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Published on: 01 Aug 2001 - International Tax and Public Finance (Department of Economics, Universiteit Leiden, 2001.03)

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Department of Economics Research Memorandum 2001.03

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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 income can be attributed to social policy measures. For most (but not all) countries we find a possible relationship between changing welfare state policies (as measured by expenditure ratios and replacement rates) and changing income inequality. 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 elaborate budget incidence analysis for the Netherlands indicates that in the period 1981-1997 inequality of disposable household income increased sharply. The two main forces behind this phenomenon were a more unequal distribution of market incomes and changes in social transfers. Fundamental social security reforms in the Netherlands indeed seem to have made the income distribution less equal. However, income inequality in the Netherlands is still below the OECD average at the end of the observed period.

JEL-classification: D31, H22, and H55

Keywords: Social Policy, Income Distribution (Indices), Taxes and Transfers

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* In an earlier stage of our research project on this topic we have benefited from discussions with Eugene Smolensky, Alain Auerbach, Erik Fjaerli, René Goudriaan, Thor Olaf Thoressen, Henk Vording, participants at the 56th Congress of the International Institute of Public Finance, August 30th 2000, Seville, Spain, and participants at the Year 2000 International Research Conference on Social Security (ISSA), September 26th 2000, Helsinki, Finland. The views expressed as well as any remaining shortcomings are, of course, our own responsibility. This research is part of Leiden Social Security Incidence Project, which is supported by a grant of Reaal Verzekering NV.

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. Consequently it is possible to study income inequality across countries (see Atkinson, Rainwater and Smeeding, 1995). However, the improvement in methods of measurement and in empirical knowledge is in contrast with the lack of insight into causes of changes in equality over time (Gustafsson and Johansson, 1997).¹ This should perhaps not come as a surprise as the distribution of income in a country is the outcome of numerous decisions made over time 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 income inequality among OECD countries. Our hypothesis is that reforms of the social system, such as benefit cuts or enforcement of stricter eligibility criteria, have made the income distribution more unequal. Of course, this is only so when (pre-reform-) social transfers are mainly directed at lower income groups (or when the transfers to lower income groups are cut more sharply than the transfers to higher income groups). When, on the other hand, the benefits of the welfare system are rather evenly spread over income classes, reforms will not have a strong impact on income (re)distribution.

Using comparative international time-series data we will analyse whether there is a relationship between changes in social expenditures and welfare generosity, and changes in the distribution of income. This is mainly a descriptive analysis. A more detailed quantitative study will be performed for the Netherlands, which is an interesting case, because the Dutch welfare system has been reformed 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 on the data(bases) are listed in the Annex.

¹ Föster (2000) summarises trends and driving factors in income distribution and poverty on the basis of a harmonised questionnaire of 21 OECD Member Countries (i.e. distribution indicators derived from national micro-economic data)..

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 about the distribution of income around the world.² 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 data-set indicates whether inequality is computed for income gross or net of taxes or for expenditures, and 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

<i>level</i> →	Gini 1960	Gini 1970	Gini 1980	<i>Gini 1990</i>
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
<i>change</i> →	<i>in the 60's</i>	<i>in the 70's</i>	<i>in the 80's</i>	
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 substantial for every decade presented here.

In this kind of empirical research there is a trade-off between data-quality and data-availability. Despite the efforts made by Deininger and Squire, by Barro, and by others, most

² See e.g. the UNU/WIDER - UNDP World Income Inequality Database (WIID, version 1.0, 12 September 2000); <http://www.wider.unu.edu/wiid/wiid.htm>. See also <http://www.worldbank.org/html/prdmg/grthweb/dddeisqu.htm> and <http://worldpolicy.org/americas/econindex.html>.

very large data-sets on world wide income inequality are not fit for cross-country analyses (Atkinson and Brandolini, 1999). Only subsets of these data-sets would qualify as high-quality. However, selected countries and data-years still differ to a wide extent in concept (income versus consumption), the measure of income (gross versus net), the unit of observation (individuals versus households, 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.³ 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).⁴ 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 a range of income surveys in various countries. The advantage of these data is that extensive efforts have 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, requiring 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 Smeeding (2000), and others using data from the Luxembourg Income Study (LIS). 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 (differences in income concepts, income units, (summary) measures, equivalence adjustments and other factors). Observed trends in inequality will be comparable as long as differences across studies do not change over time.

3 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) data-set, or augmented (updated) versions of the Deininger-Squire data-set, 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" data-sets.

4 At present 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.

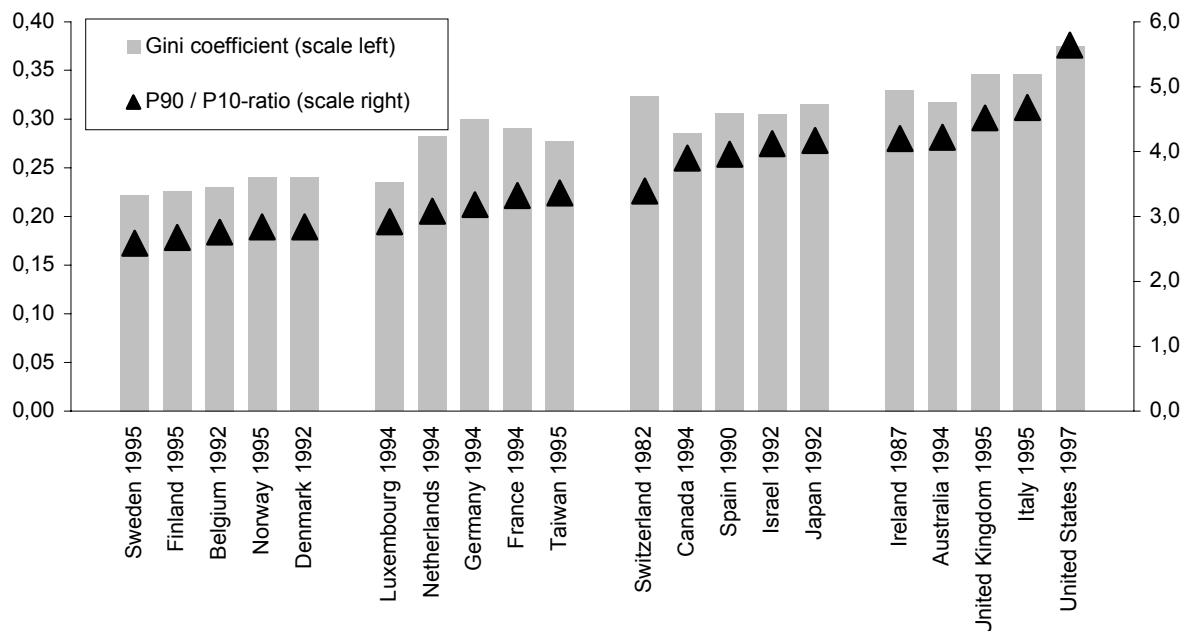
Levels of Income Inequality around the mid 1990's

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.

