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Abstract

Available evidence on the income distribution in Denmark is based on two types of sources. One is cross-section studies for a number of specific years, which are difficult to compare due to major changes in definitions and concepts. Another is evidence for a number of years since 1960 on the life time income for a number of educational groups based on an assumption of a stylized career for each group.

The data base for the present study is an existing longitudinal sample of 5% of the adult Danish population. Information is available on different categories of income, taxes, transfers, demographic variables and the labour market history of the individuals. Furthermore, the database contains information on about 3,000 married couples where both spouses are included in the sample.

Based on this, new results on the Danish income distribution using both individuals and married couples as the income unit are presented. We study the distribution of gross incomes, wages and salaries, factor incomes and disposable incomes. Hereby, we also get a rough estimate of the distributional impact from a situation with persistently high unemployment and from public sector activities. In the final parts of the paper we include some semi-lifecycle distribution measures based on work in the Danish Economic Council. The results in the present paper are related to earlier long-run estimates of inequality in the Danish income distribution.

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1 Introduction¹

In the last two decades the participation rate of women has increased very fast in Denmark. The current level is second, only marginally, to the level in Sweden, who has the highest female participation rate of all. At the same time unemployment has increased dramatically from an extremely low level between 1 and 2 percent to a current level of 10-12 percent. Only little is known about the impact on the distribution of individual and family incomes of these and related factors.

The main emphasis in the present paper is on the distribution of incomes since 1976. As a background to this, Section 2 contains a brief survey of labour market trends and macroeconomic background in the years 1976 - 1990 for which our income data are available. In Section 3 we discuss the interaction between the trends in the labour market and the distribution of income. The analysis is based on a panel data set created as a 5 percent sample of the adult Danish population. The variables in the data set are created from administrative registers. A brief survey of the data set is given in Section 4. Section 5 contains a survey of indicators of the annual distribution of gross incomes in which individuals are used as the income unit and a survey of the distribution of incomes for a longitudinal sample of married couples. For married couples the income concept is the sum of the income of the spouses divided by 2. For wage and salary earners alone we further study the distribution of factor incomes by excluding unemployment benefits and looking only at wage incomes. Section 6 reports briefly the results from looking at the distribution of factor incomes approximated by gross incomes net of taxable transfer incomes. The topic in Section 7 is some preliminary aspects of the distributional impact from the public sector. Data are available on income taxes paid and on taxable public sector transfers. Unfortunately, this results in a somewhat incomplete picture of the impact from the public sector activities. The relative size of the public sector in Denmark is one of the highest among the OECD countries. A major part of public sector expenditures is however on collective consumption which, as well known, is difficult to allocate on individuals. Next, in Section 8 we present some indicators for life time incomes for different educational groups based on earlier studies of the income profiles related to standard careers in the included groups. Section 9

¹ Support from the Danish National Research Foundation and from the Nordic Economic Research Council is gratefully acknowledged. Mette Verner has been a helpful research assistant. Earlier versions of the paper have been presented at a workshop at the Centre for Labour Market and Social Research, Aarhus, and at the EALE Conference in Warsaw in September, 1995. Comments from participants and from a referee are gratefully acknowledged. We are responsible for remaining errors and omissions.

summarizes the results for the period 1976-1990 and relates them to earlier results concerning long-run trends in the Danish income distribution. In the latter area, Section 9 is fairly tentative as it is difficult to merge results concerning different periods due to fundamental changes both in the definition of income concepts and in the way income statistics are available. This last point is due to the fact that tax registers are the primary source of information and the legal categories defining both gross income, taxable income and the unit for taxation have changed quite much over time. Finally, some concluding comments are found in Section 10.

2 Labour Market Trends and Macroeconomic Background

During the period for which consistent panel data are available the Danish economy has been characterized by fundamental and persistent macroeconomic imbalances. The composition of the macroeconomic balance problem has changed over time but the overall problem has been present ever since the years around 1960. Following the first oil price shock in 1974 the labour market situation shifted very rapidly from excess demand to high unemployment. With few and small interruptions the level went up steeply until 1983, cf. Figure 1.

Figure 1. The Rates of Unemployment and Inflation, 1960-1993. (Source: OECD, 1994).

From 1983/84 to 1986/87 the Danish economy experienced the only significant decline in unemployment in the period under review. The increase in employment was even stronger than what is reflected in Figure 1 as the participation rate went up very quickly in these years, cf. below. In the latter part of the period, 1986/87 to 1990, unemployment increased once again to the highest level since the 1930s.

