International trends in income inequality
and social policy

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International Trends in Income Inequality and Social Policy *

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Abstract

In most OECD-countries income inequality has increased during the last two decades. In this paper, we investigate whether changes in the overall distribution of incomes can be attributed to social policy measures. For some countries we find a relationship between changing welfare state policies (as measured by expenditure ratios and replacement rates) and changing income inequality, but for others not. Especially the United Kingdom and the Netherlands combined an above average rise in inequality with a reduction in the generosity of the welfare system.

A more elaborated budget incidence analyses for the Netherlands indicates that in the period 1981-1997 inequality of adjusted disposable household income increased sharply. An important force behind this phenomenon was a more unequal distribution of market incomes, but social transfers explain the largest part of the rise in inequality. Rather fundamental social security reforms indeed seem to have made the income distribution less equal.

JEL-classification: D31, H22, and H55
Keywords: Social Policy, Income Distribution (Indices), Taxes and Transfers

1 Introduction

In recent years considerable progress has been made in empirical research on income inequality in industrialised countries (see e.g. Gottschalk, Gustafsson and Palmer eds., 1997). An important development has been the launching of the Luxembourg Income Study (LIS) in which micro data sets from various countries have been harmonised. Thus there are good possibilities for studying how income inequality varies cross-countries (see Atkinson, Rainwater and Smeeding, 1995). However, the advancement in methods of measurement and in empirical knowledge is contrasted with the lack of insight into causes for differences in equality over time (Gustafsson and Johansson, 1997). This should perhaps not come as a surprise as the distribution of income in a country is the outcome of numerous decisions made by households, firms, organisations and the public sector. One could think of an almost infinite number of micro-level causes for differences and changes in income inequality (Gottschalk and Smeeding, 1997; Atkinson, Rainwater and Smeeding, 1995).

In this paper, we investigate whether social policy measures have contributed to changes in inequality among OECD countries. Our hypothesis is that reforms of the social system, such as benefit cuts or more strict eligibility criteria, have made the income distribution more unequal. Of course, this is only the case when (pre-reform-) social transfers are mainly directed at lower income groups (or when the transfers to lower income groups are cut more than the transfers to higher income groups). When, on the other hand, the benefits of the welfare system are rather evenly spread between income groups, reforms will not have a strong impact on income (re)distribution.

Using comparative international time-series data we will analyse whether there is some correlation between changes in social expenditures and welfare generosity, and changes in the income distribution. A more detailed study will be performed for the Netherlands, which is an interesting case, because the Dutch welfare system has been reformed rather fundamentally in recent years. Also income inequality has increased relatively more than in most other OECD countries (Gottschalk and Smeeding, 1998). We use the traditional budget incidence approach – despite some methodological problems we will address (see Smolensky, Hoyt and Danziger, 1987) – to study the combined effects of all taxes and transfers on the income (re)distribution. The distribution of primary or wage and salary income is compared with the distribution of income after tax and after social transfers.

The paper is organised as follows. In section 2 we summarise literature on the (changes in the) income distribution around the world, and more detailed in OECD countries. In section 3 we investigate the proposition that social policy is one of the causes of increasing inequality. Section 4 presents a more detailed budget incidence approach for the Netherlands. Section 5 concludes the paper. Details and technicalities are listed in the Annex, i.e. the comparative databases used and the definition and characteristics of several summary measures of income inequality.

2 Empirical Evidence on Income Inequality

2.1 Data on Income Inequality around the World

On the World Wide Web several sites can be found on inequality of the distribution of income around the world.[1] Some contain large data sets covering inequality indices for an wide range of country-studies which could be used for an international comparison of income dispersion over time. Deininger and Squire (1996) e.g. compiled data on income inequality for a very large panel of countries. Their data consist of Gini coefficients and quintile shares for 101 countries. For most countries data are available for the period from the early 1960's to the early 1990's. The Deininger-Squire (1996) datasheet indicates whether inequality is computed for income gross or net of taxes or for expenditures. Also indicated is whether the income concept applies to individuals or households. The data for a particular country apply to a specified survey year. Barro (1999) classed each observation of this data set as 1960, 1970, 1980, or 1990, depending on which of these ten-year values was closest to the survey (these compiled data were used in regressions for growth). Table 1 provides descriptive statistics on the Gini values of the countries with two or more observations in the sample (of which 9 are in Sub Saharan Africa).

Table 1   Descriptive Statistics for the Gini Coefficient around the World

level -->	Gini 1960	Gini 1970	Gini 1980	Gini 1990
number of countries	49	61	68	76
mean	0,432	0,416	0,394	0,409
maximum	0,640	0,619	0,632	0,623
minimum	0,253	0,228	0,210	0,227
standard deviation	0,100	0,094	0,092	0,101
change -->	in the 60's	in the 70's	in the 80's	
mean Gini Coefficient	-0,016	-0,022	0,015	

note: The years shown are the closest ten-year value to the actual date of the survey on income distribution. Deininger and Squire (1996) denote a subset of their data as high quality. Barro expanded this high quality sample size - at the expense of reduction in accuracy of measurement – with a number of observations that appeared to be based on representative, national coverage.

source: Barro (1999)

Around the world income inequality decreased in the 1960's and 1970's, while income inequality rose in the 1980's. Of course, cross-country differences are large for every decade presented here.

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1 E.g. http://www.worldbank.org/html/prdmg/grthweb/dddeisqu.htm and http://worldpolicy.org/americas/econindex.html.

There is a trade-off between data quality and data availability in this kind of empirical research. Despite the efforts made by Deininger and Squire, by Barro, and by others, most very large datasets on income inequality around the world are too rude for cross-country analyses (Atkinson and Brandolini, 1999). Only subsets of this datasets would qualify as high-quality. However, selected countries and datayears still differ to a wide extend in the concept (income versus consumption), the measure of income (gross versus net), the unit of observation (individuals versus household or equivalence scale adjustments made), the coverage of the survey (national versus subnational). Those, and other, factors in different studies make it hard to compare levels or even trends of income inequality across countries. [2]

The most promising tool to analyse changes in the income distribution are high quality time-series panel data. However, cross-national studies based on several years of panel data are just beginning to appear (see e.g. Headey, Goodin, Muffels and Dirven, 1997).[3] The best cross-nationally comparable collection is the Luxembourg Income Study (LIS). LIS was created specifically to improve consistency across countries. The LIS data are a collection of micro data sets obtained from the range of income surveys in various countries. The advantage of these data is that extensive effort has been made by country specialists to make information on income and household characteristics as comparable as possible across a large number of countries. The LIS data sets can be used to compare the distribution of disposable income in 25 nations over a 20-year period, though not all periods are available for all nations.

'Measuring inequality is tricky business, re- quiring a creative combination of science, craft, and art. When done well, it produces both truth and beauty.'

Philip B. Coulter in:
*Measuring Inequality
A Methodological Handbook*
1989, p. 185

2.2 Differences in Inequality across OECD Countries

This section reviews the evidence on cross national comparisons of annual disposable income inequality over twenty wealthy nations. This section is mainly descriptive and relies on the empirical evidence from Gottschalk and Smeeding (1997 and 1998), and others using data from the Luxembourg Income Study (LIS).[4] We summarise empirical results by both analysing absolute *levels* and *trends* of income inequality across countries. However, many factors in different studies make it difficult to compare levels in inequality over time and across countries

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2   Several studies try, however, to overcome the cross-country data-differences mentioned. See e.g. Dollar and Kraay (2000). The advanced econometric procedure used in their paper do not generate very precisely estimates for the adjustments needed (see the authors' note 8). In general, approaches to adjust the Deininger-Squire (1996) dataset, or augmented (updated) versions of the Deininger-Squire dataset, are very rude, i.e. very sensitive to the observations (not) included in the analyses. Atkinson and Brandolini (1999) therefore criticised both this types of adjustments and this type of large "secondary" datasets.

3   Presently there are a few countries for which panel data have been collected for ten years or more. Fully comparable data are available for only the United States, Germany, and the Netherlands and for only a few data years (1985-1989). Nevertheless, the approach by Headey, Goodin, Muffels and Dirven (1997) seems an attractive route in this kind of empirical research.

4   We do not review conceptual and measurement issues which should be addressed in any cross national comparison of survey based household income data (e.g. the definition of income, the unit of analysis, income sharing rules, the period of analysis, and income data quality and measurement errors), although some of this issues are addressed in section 4 and Annex B.