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.

The highest inequality is found in the United States, while Nordic countries are the most equal nations.

Figure 1 Summary Measures of the Income Distribution (Adjusted Disposable Household Income)



note: with the exception of Japan, all of the data came from LIS

source: Gottschalk and Smeeding (1998: figure 2) and updated figures from Smeeding (2000: figure 1)

Other inequality indices would alter the country-ranking to some extent. However, roughly the same pattern of overall inequality is observed in other analyses of inequality (Atkinson, Rainwater, and Smeeding, 1995).

We see that according to the Gini coefficient, the Netherlands is grouped with four other countries (Luxembourg, Germany, France, and Taiwan) with rather low coefficients compared to Switzerland, Canada, Spain, Israel, and Japan with somewhat higher coefficients; and five other countries with the highest coefficients, indicating the highest degree of inequality.

Figure 1 indicates that a wide range of inequality exists across wealthy developed nations, with the nation with the highest inequality coefficient (United States) almost twice as high as the nation with the lowest coefficient (Sweden).

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.⁵ 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 has the highest inequality but the differences in inequality among Benelux countries are small compared to the differences between these countries and the United States. 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 since 1980

LIS is very useful for measuring differences in inequality *at a point in time*, but is less well suited for measuring changes in inequality over time across countries (Smeeding, 2000). Ideally data collection on income inequality is both consistent over time and across countries. However, such a project is daunting at this time (Atkinson, Brandolini, Van der Laan, Smeeding, 2000:1). In assessing trends across countries one should be aware of noisy data due to definitional differences in income, definitional differences in population coverage (immigrants), differences in survey collections practices, and differences in periodicity related to the business cycle (Smeeding, 2000:214-219).

An extensive survey by Gottschalk and Smeeding (1997) covers many aspects of income inequality. The following stylised facts can be traced from their study:

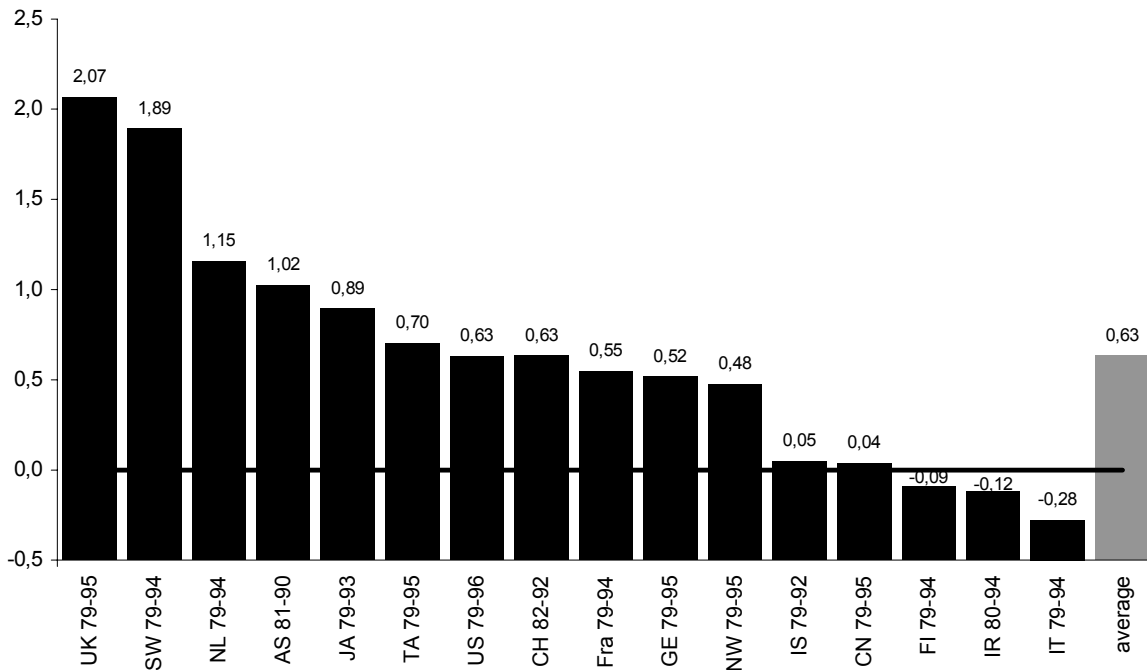
- I Almost all countries experienced some increase in wage inequality during the 1980's. Changes in household income inequality in most countries were smaller than changes in earnings inequality. In all OECD-countries post-tax and transfer disposable income is more equally distributed than market income.
- II Changes in taxes paid and transfers received - due to changes in tax and transfer structures in many countries - largely offset the changes in the distribution of markets income (pre-tax and pre-transfer).
- III However, the changes in the distribution of income 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.

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). When we include the 1990's, this conclusion alters somewhat. We rely on data from another paper by Gottschalk and Smeeding (2000) 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

5 If the Lorenz curve that represents a distribution lies entirely inside another one, it can unequivocally be said that the country represented by the outside Lorenz curve is more unequal than the one represented by the one that lies inside. In case of Lorenz Dominance several summary measures of inequality (e.g. the Gini coefficient or Mean Log Deviation) will rank the distributions uniformly. However, if Lorenz curves do cross, than the way in which different inequality measures rank two different distributions depends on the importance each gives to different parts of the distribution (see

countries. Income inequality did *not* rise in only 3 of the 16 nations observed in the period 1979-1995. 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 period indicated divided by the number of years in the interval.

source: Gottschalk and Smeeding (2000: figure 4 and appendix tables A2 and A3), and own calculations

Note that the trends in figure 2 are based on an arbitrary period (1979-1995). Cyclical variations in inequality (if any) could be involved. Inequality increased by more than 1 percent a year in four countries over this period. The United Kingdom, Sweden, the Netherlands and Australia are on top of the list in descending order. 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) appear to be experiencing a ceiling in those increases in the observed period. Thus, the increases we are seeing since are offsetting gains made during the 1960s and 1970s. Indeed, the Swedish and Dutch distributions had low base Gini coefficients (1979) compared to the United States. This, however, is not the case for the United Kingdom.

Atkinson, 1970). Several measures may therefore value and rank one and the same income distribution differently (*cf.* Champernowne, 1974).

2.3 Conclusion on the Empirical Evidence

While even the LIS-data are by no means perfect, they produce some consistent patterns. The range of income inequality among 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 found in the most equal country (Sweden).

Income inequality has increased remarkably in a number of countries, particularly in the United Kingdom, but also in the Netherlands, Sweden, and Australia. While income inequality rose in 13 of the 16 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/or 1990s.

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 was hit by oil crises twice, there has been a tendency towards more free market oriented policies, and more women have entered the labor force. 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 (which may differ over countries). 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.