The increasing unemployment in the late 1980s reflects policy reactions to an alarming development in the external debt situation of the Danish economy in the mid-1980s. The balance of payments was in deficit for all years between 1963 and 1989. In 1990 the balance turned into surplus. Another macroeconomic indicator of importance for the distribution of incomes is the rate of inflation which is also included in Figure 1. One possible implication from the volatile rate of inflation is the differential impact on the incomes for different groups in the economy. In the institutional area cost of living adjustments in collective agreements were changed from the mid-1970s. In 1975 the existing system with equal percentage adjustments was changed to a system with the same absolute amount, for a given change in the CPI, to all wage and salary earners covered by collective agreements. Given more flexible wage adjustment mechanisms in the private compared to the public sector this created the conditions for a narrowing between the average wages in the two sectors². With the overall average wage in the private sector being lower than in the public sector, this institutional change would *cet. par.* contribute to create a more equal overall distribution of incomes. In 1982 the cost of living adjustments were suspended and in 1985 they were taken out of all collective agreements. From the mid-1980s inflation has however decreased so much that this factor is of minor or no importance in relation to the development of the income distribution. Finally, it should be noted that the capital gains and losses implied by the volatile rate of inflation and by equally big changes in the rate of interest most probably have had major implications for the distribution of consumption possibilities. These gains and losses are however only very imperfectly reflected in the annual incomes from the tax registers.

Returning to the more specific trends in the labour market of importance for the distribution of incomes, Figure 2 shows the unemployment rates for men and women separately. In contrast to the situation before the oil price shocks, women have had a higher unemployment than men ever since the mid-1970s. Participation rates for both men and women have also changed during the period. For men, the only major change occurred for the group 60 years and older. An early retirement scheme for labour market reasons was enacted in 1979 which fairly quickly resulted in a major drop in participation for males meeting the age requirement³. As we concentrate the analysis below on the age group between 25 and 59 years this change is of minor importance regarding the distribution of incomes. For women, on the other hand, some very big changes occur during the period, cf. Figure 3.

² The shift in the sectoral wage structure is the topic in Pedersen et al. (1990).

³ The official retirement age, when people become eligible to the National old age pension, is 67 years for both women and men.

Figure 2. Unemployment Rates for Men and Women, 1976-1990.

Figure 3. Participation Rate for Women and Part-time Frequency, 1976 - 1990.

The participation rate for women increases very fast in the late 1970s and a somewhat slower increase occurs throughout the 1980s. The part-time frequency - also shown in Figure 3 - has a quite different profile; it increases from 1976 with a maximum in 1982 followed by a major decline. Combining the two graphs in Figure 3, we see that the impact on labour supply from the steep increase in female participation from the mid-1970s to the beginning of the 1980s is

partly neutralized by the simultaneous increase in the part-time frequency. The slower increase in participation during the 1980s is on the other hand partly neutralized by the simultaneous decrease in the part-time frequency.

3 Income Distribution and the Labour Market

The impact from the labour market trends described above on the income distribution depends on both the choice of income unit and income concept. In subsequent sections we describe the development of the distribution of factor income, gross income, wage income and disposable income. The income unit is the individual income for most people in the sample. The only exception is for married couples where both spouses are included in the sample⁴. For those persons we use the sum of the income of the spouses divided by 2 as the income concept.

The impact from the spectacular increase in female participation will depend on the interaction between the inequality reducing effect from a decrease in the share of women with zero income and the development in the distribution of positive incomes among women. According to the Pigou-Dalton transfer principle a non-increasing inequality in the distribution of positive incomes during a process of increasing female participation is a sufficient condition for a fall in the Gini coefficient when looking at the distribution of individual incomes among women. Regarding the impact on the distribution of individual incomes among both women and men, we still have the inequality reducing effect from a decline in the number of individuals with zero income. The impact on the distribution of income among individuals with positive income will however depend on the interaction between the male income distribution and the distribution of income for the women entering the labour force. If the female entrants for instance have very low incomes relative to men and women already in the labour force, the inequality reduction from the falling number of zero incomes could be counteracted by increasing inequality in the distribution of positive incomes.

For married couples it is difficult to have strong priors regarding the distributional impact from the participation profiles in Figure 3. The impact will depend on the correlation between wives' potential incomes and their decisions regarding working hours and on the correlation between husbands' incomes and wives' part-time or full-time decision⁵.

⁴ For married people whose spouse is not included in the sample, the income information for the excluded spouse is insufficient. We consequently had to treat this group in the same way as people living alone.

⁵ Analyses of the impact on the income distribution from the labour force participation of married women can be found for Sweden in a time-series context in Björklund (1992) and for the US in a cross-section context in Slottje et al. (1992). Both studies find an equalizing impact from the labour force participation of married women.

A major impact is expected from movements in unemployment on the distribution of factor incomes, and especially on the distribution of wages and salaries. The average unemployment of 8-10 per cent during the 1980s results from about 30 per cent of all wage and salary earners being hit by unemployment in different degrees during the year. By itself unemployment is expected to have a pro-cyclical impact on inequality in the distribution of wages and salaries, i.e. inequality is expected to go down as unemployment goes down and vice versa. Regarding the distribution of gross income, i.e. the sum of factor income and taxable transfers, and disposable income, the impact from movements in unemployment is expected to be smaller. A major part of taxable transfers to the group we consider, i.e. people between 25 and 59 years, is unemployment insurance benefits. The Danish unemployment insurance system is characterized by having a high coverage among the unemployed, a maximum benefit duration which practically speaking was indefinite in the period we consider, no experience rating or waiting period, and benefits at 90 per cent of the previous wage up to a maximum amount. The maximum was fairly low compared to average industrial wages, i.e. on average about 65 per cent of average industrial wages in the period we consider⁶. In relation to the distribution of gross income it should be emphasized, however, that the incidence of unemployment is much higher on low income groups implying that a major part of the unemployed experience only a fairly small reduction in their gross income. Due to women having on average lower wages than men, this effect is most pronounced for female workers.