(differences in income concepts, the income units, (summary) measures, equivalence adjustments and other factors). Trends in inequality will be comparable as long as differences across studies do not change over time. We start by comparing levels (around the mid 1990's) and short-run trends in inequality (1980's) and then shift to trends from 1979 onwards.

➢ Levels of Income Inequality around the mid 1990's

Levels of inequality can be shown in several ways, e.g. by Lorenz curves, specific points on the percentile distribution (P10 or P90), decile ratios (P90/P10), and Gini coefficients or many other summary statistics of inequality. All (summary) statistics of inequality can be used to rank income inequality in OECD countries, but they do not always tell the same story.

Summary Statistics

Figure 1 shows two summary measures of the income distribution - the P90/P10-ratio and the Gini coefficient. Countries are listed in order of their P90/P10-ratio from smallest to largest. The obvious advantage of the presentation of inequality by summary statistics is its ability to summarise several nations in one picture.

Figure 1   Summary Measures of the Income Distribution
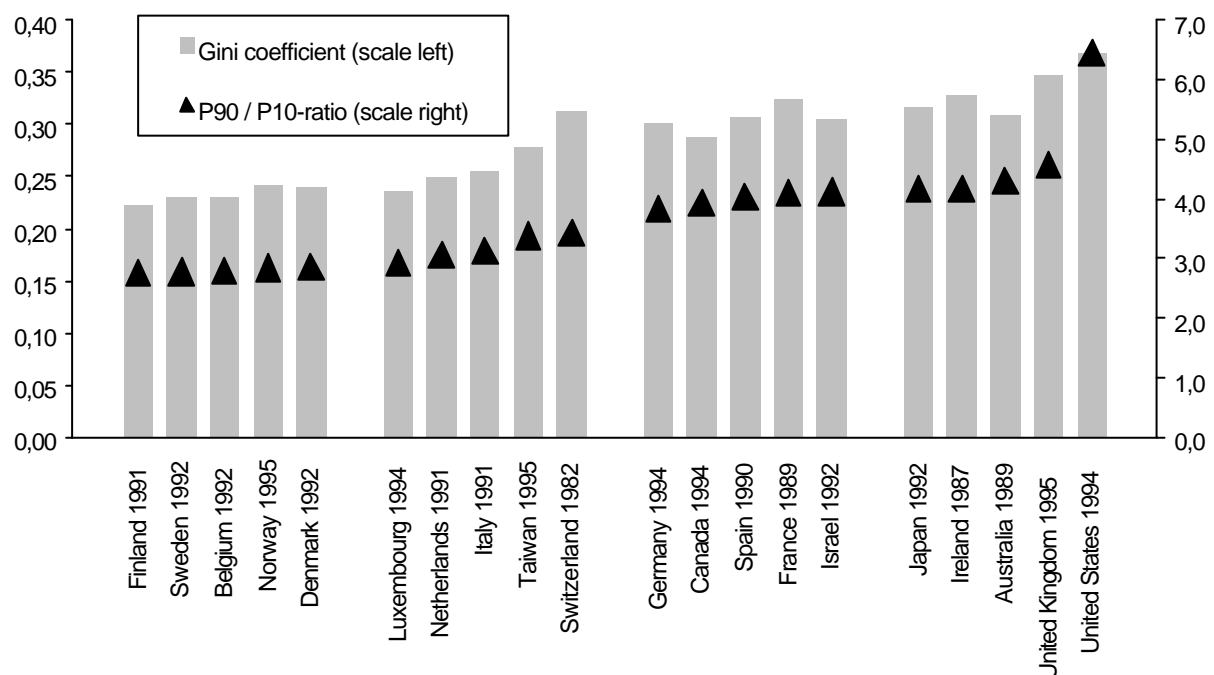
note: with the exception of Japan, all of the data came from LIS

source: Gottschalk and Smeeding (1998: figure 2)

The highest inequality is found in the United States and the United Kingdom, while Nordic countries are the most equal nations. Although other inequality indices would alter the country-ranking to some extent, roughly the same pattern of overall inequality is observed in other analyses of inequality (Atkinson, Rainwater, and Smeeding, 1995; etc)

We see that according to the Gini coefficient, The Netherlands is grouped with four other

countries (Luxembourg, Italy, Taiwan, and Switzerland) with quite low coefficients compared to Germany, Canada, Spain, France, and Israel with somewhat larger coefficient, and five other countries with the largest coefficients, indicating the highest degree of inequality.

Figure 1 indicate that a wide range of inequality exists across rich nations, with the most unequal nation (United States) experiencing a level of inequality which is more than twice the level found in the most equal nation (Finland).

Lorenz Dominance

Plots of Lorenz curves for several countries would allow us to see whether pairs of countries can be ranked by the standard Lorenz dominance criteria. Empirical evidence clearly shows that incomes are more equally distributed in all Nordic countries than in the United States. Because the Lorenz curves of Nordic countries cross, the distributions within the region can not be ranked. The BENELUX countries likewise show substantial uniformity across countries with each having greater equality than the United States. Among the BENELUX countries, The Netherlands is the least equal but the differences in inequality among BENELUX countries are small compared to the differences between these countries and the United States. Figures for other European countries and some members of the British Commonwealth show less uniformity among these countries, but the United States is still more unequal than any of them. Germany is more equal than Italy and France. Canada dominates Australia which dominates the United Kingdom. The United Kingdom and United States, however, cannot be ranked, since their Lorenz curves cross.

➢ Trends in Income Inequality during the 1980's

A typical, although not universal, observation is that inequality increased during the 1980's. Table 2 summarises the results from an extensive survey by Gottschalk and Smeeding (1997) on cross-national comparisons of earnings and income inequality. Note that disposable income is equal to market income plus transfers minus taxes. So, table 1 gives some information on social policy as well. Countries have been listed in order of changes in disposable income inequality as measured by the change in the Gini coefficient from largest to smallest change. It should, however, be noted in advance that this country-ranking depends rather strongly on the inequality index used (Gini) and the specific time-intervals applied. Any (small) difference in specification could alter both the magnitude of inequality and the country-ranking to an wide extend. However, the direction of the changes in inequality in the period 1980-1995 as shown in Table 2 is more or less in line with results of other analyses (*cf*. Ruiz-Huerta, Martinez, Ayala, 1999). As far as disposable income is concerned, it is certainly wrong to think in terms of a world-wide trend towards increased income inequality in the 1980's (*cf.* Atkinson, 1996:43).

Table 2   Changes in Market and Disposable Income Inequality During the 1980's

Country	years	market income	disposable income
United Kingdom	1981 - 91	+++	++++
United States	1980 - 93	+++	+++
Sweden	1980 - 93	+++	+++
Australia	1980 - 90	+	+
Denmark	1981 - 90	+	+
New Zealand	1981 - 89	+	+
Japan	1981 - 90	+	+
The Netherlands	1981 - 89	+	+
Norway	1982 - 89	+	+
Belgium	1985 - 89	+	+
Canada	1980 - 92	+	0
Israel	1979 - 92	+	0
Finland	1981 - 92	+++	0
France	1979 - 89	0	0
Portugal	1980 - 90	0	0
Spain	1980 - 90	n.a.	0
Ireland	1980 - 87	+	0
West Germany	1983 - 90	+	0
Italy	1977 - 91	-	-

note: Degree of change is based Gini coefficient of disposable income (income concept, method of equivalence scale and computation may differ by country).

Designation	Range of change in Gini coefficient
-	-5 percent or more
0	-4 to +4 percent
+	5 to 10 percent
++	10 to 15 percent
+++	16 to 29 percent
++++	30 percent ore more

source: Gotschalk and Smeeding (1997, table 4)

The survey of Gottschalk and Smeeding covers many aspects of income inequality. The following stylised facts can be traced from their extensive reading on the relationship between social policy and the distribution of income, i.e. redistribution.

I   Almost all countries experienced some increase in wage inequality during the 1980's. Changes in household income inequality in most countries were smaller than changes in earnings inequality. In all OECD-countries post-tax and transfer disposable income is more equally distributed than market income.

II   Changes in taxes paid and transfers received - due to changes in tax and transfer structures in many countries - were largely offsetting the changes in the distribution of markets income (pre-tax and pre-transfer).

III   However, the changes in the distribution of income - as documented in table 2 - are the result of a complicated set of forces. The links between changes in tax and transfer policy and the distribution of disposable income in different countries are not well understood at this stage.