Our hypothesis is that changes in social policies, such as expenditure cuts, reduction of benefit levels or more strict eligibility criteria, have made the national income distribution less equal. Obviously, such policies will only increase inequality when the (pre-reform) transfer system redistributes income from higher to lower income groups. This condition is usually met, at least in OECD-countries. On basis of the LIS-data presented by Ervik (1998) we find 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 OECD countries under consideration, though varying over time and over countries. However, there are also social benefits that mainly favour higher income groups, for example child benefits. When such benefits are cut, the income distribution will become more equal. But this is an exception to the rule.

Also, changes in social policies, such as cuts in public benefits programs, can be offset by compensating (semi-) private programs or by negotiated changes in wages in which case the distribution of primary income changes. Thus, both on theoretical and empirical grounds the possible (causal) relationship between changes in social policies and the income distribution is not clear cut.

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. We look at only two of these indicators in our straightforward approach (see also section 4): social security expenditures as percentage of GDP and the replacement rates.

Social Security Transfers as percentage of GDP

It is well known that social security systems and even social expenditures are very difficult to compare across countries. 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 are not included consistently in different 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 other countries not. Also, benefits can take the form of tax relief. These tax features can make a big difference in statistics on social expenditures (see Adema, 1999). Also, changes in expenditure ratios often do not reflect policy changes. Higher outlays can simply be the result of ageing or rising unemployment.

To monitor social policy developments in the OECD area, we use the OECD Social Expenditure Database (SOCX) which facilitates trend analysis of aggregate *net* social expenditures and changes in its composition across OECD countries. It includes historical series for the 1980-1995/1996 period on public and mandatory private social expenditure at programme level. These net social expenditure indicators give us the best available picture of the extent and change of social protection across countries.

However, expenditure ratios can only be considered as rough indicators of welfare state policies. Only under *ceteris paribus* conditions welfare retrenchments lower the social expenditure ratio. But it is also relevant when welfare reform, for example in a period of rising unemployment, is reflected in a *less than average* increase in the expenditure ratio, compared to other countries.

Gottschalk and Smeeding (1997) use *gross* expenditure ratios 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.

We look at *net* expenditure ratios for a somewhat longer period. Table 2 shows that in all modern welfare states net social expenditures as a percentage of GDP rose in the period 1980-1994.

Table 2 Net Social Expenditures as percentage of GDP, 1980-1994

	<i>around 1980</i>	<i>around 1994</i>	<i>change</i>
Australia 81-90	11.9	14.5	+2.6
Canada 80-95	13.2	18.2	+5.1
Finland 80-94	18.9	34.0	+15.1
France 80-94	23.5	29.7	+6.2
Germany 80-95	25.7	29.6	+3.9
Ireland 80-94	17.6	20.0	+2.4
Italy 80-95	18.4	23.7	+5.3
Japan 80-93	10.0	12.6	+2.7
Netherlands 80-94	28.5	29.0	+0.4
Norway 80-95	18.8	28.5	+9.7
Sweden 80-94	29.9	36.3	+6.5
Switzerland 82-92	16.6	22.5	+5.9
United Kingdom 80-95	18.3	22.8	+4.5
United States 80-95	13.7	16.3	+2.5
<i>average (unweighted)</i>	<i>18.9</i>	<i>24.1</i>	<i>+5.2</i>

note: change equals the change in net social expenditures as percentage of GDP over the time frame indicated, i.e. from around 1980 to around 1994.

source: OECD Social Expenditure Database (SOCX, <http://www.oecd.org/els/social>); 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 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.

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, replacement rates can also only be viewed as limited indicators of the generosity of benefit systems (Whiteford, 1995). Some of the limitations are: *i*) replacement rates are based on entitlement rules and often represent only the maximum payment available in the circumstances specified; *ii*) benefits are often not fully indexed, implying that benefits represent a decreasing percentage of wages; *iii*) not all relevant benefits may be reckoned with (such as housing subsidies or health care); *iv*) taxation can blur the picture. Bearing these limitations in mind, we can look at table 3, which presents the development of replacement rates for unemployment benefits for 15 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.

Table 3 Gross Replacement Rates Unemployment Benefits OECD, 1979-1994

	<i>around 1979</i>	<i>around 1994</i>	<i>change</i>
Australia 81-95	22.1	27.0	+4.9
Canada 79-95	25.6	27.2	+1.6
Finland 79-95	26.5	43.2	+16.7
France 79-95	24.0	37.4	+13.4
Germany 79-95	25.1	27.2	+2.1
Ireland 79-93	28.1	30.8	+2.7
Italy 79-95	1.0	19.3	+18.3
Japan 79-93	8.7	9.9	+1.2
Netherlands 79-95	47.5	45.8	-1.7
Norway 79-91	19.9	38.9	+19.0
Sweden 79-95	25.1	27.2	+2.1
Switzerland 81-93	12.8	29.5	+16.7
United Kingdom 79-95	23.8	17.8	-6.0
United States 79-93	11.7	11.9	+0.2
<i>average (unweighted)</i>	<i>21.6</i>	<i>28.8</i>	<i>+6.5</i>

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. Change equals the change in replacement rates over the time frame indicated.

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 data-year the unweighted averages of these replacement rates are computed. The computations assume standard circumstances such as 40 years of age, involuntary loss of the job, long previous work record, etc.

source: OECD (data provided by Glenn Cooper)

In only two countries - The United Kingdom and the Netherlands - replacement rates of unemployment benefits declined in the period 1979-1994. The other countries show increases in the replacement rate, varying from 1.2 percentage points in Japan to 19.0 percentage points in Norway.

Relationship

Is there a relationship between these changes? Table 4 combines the changes in the Gini's with the changes in the expenditure ratio's and the replacement rates. The countries are ranked by the changes in the Gini, from high to low. It appears that the countries with an above average rise in inequality show less than average increases in the expenditure ratio (with the exception of Sweden) and less than average increases (or decreases) in the replacement rate. Especially the UK and the Netherlands are interesting cases: these countries combine a relatively large increase in inequality with lower replacement rates and for the Netherlands also a slightly lower expenditure ratio. These are indications that support our hypothesis. For the group of countries with less than average increases (or even declines) in inequality, however, the picture is less clear. For these countries we would expect higher than average increases in the expenditure ratio and the replacement rate. Especially for the expenditure ratio such a relation can not be found.⁶ This is confirmed by a

⁶ Especially Sweden combines an above-average growth rate in social security transfers with a relatively large rise in income inequality. Note that a weak positive relationship between social security transfers and inequality can also be the result of the fact that social security transfers are not well-targeted towards the poor. Another explanation is put forward by Eriksson and Pettersson (2000). In their analysis they eliminate various peculiarities in the Swedish data that often are disregarded in

simple regression analysis reported in table 5. The estimated coefficient of the expenditure ratio-variable is not significant.⁷ However, using the replacement rate as dependent variable produces the expected negative sign, while the coefficient is statistically significant.