Regarding the distribution of disposable income, the impact from the unemployment insurance system is reinforced by a strong emphasis on a progressive income tax already from a fairly low level of income implying a further dampening of the inequality impact from movements in unemployment. The impact from the income tax is further reinforced by the existence of different means-tested benefits, i.e. housing benefits and subsidized child care. As these benefits are tax free they are unfortunately not included in the data.

Change in family status is another factor with a potential impact on the distribution of incomes. Marriage, cohabitation, divorce, an end to cohabitation, and the loss of a spouse through death are all events with a potential impact on the distribution of incomes. It is however difficult to have strong priors regarding the size and direction of the impact. Using Danish panel data the Social Commission (1992) studied the effects on the receipt of transfer incomes from changes in family status comparing 1989 with 1981. The overall conclusion was that effects of this type were fairly small. One exception was mothers who were married in 1981 and who became lone

⁶ The nominal maximum amount was fixed between 1982 and 1987 implying that the average benefit-wage ratio went down along with the decline in unemployment in those years.

mothers at the end of the decade. For this group, the analysis found a polarization effect, i.e. a greater share became fully independent of transfer incomes, but at the same time a greater share also became fully dependent on transfer incomes. In this case, an increasing tendency to divorce could induce an increase in income inequality for this group of women. The effects on the overall distribution is however uncertain as a number of the women in this group experience an increase in their average income position relative to men. Jensen & Smith (1990) found a significant impact on the propensity to divorce from individual unemployment experience. How this interaction between the labour market and family reactions will influence the distribution of incomes will however depend on the relative strength of the opposite trends discussed above.

4 The Data Set

The data used in the present analysis is a 5 percent random sample of the Danish population in the age group 15 to 74 years followed during the period 1976-1990. As mentioned we concentrate the analysis on the labour market core group between 25 and 59 years. The data set is based on administrative registers and contain a vector of demographic variables, i.e. age, gender, education, marital status, children and residence. Further, information is available on a number of labour market variables, i.e. occupation, sector of employment, union affiliation, working hours given implicitly from the payments to a supplementary pension scheme and unemployment. From tax registers information is available on a number of income categories, i.e. gross income, wage income, income from independent business, capital income, taxable income transfers, taxable income and income taxes paid. Finally, the tax registers contain information on that part of assets and liabilities which are relevant with regard to taxation⁷.

Based on these income variables, distribution analyses can proceed in different ways regarding the choice of income concept to be used in the analysis. Gross income is a composite measure including factor incomes as well as taxable transfers. There are well known conceptual and practical difficulties in defining the relevant measure for income from independent business. As a consequence, it is relevant to look only at wage incomes in part of the analysis. Measuring the impact from unemployment can be done in different ways. The distribution of wage incomes among wage and salary earners without unemployment can be compared with the distribution of wage incomes, respectively wage incomes including unemployment insurance benefits, for all wage and salary earners. The distributional impact from the public sector can be assessed - partly - by comparing the distribution of gross incomes, which includes taxable transfers, with the distribution net of taxable transfers, corresponding to factor incomes, and with the distribution

⁷ An analysis of trends in the distribution of taxable net wealth using the longitudinal database can be found in Bentzen & Schmidt-Sørensen (1994).

of disposable incomes, defined as gross income net of income taxes. It should finally be mentioned that incomes from 1976 to 1980 were censored at a level of 220,000 DKK corresponding to about three times the average annual income of an industrial worker in the late 1970s. Only a small part of the population have their incomes censored due to this rule. Nevertheless, with traditional measures of inequality, a bias towards greater equality is unavoidable in these years of high inflation as the share of people being censored is increasing.

5 Annual Distribution of Gross Incomes, 1976-90

The development in the distribution of gross incomes between all individuals in the sample aged 25-59 is illustrated by annual Gini coefficients for the period 1976-1990 in Figure 4. As mentioned above, all income variables are censored at 220,000 DKK until 1980. As a consequence, the decline in the Gini coefficients from 1976 to 1980 gives a biased picture of the trend towards increased equality. Different factors influence the magnitude of the bias over time. The rate of inflation is around 10 percent annually during these 5 years, cf. Figure 1, so this factor tends to increase the bias through time as the censoring point is fixed in nominal terms. This is counteracted by the widening unemployment gap between men and women in the late 1970s, cf. Figure 2, tending towards increasing inequality. Finally, the very strong increase in female participation along with a stationary part-time frequency, cf. Figure 3, is another potential factor tending towards increasing equality in the distribution of individual incomes. In conclusion, there is hardly any doubt about the trend towards greater equality in the distribution of gross incomes among individuals in the core age groups in the late 1970s, but the precise magnitude of the trend is unknown⁸.