➢   Trends in Income Inequality: 1980-1995

When we turn to long-run trends in inequality, the picture as set in table 2, alters substantially for several countries. We rely on data from another paper by Gottschalk and Smeeding (1998) who list countries in order of *yearly* percentages changes in disposable income inequality (as measured by the change in the Gini coefficient) from largest to smallest change. Disposable income inequality increased dramatically in a number of countries, but this trend was not

universal. Income inequality did *not* rise in 5 of the 17 nations examined from 1979 to 1995. See figure 2.

Figure 2   Trends in Disposable Income Inequality 1979-1995
Average Percentage Change per year of Gini Coefficient
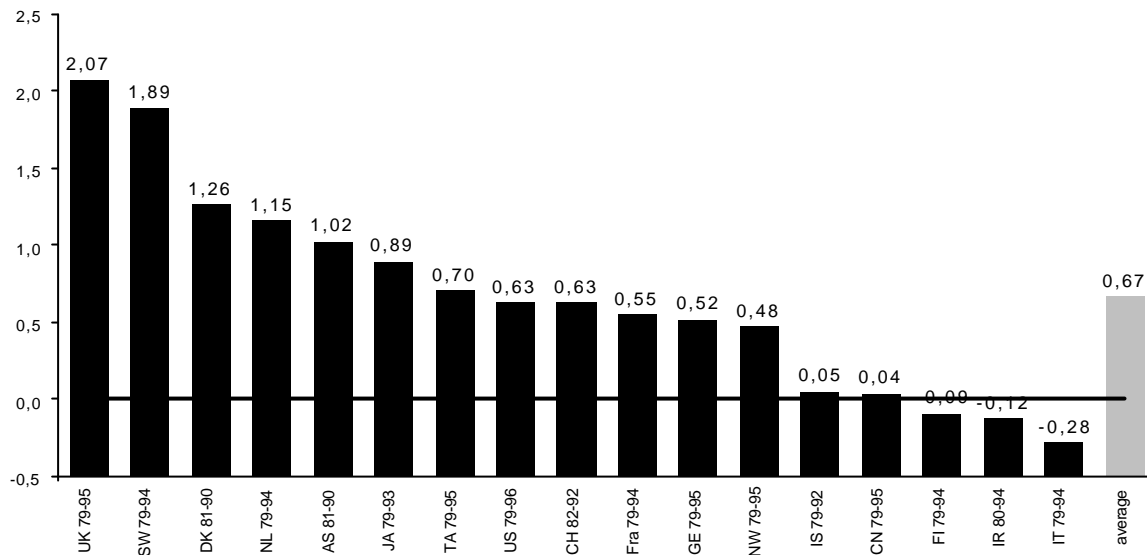
note: Average percentage change per year equals the percentage change in the Gini coefficient over the time frame indicated divided by the number of years in the interval.

source: Gottschalk and Smeeding (1998: figure 4 and appendix tables A-2), and own calculations

Inequality increased by more than 1 percent a year in five countries over this period. The United Kingdom, Sweden, Denmark, the Netherlands and Australia are on top of the list in descending order. Compared to table 2, the United States fall back dramatically, while e.g. the Netherlands show a remarkably sharp increase. In the United States the largest increases in inequality occurred in the early 1980's, with already a high level of inequality before the increase. Following Gottschalk and Smeeding (1998:27), the nations which showed a relatively early large rise in inequality (United States, see table 2) appear to be experiencing a ceiling in those increases. Thus, the increases we are seeing today are offsetting gains made during the 1960s and 1970s. Indeed, the Swedish, Danish and Dutch distributions had low base Gini coefficients (1979) compared to the United Stated. This, however, is not the case for United Kingdom. The authors put explanations of these trends high on their research agenda.

While household income inequality increased in several countries, the timing of changes was also markedly different. In the United Kingdom income inequality fell through the mid-1970s, but the Gini coefficient rose by more than 30 percent between 1978 and 1991, and has remained roughly constant since. In Sweden all of the increase came since 1989. In Denmark it occurred during the late 1980s, and in The Netherlands from the mid1980s to the mid-1990s.The United States, Japan, Taiwan, France, Germany, Switzerland, and Norway form another group of countries with moderate increases in family income inequality. Patterns of change in inequality differ across these nations as well. In the United States, the largest increases in inequality occurred in the early 1980s and l990s, peaking in 1994. h Japan and Taiwan, the largest changes were during the late 1980s, while in France, Germany, and Norway, inequality did not

increase until the early- to mid-1990s. What is remarkable about the other five countries is that they have, so far, experienced little or no increases in the dispersion of family income. In Italy, measured income inequality has declined slightly since 1979, falling sharply between 1979 and 1991 and then rapidly increasing.

2.3 Conclusion on the Empirical Evidence on Income Inequality in OECD nations

While even the LIS-data are by no means perfect, they produce some consistent patterns. The range of income inequality in OECD countries seems very wide at any point in time. The Gini coefficient in the most unequal country (United States) is almost twice as large as that found in the most equal country (Finland).

Income inequality has increased dramatically in a number of countries, particularly in the United Kingdom, but also in The Netherlands, Denmark, Sweden, Australia, and seven other nations. While income inequality rose in 12 of the 17 nations examined from 1980 to 1995, this trend was not universal. In almost all countries inequality declined through the 1970s and started to increase in the 1980s and 1990s. Country specific trends in income inequality are more similar, though not universally so. The large majority of nations have experienced rising income inequality over the last decade or longer.

3 What Makes Income Inequality Vary over Time in Different Countries?

3.1 Causes of change. Is it social policy?

The increasing income inequality observed for most – but not all – Western economies over the last decades has coincided with many structural changes in the economic system. The world economy has been hit by oil crises twice, there has been a tendency towards more free market oriented policies, and more women have been participating in the labour market. For many countries the main forces behind growing disposable income inequality are the growth of inequality of earned market income, demographic changes, changes in household size and composition, and other endogenous factors. Atkinson (2000:17) concludes that we should not expect the same development in all countries, because the distribution of income is subject to a wide variety of forces. The evolution of income inequality is not simply the product of common economic forces: it also represents the impact of institutions and national policies. We focus on social policy to that end, and look for a relationship, if any, between social policy and income inequality.

On basis of the LIS-data presented by Ervik (1998) we find mixed evidence. Ervik presents for eight countries the trend in the Gini coefficients corresponding with several income concepts; moving from earned market income, via gross income (also including social transfers) to net disposable income (gross income minus social contributions and taxes). For any year (and country) the magnitude of welfare states' total redistributive effort is represented by the reduction of the Gini coefficient between market income and net disposable income (p.30). This budget incidence approach indicates that the tax and transfer system does redistribute income in such a way that a substantial reduction in overall income inequality is accomplished

in all of the eight countries under consideration. How did this distributing effort by social policy vary over time in different countries? In some countries the redistributive effect of transfers and taxes decreased in the last ten to fifteen years (Sweden, the United Kingdom, Finland and the United States), whereas in other countries the redistributive effect of transfers and taxes increased (Denmark, Australia, Germany and Norway). However, this study does not deal with the possible relationship between welfare state *policies* and changes in the income distribution.

3.2   Empirical Evidence from a Straightforward Approach

How do we measure changes in social policy or changes in "generosity" of social security systems? A range of indicators are used in comparative studies (Whiteford:1995). We look at only two of these indicators in our straightforward approach (see also sections 4 and 6); *(a)* social security expenditures as percentage of GDP, and *(b)* the replacement rate.

Social Security Transfers as percentage of GDP
It's well known that social security systems are very difficult to compare. Countries often use different definitions of social security and of specific social risks, such as unemployment or disability. Moreover, benefits may be provided by either public institutions or market institutions. In the latter case, market provision may be regulated by government in such a way as to make it equivalent to public provision. These different forms of social protection may not be included consistently in national statistics. A specific statistical problem is related to the tax treatment of social benefits. In some countries benefits are taxable as a rule, in others not. Also, benefits can take the form of tax relief. These tax features can make a big difference in the statistics.
Also, changes in expenditure ratios often do not reflect policy changes. Higher outlays can simply be the result of ageing, rising unemployment, etcetera. Expenditure ratio's can thus only be considered as rough indicators of welfare state policies.
Gottschalk and Smeeding (1997) use this indicator to analyse the impact of social policy in the 1980's. They conclude that there is a noticeable correlation between public cash transfer expenditures and disposable income inequality. While the level of social spending is negatively correlated with changes in income inequality, there is little relationship between retrenchment and increases in inequality in most countries. Reductions in social welfare spending for the non-aged and regressive changes in the structure of income taxes for some countries during the 1980's account for only a small part of the trend in post-tax and transfer inequality in most nations.
Following Gottschalk and Smeeding, we look at expenditure ratios for a somewhat longer period. Table 3 shows that in almost all modern welfare states social security transfers as percentage of GDP rose in the period 1979-1994. Using the Comparative Welfare State Data Set (LIS/OECD), we found only two countries with a non-positive change in social security transfers over this time interval: Germany and the Netherlands.