Obviously, this straightforward analysis is much too simple to draw far-reaching conclusions. The material presented is only descriptive and does not explain changes in the household income distribution. Such an analysis should be based on a theory, which would have to address at least the following cross-national differences (cf. Gottschalk and Smeeding, 2000:263): differences in labor markets that affect earnings of individual household members; difference sources of capital and in returns to capital; demographic differences, such as the ageing of the population and growth of single parent households, which affect both family needs and labor market decisions; and differences across countries in tax and transfers policies that not only affect family income directly, but also this may affect work and investment decisions. Such a comprehensive approach is far beyond the scope of this paper.

Our material nevertheless does support a relationship between changes in income inequality and changes in social policies, as indicated by the generosity of unemployment benefits. Especially the UK and the Netherlands show patterns that are consistent with our hypothesis. A much more elaborate country-approach is needed, however, to be more conclusive, which we attempt for the case of the Netherlands.

international comparisons. According to Eriksson and Pettersson the upward trend in inequality - as measured with LIS-data - is due to changes in capital gains taxes (tax reform, page 162).

7 A similar regression is done by Gouyette and Pestieau (1999) with the *level* of the Gini and the *level* of social spending. They find a pretty good fit.

Table 4 Cross Country Changes 1979-1994 in Net Social Expenditures, Gross Replacement Rates and Gini's

	income inequality	net social expenditures as % of GDP	gross replacement rates
	change Gini (percentage)	change (percentage points)	change (percentage points)
<i>average</i>	9.8	5.2	6.5
above-average			
United Kingdom	31.0	4.5	-6.0
Sweden	28.4	6.5	2.1
Netherlands	17.3	0.4	-1.7
Australia	12.2	2.6	4.9
Japan	13.4	2.7	1.2
below-average			
United States	9.5	2.5	0.2
Switzerland	9.5	5.9	16.7
France	8.2	6.2	13.4
Germany	7.8	3.9	2.1
Norway	7.1	9.7	19.0
Canada	0.5	5.1	1.6
Finland	-1.4	15.1	16.7
Ireland	-1.8	2.4	2.7
Italy	-4.2	5.3	18.3

note: countries are ranked in order of the percentage change in Gini coefficient of equivalent disposable household income

source Gini coefficient: see below figure 2; source net social expenditure ratios: see below table 2; source gross replacement rates: see below table 3; and own calculations

Table 5 Impact of the Change in Net Social Expenditures and Gross Replacement Rates on the Change in Inequality 1979-1994

Dependent variable	Intercept	Net Social Expenditures	Gross Replacement Rates	R ²
Gini Coefficient	6.126 (4.463)	-0.093 (-0.954)		0.0705
	11.039 (4.122)		-0.461 (-2.424)	0.3286

note: OLS-regression; t-statistics in parentheses

4 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 6. Combined with a number of adverse macroeconomic shocks, a vicious cycle of increasing (non-wage) labor 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, 2000).

Table 6 Key figures 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
Same 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 labor 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 1980.⁸ 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 labor 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 – 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 has been offset to a large extent, because trade unions have negotiated supplementary benefits, especially sickness benefits and disability benefits.

⁸ On the other hand, the increases of real disposable income of social security beneficiaries had been large in the 1970's.

However, employees (and others) not taking part in these collective contracts do not profit from this.

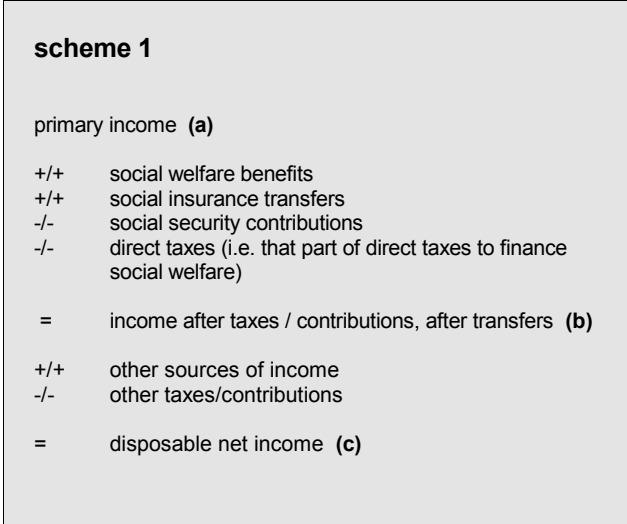
The figures in table 6 show that these policies had some success in terms of a halting the rise in claimants under 65 years, but so far the rising trend has not been clearly reversed. A more positive development is that the ratio of benefit recipients to the number of employed is falling in recent years, as a consequence of rapid employment growth. Also, total expenditure on social security is declining in recent years. It is interesting to see how these reforms affected the income distribution.

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 through 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 Ervik, 1998 and Duclos, 2000).

Analyses of statutory and budget incidence can be found for decades in literature on public finance.⁹ Of course, also critical literature on budget incidence analyses has emerged – but these criticisms 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 behavioral 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.

To identify changes in the redistributive effect of taxes and social transfers over time, we use 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 behavioral responses are ignored.



9 See for example Dalton (1936), Musgrave and Tun Thin (1948), Gillespie (1965), Kakwani (1977a), Reynolds and Smolensky (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).

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

$$\text{Redistribution by government} = (\text{primary income} - \text{disposable income}) / (\text{primary income})$$

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 far 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. We follow most of the literature in applying adjusted household income in our analysis. The next question is which equivalence scale should be used to adjust for household size and composition?¹⁰ We assume an equivalence scale elasticity of 0.5, which is consistent with recent estimates (Schiepers, 1998:120).

4.3 Results

We first show the long-run trend in disposable household income inequality in the Netherlands. Several summary statistics of disposable household income inequality are shown in table 7. All 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.¹¹

Our findings do not seem to be very sensitive for the beginning and end points of the analysis. The cyclical economic conditions in 1977 and 1997 did not differ very much. We calculated a GDP-trend over the period 1976-2000, and find that the economic growth of 1977 was +0.9 point above this trend line; real GDP-growth in 1997 lies 0.5 point above the trend line.