For the years 1981 to 1990 we have no censoring problems and Figure 4 shows a steep decline in the Gini coefficients until 1986 followed by a stable level until 1990. This strong decline occurs at the same time as the rate of inflation goes down from about 12 percent to about 3 percent. Probably more important is the continued increase in female participation along with a steep decline in the part-time frequency in these years. From 1986, female participation hardly increases any more, while the part-time frequency decreases further. The highly volatile profile in aggregate unemployment during the 1980s on the other hand is not reflected in any simple way in the course of the Gini coefficients. Looking in more detail at the shifts in the distribution, we find that the decline in the Gini coefficient reflects a loss of about 4 per cent of total gross income in the fifth quintile with the gainers being those in the two first quintiles.

⁸ This is supported by evidence in Egmose (1985, p. 64 ff.) showing a trend towards greater equality among all taxable persons using a number of different income concepts for the years 1976 to 1980.

*Figure 4. Gini Coefficients for the Distribution of Individual Gross Incomes,
All 25-59 Years Old, 1976-90.*

Next, Figure 5 shows the Gini coefficients for the distribution of gross incomes among men aged 25 to 59. Not surprisingly, the censoring has a much bigger level effect here than for both men and women in Figure 4. For the 1980s, it is interesting to note the much smaller decline in the Gini coefficients until 1986 followed, in contrast to the case in Figure 4, by a fairly strong trend towards greater inequality in the distribution of gross incomes in the late 1980s - a period where unemployment doubled for men over a short span of years. Looking more closely on the distribution we find that the increase in the Gini coefficient reflects an increasing share going to the fifth quintile with a corresponding decrease in the share of the first quintile.

Figure 6 shows the Gini coefficients for the distribution of gross incomes among women aged 25 to 59 years. Censoring has practically no impact so it is safe to conclude that a very strong decline in inequality occurs between 1976 and 1990, with the steepest decline occurring in the late 1970s and with very little decline occurring in the late 1980s. A major factor behind the trend towards a more equal distribution among women is the very strong increase in participation implying a decline in the share of women without an independent income. At the same time, the decline in the part-time frequency during most of the period implies a decline in the share of working women with fairly low incomes. Looking more closely at the distribution we find

Figure 5. Gini Coefficients for the Distribution of Individual Gross Incomes, Men, 1976-90.

the share of the fifth quintile dropping with more than 10 percentage points since 1976 reflected in big increases going to the two first quintiles, i.e. the opposite picture of what we found for men.

The impact of the opposite trends in the distribution among men and women on the distribution of gross incomes among married couples where both spouses are in the sample is shown in Figure 7⁹. The income concept used here is average gross income per spouse in the couple.

⁹ The subsample of married people where both spouses are included in the database is only available for 1980 to 1990.

Figure 6. Gini Coefficients for the Distribution of Individual Gross Incomes, Women, 1976-90.

Figure 7. Gini Coefficients for the Distribution of Gross Incomes, Married Couples, 1980-90.

If marriage occurred randomly with respect to income, we would expect from Figures 5 and 6 a steep decline in inequality in the first half of the 1980s followed by a constant or slowly increasing trend in inequality. This prediction is hardly reflected in Figure 7 at all where the Gini measure is nearly the same in 1990 as in the beginning of the 1980s.

In the final part of this section we concentrate on the distribution of income for those in the sample who are wage or salary earners according to the occupational classification used by Statistics Denmark. The main components of income for these groups are wages and salaries and unemployment benefits¹⁰. To assess the impact of unemployment for these groups in the sample, distributional indicators are presented as well for all wage and salary earners as for those who have had no unemployment during the year.

Figure 8 shows the Gini coefficients using gross incomes for wage and salary earners in the years 1981-1990. Comparing men and women without unemployment we find an increasing inequality among men and a decreasing inequality among women. For women, the decrease in part-time employment is a very probable factor behind this development, resulting in a cross-over in 1987 after which the distribution of gross incomes among female wage and salary earners without unemployment is more equal than among the male counterparts. The Gini coefficients, when we include wage and salary earners with unemployment during the year, reflect among other things the impact from unemployment benefits. The difference between the two pair of curves for men, respectively women, reflects in a damped way the unemployment profile in Figure 1 with the difference between the curves reaching a minimum by the time the lowest level of unemployment was attained in the mid-1980s. We note further that the "cross-over year" comes earlier - in 1984 - when people with unemployment are included.