Table 3   Social Security Transfers as percentage of GDP

|	*around 1979*	*around 1994*	*change*
Australia 81-94	19,5	21,8	+2.3
Canada 79-94	9,6	15,2	+5.6
Denmark 81-94	17,8	22,0	+4.2
Finland 79-94	9,4	25,1	+15.7
France 80-93	18,6	23,3	+4.7
Germany 79-94	16,5	16,1	-0.4
Ireland 80-93	12,6	15,4	+2.8
Italy 79-94	15,7	19,5	+3.8
Japan 79-93	9,8	12,1	+2.3
Netherlands 79-94	25,5	25,5	0.0
Norway 79-94	15,5	20,5	+5.0
Sweden 79-94	17,6	24,9	+7.3
Switzerland 82-92	13,2	15,9	+2.7
United Kingdom 79-94	11,1	15,4	+4.3
United States 79-93	10,0	13,2	+3.2
average (unweighted)	*14,8*	*19,1*	*+4.3*

note: change equals the change in social security transfers as percentage of GDP over the time frame indicated.

source: Comparative Welfare State Data Set LIS / OECD (http://lissy.ceps.lu/compwsp.htm); and own calculations

The expansion of social security systems and/or safety nets in most countries mitigated the observed trend of increasing (market) income inequality to some extent during the period under consideration. Although for most countries both income inequality and social security transfers rose (this seems to contradict with our hypothesis), the growth rates of social security transfers show variation across countries. Rising inequality in some countries *could* be associated with a *below average* change in social security transfers as percentage of GDP. This is analysed in figure 3.

The unweighted average of social security transfers as percentage of GDP for the countries involved in figure 3 rose from 14.8 percent around 1979 to 19.1 percent around 1994. Social security transfers rose on average approximately 0.3 percentage-points per year among these fifteen countries. Several countries show growth rates in social security transfers above this average: Canada, France, and the four Nordic countries. Other countries show below average growth rates: Australia, Germany, Ireland, Italy, Japan, the Netherlands, Switzerland, the United Kingdom, and the United States.

Figure 3   Cross Country Changes in Social Security Transfers and Gini index 1979-1994
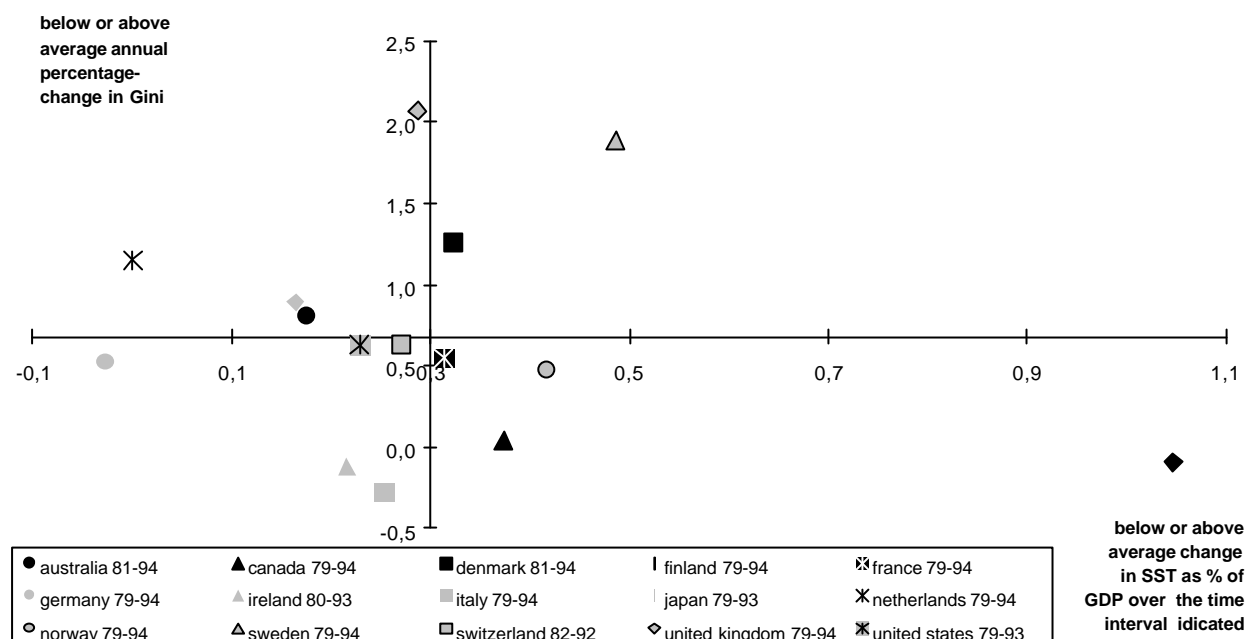
note and source Gini coefficient: see below figure 2; source Social Security Transfers: Comparative Welfare State data Set (LIS / OECD); and own calculations

The plotted results for the United Kingdom, the Netherlands, Japan, and Australia seem in line with our hypothesis. These countries combine an above average rise in income inequality with a below average growth rate of social security transfers over the time interval indicated. Furthermore, Norway, Canada, France, and Finland combined an above average growth rate in social security transfers with a below average rise in income inequality. However, for the other countries we do not find a noticeable negative correlation between the change in the level of social security transfers and disposable income inequality. Especially Sweden and Denmark combine both an above average growth rate in social security transfers with a relatively large rise in income inequality. Note that a non-negative or weak positive relationship between social security transfers and inequality - as found for the majority of the countries - remind us that in many countries social security transfers often are not well-targeted towards the poor.

Replacement Rates

Comparative studies of social security systems have increasingly turned to the use of replacement rates as measures of the level of benefits in different countries and therefore of the degree of social protection offered by different welfare systems.

However, also replacement rates can only be seen as limited indicators of the generosity of benefit systems (Whiteford, 1995). Some of the limitations are: 1) replacement rates are based on entitlement rules and often represent only the maximum payment available in the circumstances specified; 2) benefits are often not fully indexed, implying that benefits represent a decreasing percentage of wages; 3) not all relevant benefits may be reckoned with (such as housing subsidies or health care); 4) taxation can blur the picture. Bearing these limitations in mind, we can look at figure 4, which presents the development of replacement

rates for unemployment benefits for 21 OECD countries. All replacement rate calculations are based on the level of previous earnings defined with reference to the Average Production Worker (APW), taking as the two most significant cases the APW level of earnings and two thirds of the APW level of earnings.

Figure 4   Gross Replacement Rates Unemployment Benefits OECD since 1960
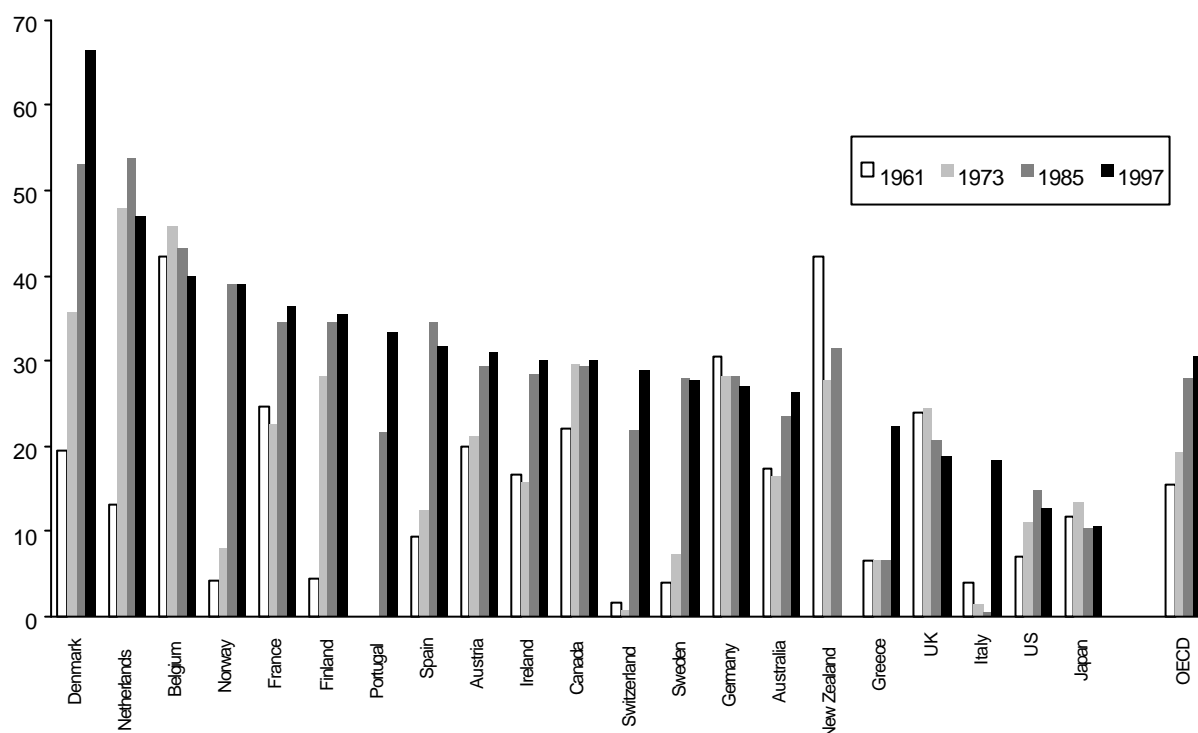
note: Replacement rates (i.e. benefits before tax as a percentage of previous earnings before tax) as defined by legislated entitlements averaged across various circumstances in which an unemployed person may be. Countries are ranked in descending order of this average in 1997.