Table 7 Trend in Adjusted Disposable Household Income Inequality 1977-1997

	1977	1997	change	%-change
Gini Coefficient	0.243	0.273	+0.030	+12
Mean Log Deviation (Theil Index)	0.110	0.141	+0.031	+28
Log Deviation	0.070	0.091	+0.021	+30

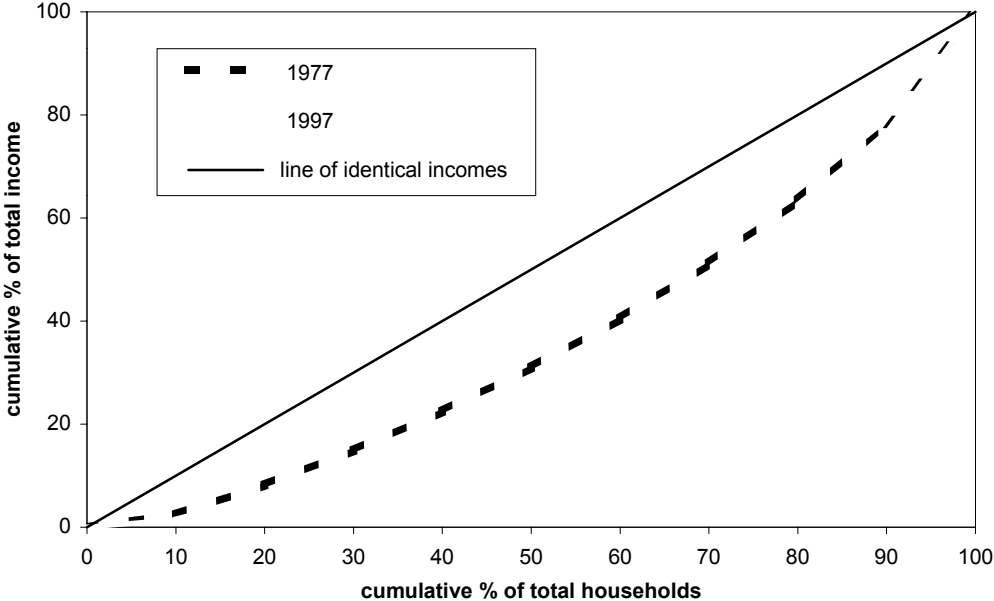
source: Gini Coefficient and Mean Log Deviation are from Trimp (1999) and Statistics Netherlands (1999:119); Log Deviation is taken from Sociaal Cultureel Planbureau (1998:108) and refer to 1977 and 1995; and own calculations

¹⁰ It has been shown that, within a wide range, the choice of equivalence scales affects international comparisons of income inequality to a wide extent. Alternatively adjustment methods would definitely affect the ranking of countries, although the broad pattern remains the same (Atkinson, Rainwater, Smeeding, 1995:52).

¹¹ It should be noted that Log Deviation is especially sensitive to changes at the top of the income distribution.

Figure 3 shows the Lorenz curves of disposable household income for 1977 and 1997. The Lorenz curve for 1977 remains above the Lorenz curve for 1997 (i.e. both curves do not intersect). Therefore it is possible to draw conclusions about the degree of inequality (Lorenz Dominance Theorem).¹² The distribution for 1977 is unambiguously more equal than the distribution of disposable income for 1997.

Figure 3 Lorenz Curves of Adjusted Disposable Household Income, 1977 and 1997



source: Statistics Netherlands (1999:118), and own calculations

Income inequality did go up substantially in the Netherlands in the period 1977-1997, although the direction of change was not one-way up. 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). Inequality especially rose during the 1980's. We analyse the trajectory from primary or market income to disposable income (cf. scheme 1).

Mean Log Deviation (Theil index) is used as a summary measure of income inequality, because 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 Mean Log Deviation can be meaningfully added and subtracted [from another] in a way that most other indices cannot.¹³

Table 8 illustrates the decomposition of the trend in inequality in the Netherlands. As expected, adjusted disposable incomes are distributed much more equally than primary

12. See footnote 5.

13 It should be noted that the choice for a specific summary measure of inequality is especially important when Lorenz curves intersect. However, in our budget incidence analysis 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

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.

Table 8 Decomposition of Inequality in Household Income: Mean Log Deviation

	<i>level</i>			<i>change</i>	<i>share in change</i>
	<i>1981</i>	<i>1991</i>	<i>1997</i>	<i>1981-1997</i>	<i>1981-1997</i>
Primary income	0.532	0.540	0.545	+0.013	36%
effect transfers	-0.334	-0.324	-0.320	+0.014	39%
Gross income	0.198	0.216	0.225		
effect taxes	-0.054	-0.040	-0.045	+0.009	25%
Disposable income	0.144	0.176	0.180	+0.036	100%
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) as reported in table 7.

Which are the main factors behind the changes in the income distribution? These are shown in the right part of table 8. In the period considered, the Mean Log Deviation for disposable income increased by 36 points, which is equivalent to a rise in overall inequality by 25 percent (29 percent when adjusted income is taken).

A major force behind the rise in overall inequality of disposable household income is a more unequal distribution of primary income (13 points or 36% of the total change). This is partly caused by the strong rise in the labor force participation of secondary earners (women). Another factor behind the increase in inequality is lower progressivity of the tax system (9 points or 25%).¹⁴ But social transfers explain the largest part of the total increase in inequality (39%).¹⁵

We conclude that the change in social policies since the early 1980's has indeed made the income distribution less equal. Social transfers are a main force behind the rise in overall income inequality. It should be noted, however, that our results are only rough estimates, given

income. See e.g. Atkinson (1970), Kiefer (1984), Formby, Smith and Thistle (1990), Lambert (1993) and Silber (1994) for a technical advanced debate on the measurement of income inequality by summary statistics.

¹⁴ This is consistent with other research we did, see Caminada and Goudswaard (1996).

¹⁵ 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).

the limitations of the budget incidence method. Including the effect of behavioral responses would probably provide a different result. Transfers cuts have reduced replacement ratios which has stimulated labor force participation of benefit recipients.¹⁶ This may have reduced income inequality. Tax shifting, however, probably did not affect our results. Empirical research indicates that tax shifting has not changed to a significant degree in the Netherlands during the period concerned (Muysken, Van Veen and De Regt, 1999).

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 13 out of 16 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 the Netherlands. We do not find a clear relationship between changes in inequality and changes in welfare state policies as measured by social expenditure ratios. Changes in replacement rates, however, seem to be a relevant factor. Especially the United Kingdom and the Netherlands are interesting cases: these countries combined an 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. Despite some methodological problems traditional budget incidence approach is used to study the combined impact 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 disposable household income increased in the period 1981-1997 by roughly 25 percent as measured by the Mean Log Deviation. The Lorenz Dominance Theorem indicates that the 1997-distribution of disposable income was unambiguously less equal than the 1981-distribution. Almost 40 percent of the increase in inequality can be attributed to transfers. Another important force was a more unequal distribution of market income. Increasing labor force participation among secondary earners has substantially contributed to increased inequality, which is probably typical of recent trends in some other European countries.

Our budget incidence analysis thus indicates that social security reforms have had an important impact on increasing inequality in the Netherlands. These reforms were motivated by, or even made inevitable by strong budgetary pressures and worsening economic conditions in the early 1980's. It should be noted, however, that after the social security reforms, the generosity of the Dutch income transfer system is still quite high in an international perspective. Also, the overall level of Netherlands income inequality is still below the OECD average.