Figure 9 is constructed along the same lines as Figure 8, but we use wage incomes instead of gross incomes, i.e. primarily unemployment benefits are excluded. Not surprisingly, we see a much bigger gap between the Gini coefficients when we include respectively exclude wage and salary earners with unemployment during the year. The distribution of wage incomes for those without unemployment is initially somewhat less equal among women reflecting the much higher part-time frequency for women than for men. At the end of the period, the Gini coefficients are the same for fully employed men and women¹¹. The higher female unemployment is reflected in the somewhat greater difference between the Gini coefficients for women when we include,

10 Unemployment benefits are taxable in Denmark and the amounts paid out are consequently available from the tax registers.

11 In Denmark, unemployment insurance can be taken out as either full-time or part-time insurance. As a consequence, the term fully employed includes also part-time workers without unemployment

Figure 8. Gini coefficients for the Distribution of Gross Incomes among Wage and Salary Earners, Including and Excluding People with Unemployment, 1981-1990.

respectively exclude, those with unemployment compared to the case for men. The equalizing impact from unemployment benefits is a major factor. For men, the difference between the Gini coefficients for gross incomes and for wage incomes when people with unemployment are included is 4.2 points and for women no less than 9.3 points.

Figure 9. Gini coefficients for the Distribution of Wage Incomes among Wage and Salary Earners, Including and Excluding People with Unemployment, 1981-1990.

6 Distribution of Factor Incomes, 1976-90

In this section we shall look briefly at trends in the distribution of factor incomes approximated by gross incomes net of unemployment benefits and other taxable transfer incomes to those between 25 and 59 years¹². In Figure 10, we show the development in Gini coefficients for all 25 to 59 years old, and separately for men, women, and married couples.

The profiles are influenced by censoring until 1980. For women, the censoring has a fairly small impact and we find a quite steep decline in inequality concerning the distribution of factor incomes from 1976 to 1986. From 1986 to 1990, the Gini coefficient is constant probably as a net result of the continued increase in participation and decrease in part-time employment tending to lower the Gini coefficients and the opposite impact from the steep increase in unemployment. For men, the censoring problem is serious, which makes it difficult to be specific about the years 1976 to 1980. During the 1980s the Gini coefficients follow an U-profile, tracking the unem-

¹² A number of tax free transfer incomes, i.e. child benefits, rent subsidies, social welfare benefits and part of early retirement pensions are not included in gross incomes as defined in the present context. This, however, is an advantage as we want to approximate factor incomes as closely as possible.

Figure 10. Gini coefficients for the Distribution of Factor Incomes, Age Group 25-59 Years, 1976-90.

ployment profile except for the years 1981-83, cf. Figure 2. For married couples, there is a slight decrease in inequality until 1986 followed by a slight increase to about the same level as in the beginning of the 1980s.

The shifts in the distribution of factor incomes summarized by the Gini coefficients are illustrated in another way in Figure 11. The shifts in decile shares from 1981 to 1990 are represented by the absolute difference between decile shares in 1990 and in 1981 for all, for men and women and for married couples. For women there is a very regular pattern with decreases in the top three deciles and gains for deciles 2 to 6. The pattern reflects the increase in participation and the decrease in part-time work discussed earlier. For men the shifts are in the opposite direction, but much smaller, with the main gains for those in deciles 7 to 9 and the main losses for those in the first and the second deciles.

Figure 11. The Absolute Change in Decile Shares from 1981 to 1990, Factor Incomes.

7 Distributional Impact from the Public Sector

Information is available in the database on income taxes paid by each individual in the sample, thus making it possible to estimate the trend in the distribution of disposable incomes. The gross income consists of wage income, capital income, income from independent business, unemployment benefits and taxable transfers. Subtracting income taxes due, calculated from available information in the database, from gross income results in the disposable income variable used in the present context.

The Gini coefficients for the distribution of disposable incomes are shown in Figure 12. Separate taxation of spouses makes it possible to distinguish meaningfully between distributional indicators for men and women as done in Figure 12¹³.

Figure 12. Gini coefficients for the Distribution of Disposable Income.

For all individuals aged 25 to 59 disposable incomes become more equally distributed throughout the 1980s with the steepest decline in the Gini coefficients taking place in the early 1980s. For men and women separately, the Gini coefficients move in opposite directions as found earlier for gross incomes and for wage incomes for fully employed persons. Finally, we find a very slight decrease in the Gini coefficients for married couples.

It is obviously interesting to compare the Gini coefficients for the distribution of disposable incomes with those for factor incomes, cf. Figure 10. This is done in Figure 13, which shows the ratio between Gini coefficients for disposable and for factor incomes. Implicitly, this ratio can be interpreted as the impact on the distribution of factor incomes of the development in and incidence of net taxes.

¹³ One problem concerns capital income where the allocation between spouses as regards tax reports is somewhat arbitrary. If the allocation does not shift during the years we review, this however presents only a level problem when making comparisons between women and men. For couples where both spouses are included in the sample we do not have this problem as the income concept is average disposable income per spouse.

Figure 13. Ratios between Gini coefficients for Disposable incomes and for Factor Incomes.