Explanation: Benefit entitlements have been estimated for two earnings levels (average earnings and two-thirds of average earnings), three family situations (single, with dependent spouse, with spouse in work) and three durations of unemployment spells (one year, 2 to 3 years, 4 to 5 years out of work). For every datayear between 1961 and 1997 the unweighted averages of these replacement rates are computed. The computations assume standard circumstances such as 40 years of age, involuntary loss of the former job, long previous work record, etc.

source: OECD (data provided by Glenn Cooper)

Seven countries show a decline in the replacement rates in the period 1985-1997: the Netherlands, Belgium, Spain, the United States, the United Kingdom, Germany and Sweden. All these countries are faced with an increasing income inequality as measured by the Gini coefficient (figure 2). This gives some support for our hypothesis.
In figure 5 we have plotted the above average percentage change of the gross replacement rates and the above average percentage change in the Gini coefficient for countries, where both data-items are available. Both averages are calculated over the period indicated (total change divided by the number of years in the interval). Figure 5 shows some indications that support our hypothesis. A negative relationship between the change in replacement rates and the change income inequality can be found for the United Kingdom and the Netherlands. Other countries with a relatively sharp increase in income inequality (Sweden and Denmark) show

relatively modest positive changes in the replacement rates. However, it is certainly wrong to think in terms of a world-wide explanation for the upward trend towards increased income inequality since the 1980's.

Figure 5   Cross Country Changes in Gross Replacement Rates and Gini index 1979-1994

● australia 81-94	▲ canada 79-94	■ denmark 81-94	◆ finland 79-94	⊠ france 79-94
germany 79-94	▲ ireland 80-93		◆ japan 79-93	✕ netherlands 79-94
◉ norway 79-94	△ sweden 79-94	☐ switzerland 82-92	◇ united kingdom 79-94	✻ united states 79-93
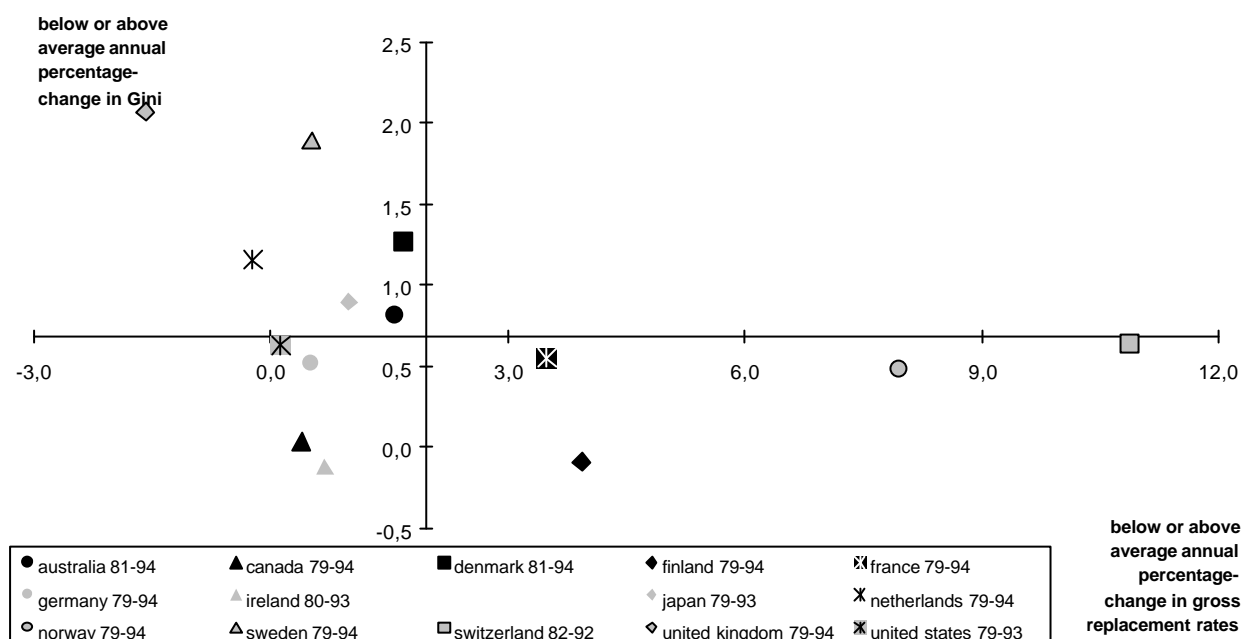
note: Italy is excluded due to a strongly downward biased figure for the replacement rate in 1979

note and source Gini coefficient: see below figure 2; note and source gross replacement rates: see below figure 4; and own calculations

3.3 Conclusion

The comparative data used in the analysis above are by no means perfect. They do not accurately indicate (the direction of) changes in social policy. Besides that, this analysis can obviously not establish a *causal* relationship between changes in social policy and changes in the income distribution. Nevertheless, for some countries the data produce patterns for the period 1979-1994, which are consistent with our hypothesis; for others not though. Especially the United Kingdom and the Netherlands combined above average rise in income inequality with a reduction in the generosity of the transfer system. A more elaborated country-approach is needed, however, to be more conclusive. We will follow such an approach for the case of the Netherlands.

4 A Budget Incidence Analysis for the Netherlands

4.1 Social Policies in the Netherlands

The Dutch social protection system used to be characterised by generous open-ended benefits and lax administrative control. However, the expansion of the system caused severe and growing problems, starting in the 1970's. The number of benefit recipients and the financial burden of inactivity rose dramatically, as can be seen in table 4. Combined with a number of adverse macroeconomic shocks, a vicious cycle of increasing (non-wage) labour costs, erosion of employment and growing benefit dependency was set in motion. Reform of the social system was called for and was indeed initiated in the early 1980's. Actually, the change in policy stance occurred at a relatively early stage, compared to other European countries, because of the severity of the problems (Bovenberg, 20000.

Table 4 Keyfigures on Social Security in the Netherlands

	1970	1980	1990	1999
Public expenditure on social security as % GDP [a]	17.2	26.4	25.8	20.7
Number of benefit recipients in millions	2.0	3.1	4.0	4.1
Idem under age 65	0.7	1.4	2.0	1.9
Benefit recipients as % of employment	45	66	82	69
Real disposable income of welfare and old age benefits (index: 1973 = 100)		124	114	112

a Excluding supplementary labour pensions and housing subsidies, including public expenditure on health care

source: Ministry of Social Affairs (1995:5) and (1999)

In the 1980's reform strategy was almost exclusively directed at cutting benefit levels. The (legally required) indexation of social benefits to wage development was suspended during almost the entire 1980's and partly in the first half of the 1990's. Actually, in many years no adjustment for inflation took place, that is benefits were frozen in nominal terms. Also, unemployment and disability benefits were cut from 80 percent to 70 percent of previous wages. As a consequence of these and other measures, real disposable income of many beneficiaries strongly fell since 1980, as shown in table 4.[5] The strategy was successful in containing expenditure growth. Public expenditure on social protection roughly stabilised in the 1980's, despite continuing growth of benefit volumes.

