review of Income and Wealth* 40(1), 67–86.
- Hart, P. (1981), *The statics and dynamics of income distributions: A survey*, Tieto, Clevedon.

- Hartog, J. & Theeuwes, J. (1995), Lessons from the north European unemployment experience: Northern light or polar night?, in A. Björklund & T. Eriksson, eds, 'Unemployment in the Nordic Countries', North-Holland, Amsterdam. In press.
- Hill, M. (1993), *PSID User's Guide*, The Institute for Social Research, Ann Arbor, MI.
- Jenkins, S. P. & Lambert, P. (1993), 'Ranking income distributions when needs differ', *The Review of Income and Wealth* 39(4), 337–356.
- Krelle, W. & Shorrocks, A., eds (1978), *Personal Income Distribution*, North-Holland, Amsterdam.
- Morgan, J. N., Duncan, G. J., Hill, M. S. & 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 (1993a), *Economic Outlook*, OECD, Paris.
- OECD (1993b), *Employment Outlook*, OECD, Paris.
- Pedersen, P., Schmidt-Sørensen, J., Smith, N. & Westergård-Nielsen, N. (1990), 'Wage differentials between the public and the private sector', *Journal of Public Economics* 41, 125–145.
- Rao, V. M. (1969), 'Two decompositions of the concentration ratio', *Journal of the Royal Statistical Society* 132, 418–425.
- Rosenfeld, R. & Birkelund, G. (1994), 'Women's part-time work: A cross-national comparison'. Department of Sociology. University of North Carolina.
- Sen, A. K. (1973), *On Economic Inequality*, Clarendon Press, Oxford.
- Shorrocks, A. (1978), 'Income inequality and income mobility', *Journal of Economic Theory* 19, 376–393.
- Topel, R. (1991), 'Specific capital, mobility, and wages: Wages rise with job seniority', *Journal of Political Economy* 99, 145–176.
- Westergård-Nielsen, N. (1984), A Danish longitudinal database, in G. R. Neumann & N. Westergård-Nielsen, eds, 'Studies in labor market dynamics', Springer-Verlag.
- Westergård-Nielsen, N., ed. (1995), *Wage Differentials in the Nordic Countries*, North-Holland, Amsterdam. Forthcoming.
- Yaari, M. (1988), 'A controversial proposal concerning inequality measurement', *Journal of Economic Theory* 24, 617–628.
- Zetterberg, J. (1990), 'Essays on inter-sectoral wage differentials'. Department of Economics. Uppsala University.