For all individuals aged 25 to 59 years net taxation has implied a trend towards a more equal distribution of disposable incomes compared with factor incomes throughout the 1980s. Again, the impact differs between men and women with a trend-less ratio for men. For women, on the other hand, net taxes have had an increasingly strong impact on the distribution of disposable incomes compared with factor incomes. For men the ratio is inversely related to the profile of unemployment. It should be emphasized, finally, that Figures 12 and 13 offer incomplete pictures of the distributional impact of public sector activities. A number of tax free cash transfers are not included and transfers in kind are not considered at all. As mentioned in the introduction, transfers in kind represent a major share of public sector activities in Denmark.

8 Semi-Life Cycle Distribution of Incomes

Bingley et al. (1995) have used the present database in a specific study of the income mobility throughout the 1980s for people earning low wages initially, with low wages defined as those below the 10 percent fractile in the wage distribution. A fairly high upward mobility is found from 1981 to 1990. After one year only 45 percent remain in the first decile of the income distribution. The subsequent transition from the first decile is slower but only 20 percent remain in the first decile 10 years later.

It is well known that the empirical knowledge in relation to lifetime incomes is unsatisfactory as few, if any, longitudinal data sets covering a whole life span are available. In Denmark a main empirical source concerning the distribution of lifetime incomes is the studies made by the Economic Council for the years 1960, 1970, 1975, 1980, 1985, and 1990.¹⁴ Estimated lifetime incomes for these years have been produced by the same methods for a limited number of educational groups. In the absence of true longitudinal data, estimates have been made by combining observed wages for groups with flat earning profiles with wage-scales from collective agreements for groups with seniority dependent wages over the life cycle. Based on a number of restrictive assumptions synthetic lifetime incomes have then been calculated. First, it is assumed that everybody enters the labour market after the standard period of training in the different educational groups. Secondly, it is assumed that everybody leaves the labour market at the official retirement age. From entry at the standard age to retirement everybody is assumed to be in full time employment. Annual incomes are then discounted and summed for the whole labour market career, and thus in principle made comparable between educational groups with very different earnings profiles.

For the year 1990, the Economic Council (1991) presents two sets of results on lifetime incomes. The first set is lifetime incomes for the same educational groups as in the previous years back to 1960 calculated in the same way as in the earlier studies. The second set of results represents an interesting extension. First, a larger number of educational groups are included. Secondly, wages are now actual, individual average wage income from a register-based cross-section including information on age, education, gender, spouse, income of the spouse, children, unemployment, amount of different income transfers received and income taxes paid in 1990.

This much richer data set is the foundation of a number of interesting step-wise calculations of different concepts of average lifetime income for a broad number of educational groups. Data are still cross-sectional and not longitudinal. The impact of e.g. changes over time in family formation, family labour supply, varying incidence of unemployment, variations in average retirement age etc. is not included. The same applies to the transition to self-employment which surely differs between educational groups. With these reservations in mind the new results represent a very interesting improvement relative to the earlier stylized career-income profiles. A number of results are briefly described below.

14 The most recent results for 1990 along with results from the earlier years are found in Economic Council (1991).

The synthetic factor income profiles for different educational groups calculated by the Economic Council for a number of years between 1960 and 1990 can be used in different ways. One aspect is the difference in lifetime factor incomes in a given year calculated by a cross-section approach. Another aspect is to utilize that calculations are available now for a number of years over a period of 30 years. This has been done in Figure 14, which shows a very clear negative relationship for the whole period between the 1960 level of lifetime real income and the change from 1960 to 1990.

Figure 14. Change in Lifetime Real Factor Income. Educational Groups, 1960-90.

As mentioned above, beyond the 1990 estimates comparable to estimates from previous years and used in Figure 14, the Economic Council (1991) produced a whole new set of cross section based estimates of lifetime incomes for a great number of educational groups using register data. The population included in the estimates was enlarged stepwise, beginning with people in full time employment in each educational group. Some main trends in the results are presented in Table 1 for five aggregated educational groups. Results are shown in Table 1 for calculations using both an individual approach and using a family based approach. The latter approach is necessary in the calculation of transfers and taxes depending more or less on family circumstances. The first row in Table 1 summarizes results when only people in full time employment are included. Numbers in the table indicate for each educational group the lifetime factor income relative to the overall average. For people in full time employment, the range goes from 88% of the average for the group without formal education to 49% above average for the group with long theoretical education.

Table 1. Cross-Section Based Lifetime Incomes, Educational Groups. 1990

	No formal education	Vocational education	Short theoretical education	Medium long theoretical education	Long theoretical education	Average
People in full time employment	88	99	98	121	149	100
Incl. people with unemployment	84	101	104	130	157	100
Incl. people in early retirement	79	108	114	148	182	100
Incl. income compensating transfers	85	105	108	135	166	100
All adults, average disposable income	91	104	108	120	135	100

Source: Economic Council (1991).