In the 1990's the reform strategy has been primarily directed at reducing the number of beneficiaries, through encouraging labour force participation, and discouraging and preventing benefit dependency. Important policy measures in this context have been the tightening of eligibility requirements in the unemployment and disability schemes, reform of the benefit administration, and the introduction of stronger financial incentives for employees and –

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5 On the other hand, the increases of real disposable income of social security beneficiaries had been large in the 1970's.

especially – employers. The sickness benefit scheme has been privatised in the period 1994-1996, which means that employers are now fully responsible for paying sickness benefits of 70 percent of wages during the first year of sick leave. This risk can be privately insured, which has actually occurred on a large scale. The disability scheme has also been changed fundamentally, through the introduction of experience rating. Also, the option was introduced for employers to private coverage of the disability risk during the first five years of disability. Radical changes have been made in the survivors scheme. Most people are now expected to privately insure against the risk of disease of relatives.

The reduction in statutory benefits have been offset mostly, because trade unions have negotiated supplementary benefits, especially sickness benefits and disability benefits. However, employees (and others) not taking part in these collective contracts do not profit from this.

The figures in table 4 show that these policies had some success in terms of a halting the rise in claimants under 65 years, but so far the rising trend has not been clearly reversed. A more positive development is that the ratio of benefit recipients to the number of employed is falling in recent years, as a consequence of rapid employment growth. Also, total expenditure on social security is declining in recent years. It goes without saying, however, that the reforms discussed will have a substantial impact on the income distribution. This will be analysed in section 4.3.

4.2 Methodology

Social security schemes in the Netherlands, as in many countries, make low income earners better off after social policy than before. In general, income is transferred from high income earners to poor ones trough taxes and transfers. We analyse the effect of social policy on the distribution of income as follows. The distribution of primary or wage and salary income is compared with the distribution of income after tax and after social transfers, see scheme 1. Summary statistics of income inequality before and after social policy are used to indicate the amount of distribution by social policy (in line with the work of Ervik, 1998 and Duclos, 2000).

The case for aggregate incidence studies was set down by Dalton (1936). From the studies in which this methodology has been implemented since research was initiated by Gillespie (1965), a small set of stylised conclusions has emerged (see below). Of course, also critical literature on budget incidence analyses has emerged – but these criticism leave the stylised conclusions intact; see a critical survey of efforts to measure budget incidence by Smolensky, Hoyt and Danziger (1987). For example, the important issue of tax/transfer shifting is totally ignored in analyses on budget incidence in such a classical framework. However, models that include all behavioural links are beyond the scope of existing empirical work (Gottschalk and Smeeding, 1998:3). Therefore, researchers have restricted themselves largely to accounting exercises which decompose changes in overall inequality into a set of components. Despite the problem of tax shifting, analyses on statutory and budget incidence can be found for

decades in literature on public finance.[6]

To identify changes in the redistributive effect of taxes and social transfers over time, we analyse data for a long time period. For reasons of data-availability we have to analyse the whole trajectory from original or market income to net disposable income (trajectory a-c in scheme 1) to approach the impact of the tax and benefit system as part of the overall trend in income distribution. We calculate the statutory or budget incidence of social policy in line with the work of Musgrave, Case and Leonard (1974). That is, important issues of tax/transfer shifting and behavioural responses are ignored.

> **scheme 1**
>
> primary income **(a)**
>
> | | |
> |---|---|
> | +/+ | social welfare benefits |
> | +/+ | social insurance transfers |
> | -/- | social security contributions |
> | -/- | direct taxes (i.e. that part of direct taxes to finance social welfare) |
>
> = income after taxes and contributions, after transfers **(b)**
>
> | | |
> |---|---|
> | +/+ | other sources of income |
> | -/- | other taxes/contributions |
>
> = disposable net income **(c)**

Our measure of the redistributive impact of social security on inequality is straightforwardly based on formulae developed by Kakwani (1986) and Ringen (1991):

Redistribution by government = (primary income – disposable income) / (primary income)

This formula is used to estimate the reduction in inequality produced by social security, where primary income inequality is given by a summary statistic of pre-tax, pre-transfer incomes and disposable income inequality is given by the same summary statistic of disposable equivalent incomes. The measures of both pre- and post-social security income are fare from ideal. At a conceptual level, no conceivable measure of pre-social security income could indicate what the income distribution would look like if social security did not exist.

The unit of analysis is an important issue in income distribution studies. Equivalence scales are widely used.[7] Equivalence scale elasticity for the Netherlands has been estimated at

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6 See for example Dalton (1936), Musgrave and Tun Thin (1948), Gillespie (1965), Kakwani (1977a), Reynolds and Smolenskey (1977), Kiefer (1984) and Silber (1994), and more recent analyses based on the Luxembourg Income Study database (some of them are also listed in our references).

7 An equivalence scale is a function that calculates adjusted income from income and a vector of household characteristics (cf. Figini, 1998). The general form of these equivalence scales is given by the following expression:

$$W = \frac{D}{S^{E}}$$

, where W is adjusted income, D is income (disposable income), S is size (number of persons in households) and E is equivalence elasticity. E varies between 0 and 1. The larger E, the smaller are the economies of scale assumed by the equivalence scales. Equivalence scales range from E=0 (no adjustment or full economics of scale) to E=1 (zero economies of scale). Between these extremes, the range of values used in different studies is very large, strongly affecting measured inequality. It has been shown that, within a wide range, choice of equivalence scales affects international comparisons of income inequality to a wide extend. Alternatively adjustment methods would definitely affect the ranking of countries, although the broad pattern remains the same (Atkinson, Rainwater, Smeeding, 1995:52).

around 0.47 for the period 1990-1995 (Schiepers, 1998:120)[8]; in our historical analysis for the Netherlands we use the results obtained by other researchers, where equivalence scale elasticity is around 0.5 (*cf.* most OECD-studies).

We use the Mean Log Deviation (Theil index) as a summary measure of income inequality. It is generally agreed upon that this statistic is best suited to identify components of the change in inequality, that is for assessing the impact of taxes and benefits on inequality. The lower this statistic the more equal is the distribution. Mean Log Deviation can be meaningfully added and subtracted from another in a way that most other indices of inequality cannot. Of course, many other summary measures can be found in the literature and all imply some *a priori* value judgements about the distribution itself; Annex B presents expressions and technical details of inequality measures.

4.3 Results

We perform a budget incidence analysis for the period 1981-1997, because we measure the lowest level of inequality in the early 1980's (as most studies for the Netherlands do; see Annex B). Inequality especially rose during the 1980's. We analyse the trajectory from primary or market income to adjusted disposable income (*cf.* scheme 1). Table 5 illustrates the main characteristics of the trend in inequality in the Netherlands.

As expected, adjusted disposable incomes are distributed much more equally than primary incomes. In the years shown, inequality was reduced by some 80 percent. By far the largest part of the overall reduction in inequality (about 60 percentage points) is due to social transfers. Note, however, that the redistributive effect of transfers has become smaller in the period under consideration. Taxes and social security contributions reduce inequality by some 7 to 10 percentage points. Finally, the use of equivalence scales reduces inequality by another 10 percentage points.

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8 This implies that in order to have an equivalent income of a household of one person where income is 100, a household of two persons must have an income of 138 to have equivalent incomes. Alternatively an one-person household must have 72 percent of the total income of a two-person household to have equivalent income.

Table 5 Decomposition of Inequality in Household Income: Mean Log Deviation

	level			change
	1981	*1991*	*1997*	*1981-1997*
Primary income	0.532	0.540	0.545	+0.013
effect transfers	-0.334	-0.324	-0.320	+0.014
Gross income	0.198	0.216	0.225	
effect taxes	-0.054	-0.040	-0.045	+0.009
Disposable income	0.144	0.176	0.180	
adjustment for household size and composition	-0.048	-0.057	-0.056	-0.008
Disposable income equivalence scale	0.096	0.119	0.124	+0.028

source:
Data on the partial effects of transfers and taxes for 1981 are from Odink (1985); for 1991 from Jeurissen (1995) and for 1997 are own calculations. The partial effects of household size and composition are taken from Trimp (1993) and De Kleijn (1998). The data mentioned did not (always) correspond. For all data years we have postulated the same income concepts and used the same income units as Jeurissen (i.e. definitions from before a major tax reform in 1990) to arrive identical decomposition of income inequality for all data-years. Thereafter we reweighted the partial effects (of taxes, transfers and household size and decomposition). Because of these transformations values in the table will differ from values as presented by Statistics Netherlands (and other studies).