16 See e.g. Gelauff and Graafland (1994, chapter on 10 'Cutting back the welfare state').

References

- Adema, W. (1999) 'Net Social Expenditures', *Labour Market and Social Policy Occasional Papers* no. 39; *OECD working papers* vol. 7, no. 61, OECD, Paris.
- Atkinson, A.B. (1970) 'On the Measurement of Inequality' *Journal of Economic Theory* 2:244-263.
- Atkinson, A.B., L. Rainwater, and T.M. Smeeding (1995) 'Income Distribution in OECD Countries: Evidence from the Luxembourg Income Study' *OECD Social Policy Studies* 18, Paris.
- Atkinson, A.B. (1996) 'Explaining the Distribution of Income' in: J. Hills (eds.) *New inequalities*, Cambridge University Press, Cambridge:19-48.
- Atkinson, A.B., and A. Brandolini (1999) 'Promise and Pitfalls in the Use of "Secondary" Data-Sets: Income Inequality in OECD Countries', Manuscript. Nuffield College, Oxford and Banca d'Italia, Research Department.
- Atkinson, A.B. (2000) 'The Changing Distribution of Income: Evidence and Explanation', *German Economic Review* 1 (1):3-18.
- Atkinson, A.B., A. Brandolini, P. van der Laan, and T. Smeeding (2000) 'Producing Time Series Data for Income Distribution: Sources, Methods, and Techniques', *Paper prepared for the 26th General Conference of The International Association for Research in Income and Wealth*, Cracow, Poland: August 27-September 2, 2000.
- Barro, R.J. (1999) 'Inequality and Growth in a Panel of Countries', *NBER Working Paper* no. 7038, Cambridge.
- Bovenberg, A.L. (2000) 'Reforming Social Insurance in The Netherlands' *International Tax and Public Finance* 7 (3):345-371.
- Caminada, K., and K.P. Goudswaard (1996) 'Progression and Revenue Effects of Income Tax Reform' *International Tax and Public Finance* 3 (1):57-66.
- Champernowne, D.G. (1974) 'A Comparison of Measures of Inequality of Income Distribution' *Economic Journal* 84:787-816.
- Coulter, P.B. (1989) *Measuring Inequality: A Methodological Handbook*, Westview Press, London.
- Dalton, H. (1936) *Principles of Public Finance*, third edition, George Routledge & Sons, London.
- Deininger, K., and L. Squire (1996) 'A New Data Set Measuring Income Inequality', *The World Bank Economic Review* 10 (3):565-592.
- Dollar, D., and A. Kraay (2000) '*Growth Is Good for the Poor*', World Bank, Development Research Group, (forthcoming Working Paper).
- Duclos, J.-Y. (2000) 'Gini Indices and Redistribution of Income', *International Tax and Public Finance* 7 (2):141-162.
- Eriksson, I., and T. Pettersson (2000) 'Income Distribution and Income Mobility - Recent Trends in Sweden', in: R. Hauser and I. Becker (eds.) *The Personal Distribution of Income in an International Perspective*, Berlin, Germany, Springer-Verlag:158-175.
- Ervik, R. (1998) 'The Redistributive Aim of Social Policy. A Comparative Analysis of Taxes, Tax Expenditure Transfers and Direct Transfers in Eight Countries' *LIS Working Paper Series* 184, Luxembourg.
- Figini, P. (1998) 'Inequality Measures, Equivalence Scales and Adjustment for Household Size and Composition' *LIS Working Paper Series* 185, Luxembourg.
- Formby, J.P., W.J. Smith, and P.D. Thistle (1990) 'The Average Tax Burden and the Welfare Implications of Global Tax Progressivity' *Public Finance Quarterly* 18 (1):3-24.
- Föster, M. (2000) 'Trend and Driving Factors in Income Distribution and Poverty in the OECD Area', *Labour Market and Social Policy Occasional Papers* no. 42, OECD, Paris.
- Gelauff, G.M.M., and J.J. Graafland (1994) 'Modelling Welfare State Reform', Amsterdam, Elsevier Science.
- Gillespie, W.I. (1965) 'Effects of Public Expenditures on the Distribution of Income' in: R. Musgrave (eds.) *Essays in Fiscal Federalism*, The Brookings Institution, Washington.
- Gottschalk, P., B. Gustafsson, and E. Palmer (eds.) (1997) *Changing Patterns in the Distribution of Economic Welfare*, Cambridge University Press, Cambridge.
- Gottschalk, P., and T.M. Smeeding (1997) 'Cross-National Comparisons of Earnings and Income Inequality' *Journal of Economic Literature* 35 (June):633-687.
- Gottschalk, P., and T.M. Smeeding (1998) 'Empirical Evidence on Income Inequality in Industrialized Countries' *LIS Working Paper Series* 154 (revised), Luxembourg.
- Gottschalk, P., and T. Smeeding (2000) 'Empirical Evidence on Income Inequality in Industrialized Countries', in: A.B. Atkinson and F. Bourignon (eds.) *Handbook of Income Distribution*, New York, Elsevier-North Holland Publishers, Vol. 1:262-307.
- Gouyette, C., and P. Pestieau (1999) 'Efficiency of the Welfare State' *Kyklos* 52 (4):537-553.
- Gustafsson, B., and M. Johansson (1997) 'In Search for a Smoking Gun: What Makes Income Inequality Vary Over Time in Different Countries?' *LIS Working Paper Series* 172, Luxembourg.
- Headley, B., R.E. Goodin, R. Muffels, and H-J. Dirven (1997) 'Welfare Over Time: Three Worlds of Welfare Capitalism in Panel Perspective' *Journal of Public Policy* 17 (3):329-359.
- Jeurissen, P.C.J. (1995) 'Robin Hood in Nederland' (Robin Hood in the Netherlands) *Sociaal-economische maandstatistiek* 12 (4):17-21.