The second row shows the results when people with unemployment are included in the calculations. Only wage income during employment is included, while unemployment benefits are excluded at this step. The uneven incidence of unemployment shows up in the larger range. This is reinforced in the third row where people in all types of early retirement are included. The propensity to retire early is inversely related to the level of education which is clearly seen in the calculated lifetime factor incomes. The fourth row shows the impact on lifetime incomes when individually-based income compensating transfers are included. As the degree of compensation is less than one in the different programmes, the range is still greater than what was found when only full time wage incomes were included. Finally, the last row in Table 1 shows the calculated disposable lifetime incomes when the whole adult population up to the official retirement age is included. All transfers received and taxes paid are included in these calculations. A number of transfer incomes are means tested against family income. For married people it is thus the average disposable lifetime income for the spouses which is used in the calculation of the numbers shown in the final row of Table 1. More detailed results concerning the average net lifetime position of different educational groups in relation to the public sector can be found in the Economic Council (1991).

9 Earlier Studies of the Danish Income Distribution

Two main results in the present study are the finding of a decline in inequality until the mid-1980s after which time most indicators show a constant income distribution and the finding of different results for men and women. For men we find with all indicators used a trend towards increasing

inequality from the mid-1980s. For the earlier part of the period, the conclusions differ somewhat depending on the specific income variables used. For women, on the other hand, all indicators point to a strong trend towards a more equal distribution of incomes.

In this section, the findings in the present study are related to some earlier results concerning the long run trends in the Danish income distribution. The main sources to earlier results are Bjerke (1957, 1965) and Egmosen (1985). A main difficulty in linking studies of different periods to produce a coherent picture of the long run trend in the distribution of incomes is the frequent changes in the available income variables and in the unit of income, being either individuals or households. The root of this difficulty lies with the source of data which is tax registers, the contents of which depend on the ever changing tax laws. Until 1966 the income variable, used by Bjerke (1957, 1965), is the so-called assessed income defined as taxable income minus taxes paid. Assessed income defined in this way is approximately equal to disposable income. The income unit according to the tax law was until 1966 the household, i.e. distributional indicators until 1966 are heavily influenced by changes in the composition of families. From 1970 individuals become the unit of taxation, and taxable income is used by Egmosen (1985) in his analysis of the years 1970 to 1980. The years 1967 to 1969 are difficult - or according to Egmosen (1985) impossible - to incorporate in a survey of the long run development. In 1967 and 1968 the income concepts were changed in each of the years. In 1970 the income tax was changed to a PAYG system which replaced an earlier system where taxes paid in the current year depended on income in the previous year. As a practical solution, incomes earned in 1969 were not taxed and - due to this - not recorded with the usual procedures.

Bjerke (1957, 1965) reports data on the distribution of assessed incomes for approximately every five years from 1939 to 1964. Based on these distributions, Egmosen (1985) has calculated Gini coefficients and supplemented with the Gini coefficient for 1966 calculated with the same procedure as for 1939-64. For each year between 1970 and 1980 Egmosen (1985) further reports Gini coefficients for the distribution of individual taxable incomes.

In Figure 15 we have collected these different indicators for the whole period 1939 to 1990, i.e. for 1939-1966 Gini coefficients relative to assessed incomes on a household basis and for 1970-1980 Gini coefficients relative to taxable incomes on an individual basis. For 1981-1990 we have included our own estimates and have chosen Gini coefficients relative to disposable incomes on an individual basis as the concept closest to those used for the major part of the earlier years in Figure 15¹⁵. So, obviously, level differences between the three sub-periods are

15 The income variable - but not the income unit - for 1981 to 1990 is fairly close to the one used for 1939 to 1966, but different from the one used for 1970 to 1980.

irrelevant, and only the slopes of the curves are interesting. Note furthermore that only the age groups between 25 and 59 are included in our estimates, while there are no such age limits in the estimates for the earlier years.

Figure 15. Gini coefficients, 1939-1990.

The main impression from Figure 15 is the very steep decline in inequality in the last twenty years. The only visible reaction to the increase in unemployment is the absence of a decline in the Gini coefficient from 1973 to 1974 when unemployment increased rapidly. On the other hand, the equally strong increase in unemployment from 1980 to 1983 coincides with a steep decline in inequality. The modest or non-existing impact from unemployment could be the combined consequence of a fairly high compensation through unemployment benefits and the increase in female participation. It is interesting to note that the only increase in the Gini coefficient - from 1978 to 1979 - coincides with a decrease in participation. The constant level from 1979 to 1980 coincides with the introduction of a labour market related early retirement

scheme¹⁶. In an international comparison for the 1970s Egmoose (1985) finds that inequality declines much faster in Denmark during the 1970s than in England, Norway and Sweden. The decline continues in the 1980s, though at a decreasing rate. We return below to a summary of the 1980s development collecting the evidence from use of different income concepts.