Appendix

Table A 1 Gini coefficients of annual income, Period 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) | 0.389 | (0.008) |
| | | 1981 | 0.246 | (0.002) | 0.283 | (0.000) | 0.254 | (0.004) | 0.390 | (0.008) |
| | | 1982 | 0.239 | (0.002) | 0.279 | (0.000) | 0.252 | (0.004) | 0.357 | (0.013) |
| | | 1983 | 0.234 | (0.002) | 0.276 | (0.000) | 0.252 | (0.004) | 0.363 | (0.015) |
| | | 1984 | 0.234 | (0.002) | 0.273 | (0.000) | 0.249 | (0.004) | 0.375 | (0.016) |
| | | 1985 | 0.233 | (0.002) | 0.271 | (0.000) | 0.246 | (0.004) | 0.376 | (0.014) |
| | | 1986 | 0.238 | (0.002) | 0.268 | (0.000) | 0.249 | (0.004) | 0.385 | (0.017) |
| | | 1987 | 0.237 | (0.002) | 0.266 | (0.000) | 0.247 | (0.005) | 0.395 | (0.019) |
| | | 1988 | 0.238 | (0.002) | 0.269 | (0.000) | 0.247 | (0.004) | 0.404 | (0.021) |
| | | 1989 | 0.241 | (0.002) | 0.270 | (0.000) | 0.250 | (0.004) | 0.395 | (0.017) |
| | 1990 | 0.249 | (0.002) | 0.282 | (0.000) | 0.261 | (0.005) | 0.395 | (0.011) | |
| | N | 11734 | 11734 | 705597 | 705597 | 2834 | 2834 | 1939 | 1939 | |
| Market income | Single year | 1980 | 0.193 | (0.003) | | | 0.234 | (0.004) | 0.365 | (0.012) |
| | | 1981 | 0.234 | (0.004) | | | 0.224 | (0.004) | 0.363 | (0.008) |
| | | 1982 | 0.232 | (0.004) | | | 0.234 | (0.004) | 0.378 | (0.008) |
| | | 1983 | 0.233 | (0.004) | | | 0.239 | (0.004) | 0.377 | (0.009) |
| | | 1984 | 0.238 | (0.004) | | | 0.239 | (0.004) | 0.401 | (0.012) |
| | | 1985 | 0.239 | (0.004) | | | 0.249 | (0.005) | 0.402 | (0.010) |
| | | 1986 | 0.237 | (0.004) | | | 0.249 | (0.005) | 0.410 | (0.010) |
| | | 1987 | 0.244 | (0.004) | | | 0.242 | (0.005) | 0.426 | (0.015) |
| | | 1988 | 0.247 | (0.004) | | | 0.234 | (0.004) | 0.448 | (0.015) |
| | | 1989 | 0.251 | (0.004) | | | 0.229 | (0.004) | 0.450 | (0.012) |
| | 1990 | 0.256 | (0.004) | | | 0.227 | (0.005) | 0.456 | (0.009) | |
| | N | 3336 | 3336 | 0 | 0 | 3235 | 3235 | 3119 | 3119 | |
| Disposable income | Single year | 1980 | 0.185 | (0.003) | | | | | 0.295 | (0.011) |
| | | 1981 | 0.220 | (0.004) | | | | | 0.286 | (0.007) |
| | | 1982 | 0.217 | (0.004) | | | | | 0.307 | (0.007) |
| | | 1983 | 0.215 | (0.004) | | | | | 0.311 | (0.008) |
| | | 1984 | 0.219 | (0.004) | | | | | 0.336 | (0.012) |
| | | 1985 | 0.221 | (0.004) | | | | | 0.336 | (0.009) |
| | | 1986 | 0.221 | (0.004) | | | | | 0.342 | (0.010) |
| | | 1987 | 0.224 | (0.004) | | | | | 0.359 | (0.016) |
| | | 1988 | 0.232 | (0.004) | | | | | 0.376 | (0.016) |
| | | 1989 | 0.234 | (0.004) | | | | | 0.367 | (0.011) |
| | 1990 | 0.245 | (0.005) | | | | | 0.360 | (0.008) | |
| | N | 3336 | 3336 | 0 | 0 | 0 | 0 | 3119 | 3119 | |

Table A 2 Gini coefficients of annual income, Period 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) | 0.362 | (0.010) |
| | | 1987 | 0.242 | (0.002) | 0.291 | (0.000) | 0.260 | (0.004) | 0.371 | (0.011) |
| | | 1988 | 0.242 | (0.002) | 0.290 | (0.000) | 0.258 | (0.004) | 0.376 | (0.010) |
| | | 1989 | 0.245 | (0.002) | 0.288 | (0.000) | 0.260 | (0.004) | 0.376 | (0.012) |
| | | 1990 | 0.252 | (0.002) | 0.297 | (0.000) | 0.269 | (0.004) | 0.393 | (0.015) |
| | N | | 16811 | 16811 | 1307540 | 1307540 | 3606 | 3606 | 5483 | 5483 |
| Market income | Single year | 1986 | 0.248 | (0.004) | 0.269 | (0.006) | 0.238 | (0.004) | 0.390 | (0.007) |
| | | 1987 | 0.253 | (0.004) | 0.271 | (0.006) | 0.234 | (0.004) | 0.399 | (0.009) |
| | | 1988 | 0.258 | (0.004) | 0.279 | (0.006) | 0.226 | (0.004) | 0.413 | (0.009) |
| | | 1989 | 0.261 | (0.004) | 0.299 | (0.012) | 0.224 | (0.004) | 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 | 3861 | 3861 | 6712 | 6712 |
| Disposable income | Single year | 1986 | 0.228 | (0.003) | 0.209 | (0.006) | 0.212 | (0.003) | 0.327 | (0.006) |
| | | 1987 | 0.229 | (0.003) | 0.205 | (0.005) | 0.205 | (0.003) | 0.339 | (0.010) |
| | | 1988 | 0.239 | (0.003) | 0.208 | (0.006) | 0.199 | (0.003) | 0.350 | (0.010) |
| | | 1989 | 0.240 | (0.003) | 0.226 | (0.011) | 0.199 | (0.003) | 0.346 | (0.007) |
| | | 1990 | 0.247 | (0.004) | 0.218 | (0.008) | 0.192 | (0.003) | 0.346 | (0.005) |
| | N | | 5455 | 5455 | 2047 | 2047 | 3861 | 3861 | 6712 | 6712 |

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