What are the main factors behind the changes in the income distribution? This is shown in the right column of table 5. In the period considered, the Mean Log Deviation for adjusted disposable income increased by 28 points, which is equivalent to a rise in overall inequality by 29 percent (0.028 as a percentage of 0.096). A major force behind the rise in overall inequality of adjusted disposable household income is a more unequal distribution of primary income (13 points). This is partly caused by the strong rise in the labour force participation of secondary earners (women). Social transfers also explain a large part of the rise in inequality (14 points). Another factor behind the increase in inequality is lower progressivity from the tax system (9 point). Finally, inequality would have risen even more without the correction for household size and composition (-8 points). The growth in the number of one-person households since 1981 has made the non-adjusted distribution of disposable household income more unequal (*cf.* Trimp, 1999 and Sociaal en Cultureel Planbureau, 1998:109).

We conclude that the change in social policies in the early 1980's has indeed made the income distribution more unequal. Especially social transfers, but also taxes are main forces behind the rise in overall income inequality since 1981. It should be noted, however, that our results are only rough estimates, which depend rather strongly on the data used.

5 Conclusions

In this paper, we investigated whether changes in the overall distribution of incomes in OECD countries can be attributed to social policy measures. Income inequality rose in 12 out of 17 OECD countries since the early 1980's. In some countries this rise was rather dramatic,

especially in the United Kingdom and in Sweden and - to a lesser extent- in Denmark and the Netherlands. For some countries we find a relationship between changing welfare state policies (as measured by expenditure ratios and replacement rates) and changes in income inequality, but for others not. Especially the United Kingdom and the Netherlands combined and above average rise in inequality with a reduction in the generosity of the welfare system.

We performed a more elaborated country approach for the case of the Netherlands, which is interesting because this country combined a relative sharp increase in income inequality with a quite fundamental reform of the welfare state. We used the traditional budget incidence approach – despite some methodological problems we addressed – to study the combined effects of all taxes and transfers on the income (re)distribution. The distribution of primary or wage and salary income is compared with the distribution of income after tax and after social transfers. Summary statistics of income before and after social policy are used to indicate the redistributive effect of social policy. We find that inequality of adjusted disposable household income increased in the period 1981-1997 by roughly 29 percent as measured by the Mean Log Deviation. An important force behind this was a more unequal distribution of market income, but both social transfers and taxes explain a more substantial part of the rise in inequality. Our budget incidence analyses indicate that the social security reforms indeed seem to have made the income distribution less equal.

Annex A Comparative database: availability

COUNTRIES	*database 1* income inequality around 1995 LIS	*database 2* trend in income inequality around 1979-1995 LIS	*database 3* gross replacement rates 1961-1997 OECD	*database 4* comparative welfare state data set 1960-1995 LIS / OECD	*database 5* social transfers as % of GNP data set OECD 1960-1999 Economic Outlook	qualified
1 Austria	n.a.	n.a.	x	x	x	no
2 Australia	x	x	x	x	x	yes
3 Belgium	x	n.a.	x	x	x	no
4 Canada	x	x	x	x	x	yes
5 Denmark	x	x	x	x	x	yes
6 Finland	x	x	x	x	x	yes
7 France	x	x	x	x	x	yes
8 Germany	x	x	x	x	x	yes
9 Greece	n.a.	n.a.	x	n.a.	x	no
10 Israel	x	x	n.a.	n.a.	n.a.	no
11 Ireland	x	x	x	x	x	yes
12 Italy	x	x	x	x	x	yes
13 Japan	x	x	x	x	x	yes
14 Luxembourg	x	n.a.	n.a.	x	n.a.	no
15 Netherlands	x	x	x	x	x	yes
16 New Zealand	x	n.a.	x	x	n.a.	no
17 Norway	x	x	x	x	x	yes
18 Portugal	n.a.	n.a.	x	n.a.	x	no
19 Spain	x	n.a.	x	n.a.	x	no
20 Sweden	x	x	x	x	x	yes
21 Switzerland	x	x	x	x	x	yes
22 Taiwan	x	x	n.a.	n.a.	n.a.	no
23 United Kingdom	x	x	x	x	x	yes
24 United States	x	x	x	x	x	yes
coverage	21	17	21	19	21	15

sources:
database 1: Gottschalk and Smeeding (1998: figure 2)
database 2: Gottschalk and Smeeding (1998: figure 4 and appendix tables A-2)
database 3: OECD (data provided by Glenn Cooper, may 2000)
database 4: Comparative Welfare State Data Set LIS / OECD (internet http://lissy.ceps.lu/compwsp.htm)
database 5: Data Set OECD Economic Outlook (December 1998)

Trends in disposable income inequality Gini coefficient Index Gini (1979=100)

	year 1:	year 2:	number of years	index	annual % change
Australia	1981	1990	9	1,0730	0,81
Canada	1979	1995	16	1,0056	0,04
Denmark	1981	1990	9	1,1136	1,26
Finland	1979	1994	15	0,9858	-0,09
France	1979	1994	15	1,0820	0,55
Germany	1979	1995	16	1,0827	0,52
Ireland	1980	1994	14	0,9830	-0,12
Italy	1979	1995	16	0,9556	-0,28
Japan	1979	1993	14	1,1250	0,89
Netherlands	1979	1994	15	1,1731	1,15
Norway	1979	1995	16	1,0760	0,48
Sweden	1979	1994	15	1,2837	1,89
Switzerland	1982	1992	10	1,0632	0,63
United Kingdom	1979	1995	16	1,3306	2,07
United States	1979	1996	17	1,1071	0,63
average qualifiers	*1979,5*	*1993,7*	*14,2*	*1,0960*	*0,68*

source: Gottschalk and Smeeding (1998: figure 4 and appendix tables A-2), and own calculations

Social security transfers as percentage of GDP

	year 1:	year 2:	variable year 1	variable year 2	index	change per year
Australia	1981	1994	19,5	21,8	1,1179	0,18
Canada	1979	1994	9,6	15,2	1,5833	0,37
Denmark	1981	1994	17,8	22,0	1,2360	0,32
Finland	1979	1994	9,4	25,1	2,6702	1,05
France	1979	1994	18,6	23,3	1,2527	0,31
Germany	1979	1994	16,5	16,1	0,9758	-0,03
Ireland	1980	1993	12,6	15,4	1,2222	0,22
Italy	1979	1994	15,7	19,5	1,2420	0,25
Japan	1979	1993	9,8	12,1	1,2347	0,16
Netherlands	1979	1994	25,5	25,5	1,0000	0,00
Norway	1979	1991	15,5	20,5	1,3226	0,42
Sweden	1979	1994	17,6	24,9	1,4148	0,49
Switzerland	1982	1992	13,2	15,9	1,2045	0,27
United Kingdom	1979	1994	11,1	15,4	1,3874	0,29
United States	1979	1993	10,0	13,2	1,3200	0,23
average qualifiers	*1979,5*	*1993,5*	*14,83*	*19,06*	*1,2855*	*0,30*

source: Comparative Welfare State Data Set LIS / OECD (internet http://lissy.ceps.lu/compwsp.htm); and own calculations

Gross Replacement Rates

	year 1:	year 2:	variable year 1	variable year 2	index	change per year
Australia	1981	1995	22,1	27,0	1,2217	1,58
Canada	1979	1995	25,6	27,2	1,0625	0,39
Denmark	1981	1995	54,2	67,0	1,2362	1,69
Finland	1979	1995	26,5	43,2	1,6302	3,94
France	1979	1995	24,0	37,4	1,5583	3,49
Germany	1979	1995	25,1	27,2	1,0837	0,52
Ireland	1979	1993	28,1	30,8	1,0961	0,69
Italy	1979	1995	1,0	19,3	19,3000	114,38
Japan	1979	1993	8,7	9,9	1,1379	0,99
Netherlands	1979	1995	47,5	45,8	0,9642	-0,22
Norway	1979	1991	19,9	38,9	1,9548	7,96
Sweden	1979	1995	25,1	27,2	1,0837	0,52
Switzerland	1981	1993	12,8	29,5	2,3047	10,87
United Kingdom	1979	1995	23,8	17,8	0,7479	-1,58
United States	1979	1993	11,7	11,9	1,0171	0,12
average qualifiers	1979,4	1994,2	23,74	30,67	1,2921	1,97

source: OECD (data provided by Glenn Cooper, may 2000), and own calculations

Annex B   Definition and characteristics of summary measures of inequality

Most summary measures of income inequality have some things in common (derived from the well known Lorenz curve), but do not always give the same answer on the basic question: 'which of the two distributions of income is more equal?'.[9]

The most commonly used summary measure of inequality is the Gini coefficient. The Gini coefficient for pre-tax-pre-transfer income (G_v) is simply the ratio of the area between the Lorenz curve and the diagonal (line of perfect equality) and the whole area under the diagonal (see Kakwani, 1977a:72). We define the Gini coefficient G_v by (*cf.* Lambert, 1993:44):

$$ G_v = \frac{1}{2 \cdot N^2 \cdot \textbf{\textit{m}}} \sum_{i=1}^{N} \sum_{j=1}^{N} \left| y_i - y_j \right| \qquad \text{min = 0 ; max = 1} $$

where y_i =   pre-tax-pre-transfer income of unit *i*
          ì   =   mean income
          N   =   population of income recipients

The value of G_v is between zero and one. G_v=1 if total pre-tax-pre-transfer income is earned by only one single person; G_v=0 if total income is distributed perfectly equal over all income earners. The Gini coefficient is reduced by a small income transfer from a higher to a lower income; it is not sensitive to the levels of the incomes between which the transfer takes place. The Gini coefficient is well-known and easy to understand, but it is not a very good measure for inequality decomposition analysis (see Lambert and Aronson, 1993). Compared to other summary measures of income inequality the Gini coefficient is rather insensitive to changes in incomes (Pen and Tinbergen, 1976).