- Kakwani, N.C. (1977a) 'Measurement of Tax Progressivity: An International Comparison' *Economic Journal* 87:71-80.
- Kakwani, N.C. (1977b) 'Applications of Lorenz Curves in Economic Analysis' *Econometrica* 45 (3):719-727.
- Kakwani, N.C. (1986) *Analyzing Redistribution Policies*, Cambridge University Press, Cambridge.
- Kiefer, D.W. (1984) 'Distributional Tax Progressivity Indexes' *National Tax Journal* 37:497-513.
- Kleijn, J.P. De (1998) 'Inkomensverdeling 1996' (Income Distribution 1996) *Sociaal-economische maandstatistiek* 15 (3):18-22 and 75-85.
- Lambert, P.J. (1993) *The Distribution and Redistribution of Income: a Mathematical Analysis*, second edition, Manchester University Press, Manchester.
- Ministry of Social Affairs (1995) *Sociale Nota 1996*, (in Dutch), Sdu Uitgevers, The Hague.
- Ministry of Social Affairs (1999) *Sociale Nota 2000*, (in Dutch), Sdu Uitgevers, The Hague.
- Musgrave, R.A., and Tun Thin (1948) 'Income Tax Progression, 1929-48' *Journal of Political Economy* 56:498-514.
- Musgrave, R.A., K.E. Case, and H.B. Leonard (1974) 'The Distribution of Fiscal Burdens and Benefits' *Public Finance Quarterly* (2), July:259-311.
- Muysken, J., T. van Veen, and E. de Regt (1999) 'Does a Shift in the Tax Burden Create Unemployment?' *Applied Economics* 31:1195-1205.
- Odink, J.G. (1985) *Inkomensherverdeling - enkele aspecten van de inkomensherverdeling door de overheid in Nederland*, (PhD in Dutch about Income Redistribution), Wolters-Noordhoff, Groningen.
- OECD (1994) *The OECD Jobs Study: Facts Analysis Strategies*, Paris, OECD.
- OECD (1994) *The OECD Jobs Study: Evidence and Explanations* (part 1 and 2), Paris, OECD.
- Reynolds, M., and E. Smolensky (1977) 'Post Fisc Distributions of Income 1950, 1961, and 1970' *Public Finance Quarterly* 5:419-438.
- Ringen, S. (1991) 'Households, standard of living and inequality', *Review of Income and Wealth* 37:1-13.
- Schiepers, J.M.P. (1998) 'Equivalentiefactoren: methode en belangrijkste uitkomsten', (Equivalence Scales for the Netherlands: Methodology and Main Results), in: CBS *Jaarboek Welvaartsverdeling 1998*, Kluwer/CBS, Deventer:117-121.
- Silber, J. (1994) 'Income Distribution, Tax Structure, and the Measurement of Tax Progressivity' *Public Finance Quarterly* 22 (1):86-102.
- Smeeding, T. (2000) 'Changing Income Inequality in OECD Countries: Updated Results from the Luxembourg Income Study (LIS)', in: R. Hauser and I. Becker (eds.) *The Personal Distribution of Income in an International Perspective*, Berlin, Germany, Springer-Verlag:205-224.
- Smolensky, E., W. Hoyt, and S. Danziger (1987) 'A Critical Survey of Efforts to Measure Budget Incidence' in: H.M. van de Kar, B.L. Wolfe (eds.), *The Relevance of Public Finance for Policy-Making*, Proceedings IIFP Congress 1985, Detroit:165-179.
- Sociaal en Cultureel Planbureau (1998) *Sociaal en Cultureel Rapport 1998. 25 jaar sociale verandering* (Social Cultural Report 1998), SCP, Rijswijk.
- Statistics Netherlands, CBS (1999) 'Inkomensverdeling 1977-1997. Tabellen' (Income Distribution 1977-1999. Tables) *Sociaal-economische maandstatistiek* 16 (5):107-119.
- Trimp, L. (1993) 'Inkomens van huishoudens, 1977-1990' (Income of Households, 1977-1990) *Sociaal-economische maandstatistiek* 10 (7):16-18.
- Trimp, L. (1999) 'Inkomensverdeling 1977-1997' (Income Distribution 1977-1997) *Sociaal-economische maandstatistiek* 16 (5):21-27.
- Whiteford, P. (1995) 'The use of replacement rates in international comparisons of benefit systems' *International Social Security Review* 48 (2):3-30.

Annex Comparative database: availability data around 1979 and 1994

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

sources:

database 1: Gottschalk and Smeeding (1998: figure 2) and updated figures from Smeeding (2000: figure 1)

database 2: Gottschalk and Smeeding (2000: figure 4 and appendix tables A2 and A3), and own calculations

database 3: OECD (data provided by Glenn Cooper, may 2000)

database 4: Comparative Welfare State Data Set LIS / OECD (<http://lissy.ceps.lu/compwsp.htm>)

database 5: Data Set OECD Economic Outlook (December 1998)

database 6: OECD, SOCX Database (downloading 11-1-2001); <http://www.oecd.org/els/social>

Trends in Disposable Income Inequality Gini Coefficient Index Gini (1979=100)

	<i>year 1:</i>	<i>year 2:</i>	<i>number of years</i>	<i>index</i>	<i>annual % change</i>
Australia	1981	1990	9	1.0730	0.81
Canada	1979	1995	16	1.0056	0.04
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
<i>average qualifiers</i>	<i>1979.4</i>	<i>1994.0</i>	<i>14.6</i>	<i>1.0947</i>	<i>0.65</i>

source: Gottschalk and Smeeding (2000: figure 4 and appendix tables A2 and A3), and own calculations

Social Security Transfers as percentage of GDP, 1979-1994

	<i>1979</i>	<i>1980</i>	<i>1981</i>	<i>1982</i>	<i>1983</i>	<i>1984</i>	<i>1985</i>	<i>1986</i>	<i>1987</i>	<i>1988</i>	<i>1989</i>	<i>1990</i>	<i>1991</i>	<i>1992</i>	<i>1993</i>	<i>1994</i>
Australia	19.3	19.0	19.5	19.9	20.0	20.0	20.4	20.6	21.1	20.3	19.9	19.8	20.0	20.3	21.8	21.8
Canada	9.6	9.9	9.9	11.7	12.4	12.1	12.2	12.4	12.3	12.8	11.8	12.9	14.7	15.7	16.0	15.2
Denmark	15.4	16.6	17.8	18.1	17.8	17.0	16.3	15.5	16.3	17.6	18.1	18.4	19.0	19.6	20.4	22.0
Finland	9.4	9.1	9.1	10.1	13.9	14.0	14.8	15.3	15.4	14.7	14.4	15.8	19.6	23.7	25.2	25.1
France	18.6	19.2	20.3	21.2	21.5	21.8	22.1	22.0	21.8	21.7	21.4	21.2	21.8	22.4	23.6	23.3
Germany	16.5	16.5	17.2	17.6	17.0	16.5	16.2	15.9	16.1	16.0	15.7	15.2	14.7	14.8	15.9	16.1
Ireland	11.3	12.6	13.6	15.6	16.3	16.1	16.6	17.2	16.8	16.2	14.3	14.1	14.9	15.4	15.4	-
Italy	15.7	14.1	15.7	16.3	17.3	16.7	17.1	17.3	17.3	17.3	17.7	18.2	18.3	19.3	19.5	19.5
Japan	9.8	10.1	10.6	11.0	11.3	11.1	11.0	11.4	11.8	11.8	11.0	11.5	11.0	11.5	12.1	-
Netherlands	25.5	25.9	26.9	28.4	28.8	27.5	26.1	25.9	26.4	25.7	25.3	25.8	26.0	26.4	26.7	25.5
Norway	15.5	14.4	14.5	15.0	15.5	15.0	14.8	15.9	16.3	18.1	19.0	19.5	20.5	-	-	-
Sweden	17.6	17.7	18.2	18.4	18.4	17.5	18.2	18.3	18.6	19.5	19.5	19.5	21.1	23.4	25.0	24.9
Switzerland	13.0	12.7	12.4	13.2	13.5	14.1	13.7	13.6	13.6	13.8	13.4	13.6	14.5	15.9	17.5	17.6
United Kingdom	11.1	11.5	12.9	13.8	13.8	13.9	13.8	14.0	13.1	12.2	11.9	11.6	13.0	14.4	15.6	15.4
United States	10.0	10.9	11.1	11.9	11.9	11.0	11.0	11.0	10.8	10.6	10.8	11.2	12.3	13.1	13.2	

source: Comparative Welfare State Data Set LIS / OECD (<http://lissy.ceps.lu/compwsp.htm>)