In the years covered by the analysis in Bjerke (1957, 1965) a strong decline occurs during the war and in the immediate postwar years. The average annual change in the Gini coefficient between 1939 and 1949 is however smaller than in the post 1970 years. Unemployment was very much lower in 1949 than in 1939, and in contrast to the post 1970 period, the change in unemployment may be part of the explanation of the decrease in inequality. While the average degree of compensation from unemployment benefits was up to 90 percent - and on average 65 percent - after 1970, the average level was only about 40 percent in the 1940s. This, however, is only a partial explanation as the more equal distribution was effected mainly by a very big decrease in the share of the top 2 percent in the distribution of assessed incomes, cf. Bjerke (1957, p. 107).

Figure 16. Gini coefficients for Different Income Variables, Individuals, 1981-1990.

16 The impact of this is nevertheless hardly of any major long-run importance. Take-up of the programme proceeded even faster in the beginning of the 1980s along with a steep decline in inequality.

For the 1980s Figure 15 shows a decline in inequality with regard to individual disposable incomes. Finally, combining evidence from Figures 4, 10 and 12 in Figure 16, it is seen that the levelling of incomes ends in the mid-1980s with a shift to increasing inequality with regard to factor incomes. Considering also the different trends found above for men and women it seems reasonably safe to conclude that several decades of levelling the distribution of incomes came to an end in the mid-1980s.

10 Concluding Remarks

The few available earlier studies of the Danish income distribution found a strong trend towards a levelling of incomes most pronounced in the 1940s and - even stronger - in the 1970s. The present study based on panel data finds a continued decline in inequality until the mid-1980s. This result is robust with regard to the alternative income variables being used. From the mid-1980s, the distribution seems to be stable for all individuals in the age group 25 to 59 years. Separate distributional indicators for men and women point to a somewhat more complex picture. For men, all indicators point to a rise in inequality from the mid-1980s while the evidence is more mixed for the early 1980s. For women, on the other hand, the evidence shows a fairly massive move towards a more equal distribution of incomes. A major part of the levelling of incomes between women depends on the strong increase in female participation and the decline in the part-time frequency when participation begins to grow more slowly. The importance of shifts in participation is evident as the distribution of wage incomes for fully employed female wage earners is fairly stable throughout the 1980s.

Based on the present preliminary results, the dramatic increase in unemployment to a persistently high level does not appear to have had a direct impact on the distribution of gross incomes and disposable incomes. The prior expectations would be an induced increase in inequality. At the aggregate level this effect seems to have been dominated by the increase in female participation and the fairly generous system of income compensation. A decomposition of the distributional impact of the development in the labour market and in transfers and taxes is the topic for future research using the longitudinal database.

Literature

- Bentzen, J. & J.B. Schmidt-Sørensen. 1994. *Wealth Distribution and Mobility in Denmark: A Longitudinal Study*. Working Paper 94-4. Centre for Labour Market and Social Research. University of Aarhus and Aarhus School of Business
- Bingley, P., N. Bjørn & N. Westergård-Nielsen. 1995. *Wage Mobility in Denmark 1980 - 1990*. Working Paper 95-10. Centre for Labour Market and Social Research. University of Aarhus and Aarhus School of Business.
- Bjerke, K. 1957. Changes in Danish Income Distribution 1939-52. In *Income & Wealth. Series VI*. Bowes & Bowes. London.
- Bjerke, K. 1965. Forskydninger i den personlige indkomstfordeling fra 1939 til 1964. *Socialt Tidsskrift*, 8. (Changes in the Personal Distribution of Incomes from 1939 to 1964).
- Björklund, A. 1992. Rising Female Labour Force Participation and the Distribution of Family Income - The Swedish Experience. *Acta Sociologica*, 35: 299-309.
- Economic Council. 1991. *Dansk økonomi, December 1991*. (The Danish Economy, December 1991). Copenhagen.
- Egmosen, S. 1985. Udviklingen i den personlige indkomstfordeling. In S. Egmosen, L. Egmosen, G.V. Mogensen & H. Aage. *Uligheden, politikerne og befolkningen. Sammenligningsundersøgelsen 2*. (The Development in the Personal Distribution of Incomes. In S. Egmosen et al. *Inequality, the Politicians and the Population*). The Danish National Institute of Social Research. Publication 139. Copenhagen.
- Jensen, P. & N. Smith. 1990. Unemployment and Marital Dissolution. *Journal of Population Economics*: 215-29.
- OECD. 1994. *Economic Outlook*. Paris.
- Pedersen, P.J., J.B. Schmidt-Sørensen, N. Smith & N. Westergård-Nielsen. 1990. Wage Differentials between the Public and the Private Sector. *Journal of Public Economics*: 125-45.
- Slottje, D.J., K.J. Hayes & J. Shackett. 1992. Labour Force Participation, Race and Human Capital: Influence on Earnings Distributions across States. *Review of Income and Wealth, Series 38, Number 1, March*: 27-37.
- Social Commission. 1992. *Uden arbejde. Overførselsindkomst til midtergruppen. Rapport nr. 3*. (Out of Work. Transfer Incomes to the Middle Aged Group. Report No. 3). Copenhagen..

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