In the same way as G_v, one can construct concentration indices for taxes (C_t) and for after tax income (G_n). Different combinations of G_v, G_n and C_t are used in empirical analysis of income inequality. See e.g.

Musgrave and Tun Thin (1948)   EP = (1-G_n)/(1-G_v);
Pechman and Okner (1974)   PO = (G_n-G_v)/G_v;
Khetan and Poddar (1976)   KP = (1-G_v)/(1-C_t);
Kakwani (1977a)   P = C_t-G_v;
Reynolds and Smolensky (1977)   RS = G_n-G_v.

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9   Especially when the Lorenz curves for two different distributions intersect, the ranking of two different distributions by different inequality measures depends on the importance each gives to inequality at different parts of the distribution (see Atkinson, 1970). Different measures may therefore value one and the same income distribution differently (*cf.* Champernowne, 1974). Moreover, one and the same summary statistic - e.g. Gini – can have one single value for two or more entirely different income distributions (in case the Lorenz curves do cross). However, in the case two Lorenz curves do not intersect (one lies entirely inside another one), it can unequivocally be said that the distribution represented by the outside Lorenz curve is more unequal than the one represented by the one that lies inside (Lorenz Dominance Theorem). In our budget incidence analysis (section 4) the Lorenz Dominance Theorem can be applied. For all data years the Lorenz curve for disposable income (or after-tax-after-transfer income) lies inside the Lorenz curve for primary income. See e.g. Atkinson (1970), Kiefer (1984), Formby *et al* (1990), Lambert (1993) and Silber (1994) for a technical advanced debate on the measurement of income inequality by summary statistics.

The Mean Log Deviation or Theil index (T) is a summary measure frequently used for a specific purpose. The Theil index can be used to show the breakdown of inequality within and between population groups. Components of change in inequality can be identified (see Goodman *et al*, 1997:50). It is defined as:

$$T = \frac{1}{N \cdot m} \sum_{i=1}^{N} y_i \ln \frac{y_i}{m} \qquad\qquad \text{min} = 0 ; \text{ max} = \ln N$$

The Theil index gives greatest weight to changes in incomes at the bottom of the distribution. It is bounded by zero (perfectly equal distribution) and and ln N (distribution in which inequality is maximal*).* The interpretation of the Theil index is more difficult than the interpretation of the Gini coefficient. The Theil index can not be calculated for an income distribution which includes negative incomes. In our empirical analysis we solve this problem by merging non-positive incomes with the lowest positive income till an income class results with non-negative income (cf. Odink and Van Imhoff, 1984).

Another summary measure is the Schuts coefficient, also known as the Robin-Hood indicator as indicated in 1992 by Atkinson and Micklewright (Statistics Netherlands, 1995:71). We prefer the last name because it measures that proportion of total income which would have to be transferred from incomes *above* the mean to income *below* the mean to achieve perfect equality. The Robin Hood indicator (RH) measures the maximum vertical distance between the Lorenz curve and the line of perfect equality (45∘ line), so:

$$RH = \frac{\sum_{i=1}^{N} |y_i - m|}{2 \cdot m \cdot N} \qquad\qquad \text{min} = 0 ; \text{ max} = 1$$

The Robin Hood indicator is reduced by any unit income transfer from an above-average to a below-average income, but is unaffected by transfers *not* across the mean. The Robin Hood indicator is easy to understand, but it is inappropriate in relation to the so called Principle of Transfers (every transfer from higher to lower incomes should reduce the inequality measure).

A fourth summary measure is the Atkinson inequality index (A). Judgements about the distribution itself are made explicit in this index (i.e. weighting several parts of the income distribution differently, see Atkinson, 1970). The index is not always easily understood, but its value lies in the fact that the normative aspect is made explicit. The sensitivity to changes in the lower part of the income distribution rises with the value of the coefficient á in the mathematical expression below. So the Atkinson index is higher - for a specific income distribution - for higher values of á (see De Vries, 1994:33-34).

$$A = 1 - \left[\sum_{i=1}^{N} \left(\frac{y_i}{m}\right)^{1-a} \cdot \frac{p_i}{N} \right]^{\frac{1}{1-a}} \quad \text{with } 0 < \alpha < 1 \qquad \text{min} = 0 ; \text{ max} = 1$$

where p_i = pre-tax-pre-transfer income share of unit i

It should be noted that the calculated *level* for the Atkinson index is rather sensitive for different values of á. However, when the *percentage change* of the Atkinson index is calculated, e.g. when the indices of pre-tax-pre-transfer income and post-tax income are confronted, the choice for á is less important (see Caminada and Goudswaard, 1998:39).

Table A1 summaries the main characteristics of the summary measures of income inequality mentioned. This evaluation does not point in a specific direction. Weighting of the pros and cons is a rather normative exercise.

Table A1 Main Characteristics of Summary Measures of Income Inequality

	Gini	*Theil*	*Robin Hood*	*Atkinson*
Boundary				
Minimum	0	0	0	0
Maximum	1	log N	1	1
Principles (generally agreed upon)				
- Principle of Symmetry: re-ranking of incomes in the way that the Lorenz curve do not alter, should not affect the measure	+	+	x +	+
- Principle of Transfers and Pigou-Dalton-criteria: a transfer from high to low incomes should reduce the summary measure	+	+	-	+
- Principle of Homogenity: an equiproportionate growth in all incomes should not affect the summary measure	+	+	+	+
- Lorenz Dominantion: since the outside Lorenz curve is more unequal than the one represented by the one that lies inside, the summary measure of the latter should be lower	+	+	-	+
Other (normative) aspects				
- easily understood	+++	++	+++++	+
- easily decomposable	+	+++	+	-
- normative judgement possible?	no	no	no	yes
- sensitive for low incomes	-	+	-	depends on the choice for á
- sensitive for middle incomes	+	++	-	
- sensitive for high incomes	-	++++	-	
- summary measure is sensitive for changes in the distribution?	---	+++	---	+++

source: De Vries (1994:35), Statistics Netherlands (1995:71), Odink (1985:22-34), Van der Stadt (1988:21), and Caminada and Goudswaard (1998)

Table A2 show two summary statistics of disposable household income inequality for the Netherlands. Those summary statistics indicate a significant increase in inequality of (adjusted) disposable income between 1977 and 1997, although the magnitude of the increase varies. The spread is between +12 percent for the Gini coefficient and +30 percent as measured by Log Deviation for adjusted income. The Gini coefficient is the more sensitive to inequality changes around the median (which did not alter so much), while the Mean Log Deviation is more sensitive for low incomes. Furthermore, the Gini coefficient shows a relatively low growth rate, because the base figure (1977) is high compared to the (Mean) Log Deviation.

Table A2 Trend in Disposable Household Income Inequality 1977-1997

	1977	1997	change	%-change
Gini Coefficient	0.284	0.322	+0.038	+13
Idem, Equivalence Scales	0.243	0.273	+0.030	+12
Mean Log Deviation	0.143	0.184	+0.041	+29
Idem, Equivalence Scales	0.110	0.141	+0.031	+28

source: Gini Coefficient and Mean Log Deviation are from Trimp (1999) and Statistics Netherlands (1999:119); Log Deviation is taken from Sociaal Cultureel Planbureau (1998:108) and refer to 1977 and 1995; and own calculations

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