Gross Replacement Rates Unemployment Benefits OECD, 1979-1994

	1961	1963	1965	1967	1969	1971	1973	1975	1977	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997
Australia	17.3	20.1	17.8	16.1	13.7	13.8	16.4	21.6	24.5	24.9	22.1	22.2	23.5	24.5	24.6	26.5	27.2	27.0	26.2
Austria	19.9	18.0	16.1	13.3	21.5	23.2	21.1	21.4	25.6	29.3	29.4	25.0	29.4	28.5	29.3	31.2	26.5	25.8	31.0
Belgium	42.2	37.7	32.5	29.7	40.5	40.8	45.8	47.3	46.8	46.3	44.6	43.6	43.1	42.5	42.1	41.6	40.4	38.7	39.8
Canada	22.1	21.9	20.9	20.0	22.8	21.2	29.5	28.4	27.5	25.6	25.2	29.3	29.4	29.5	28.8	28.1	27.9	27.2	30.0
Denmark	19.5	20.5	18.8	21.4	26.6	34.3	35.7	38.7	44.2	49.8	54.2	56.2	53.1	49.4	51.5	51.9	71.0	67.0	66.4
Finland	4.5	5.0	4.2	3.7	5.7	7.6	28.1	23.9	29.4	26.5	23.7	25.2	34.4	35.9	33.9	38.8	38.7	43.2	35.5
France	24.6	25.0	24.9	24.5	27.3	24.0	22.6	26.3	24.4	24.0	31.3	30.6	34.4	37.6	36.9	37.6	37.7	37.4	36.5
Germany	30.4	30.5	30.5	30.0	29.7	29.0	28.1	29.0	29.2	29.9	29.4	28.9	28.1	27.5	27.6	28.8	27.8	26.6	27.1
Greece	6.7	6.7	6.7	6.7	6.7	6.7	6.5	6.6	6.7	6.7	6.7	6.7	6.7	9.2	9.2	17.1	22.1	22.1	22.3
Ireland	16.8	17.1	17.4	17.7	16.4	17.3	15.7	21.3	26.8	28.1	28.1	32.3	28.3	29.8	26.9	29.3	30.8	26.3	30.0
Italy	4.0	3.0	2.4	2.7	2.4	1.8	1.4	1.9	1.3	1.0	0.7	0.5	0.4	0.3	2.7	2.5	16.7	19.3	18.3
Japan	11.8	12.0	12.1	12.0	12.0	13.4	13.4	13.4	8.6	8.7	8.8	8.7	10.3	10.3	10.0	9.9	9.9	10.2	10.6
Netherlands	13.2	13.2	48.0	46.3	48.0	48.0	48.0	48.0	48.0	47.5	47.9	47.4	53.8	53.6	53.2	51.3	46.3	45.8	46.9
New Zealand	42.2	37.9	32.9	32.7	32.2	26.6	27.7	28.3	26.9	26.9	29.0	31.4	31.4	32.5	32.1	30.4	29.8	27.1	-
Norway	4.2	3.8	3.3	3.7	3.7	5.0	7.9	7.6	20.4	19.9	29.0	29.0	38.9	38.9	38.9	38.9	38.9	38.9	38.9
Portugal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.4	5.4	7.4	8.6	7.2	21.7	30.7	31.7	34.4	35.4	35.4	33.4
Spain	9.4	9.4	18.7	18.7	18.7	12.4	12.4	21.4	21.4	21.4	27.9	27.9	34.4	33.8	33.8	33.5	31.7	31.7	31.7
Sweden	4.0	3.6	5.1	5.0	6.8	6.4	7.2	21.9	23.8	25.1	25.1	28.0	28.0	29.5	28.9	29.4	28.5	27.2	27.6
Switzerland	1.6	1.4	1.1	1.0	1.0	0.7	0.6	2.9	7.7	12.9	12.8	12.5	21.9	21.9	21.9	21.9	29.5	29.5	28.9
UK	24.0	25.3	25.6	27.6	27.3	25.3	24.4	21.6	25.3	23.8	24.1	21.7	20.7	18.6	17.6	17.8	18.5	17.8	18.8
US	7.1	10.1	9.0	9.7	9.4	11.2	11.1	12.0	15.4	11.7	14.6	13.8	14.7	11.3	11.4	11.1	11.9	11.9	12.6

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. Change equals the change in replacement rates over the time frame indicated.

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 data-year the unweighted averages of these replacement rates are computed. The computations assume standard circumstances such as 40 years of age, involuntary loss of the job, long previous work record, etc.

source: OECD (data provided by Glenn Cooper)

Net Social Expenditure (Public & Private Mandatory, 1- and 2- digits only) as percentage of GDP, 1980-1996

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
AUS	11.74	11.93	12.95	13.48	13.83	13.98	13.84	13.77	12.99	13.27	14.54	15.64	16.55	16.54	16.07	15.73	-
AUT	23.87	-	-	-	-	25.40	-	-	-	-	25.24	25.45	25.94	27.35	27.63	27.11	-
BEL	25.59	27.43	28.00	28.36	27.42	28.21	28.21	27.58	27.38	26.46	26.61	27.34	27.77	28.98	28.46	28.78	-
CAN	13.16	13.68	16.17	16.18	16.02	16.35	16.54	16.12	15.85	16.19	17.56	19.43	20.04	19.99	18.91	18.24	-
CZE	-	-	-	-	-	-	-	-	-	-	15.95	18.94	18.42	19.35	19.62	19.23	-
DEN	27.54	27.75	28.04	28.51	27.27	26.36	25.64	26.42	27.73	28.24	28.11	28.99	29.66	31.10	33.00	32.58	31.87
FIN	18.90	19.46	20.74	21.37	22.29	23.42	23.98	24.38	23.88	23.51	25.18	30.53	34.83	34.95	34.04	32.12	-
FRA	23.47	25.11	26.10	26.58	26.93	27.02	26.75	26.63	26.45	25.68	26.66	27.31	28.15	29.68	29.70	30.07	-
GER	25.68	26.50	26.64	25.92	25.54	26.31	26.16	26.53	26.48	25.51	24.82	26.94	28.35	29.22	28.96	29.61	-
GRE	10.79	11.99	14.33	14.72	15.28	16.23	16.63	16.75	16.42	17.15	17.09	16.90	16.19	16.79	-	-	-
ISL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19.50	19.87	-
IRE	17.61	17.74	18.43	18.55	17.94	22.93	23.10	22.25	20.81	19.12	19.23	19.95	20.44	20.41	20.04	19.40	18.38
ITA	18.37	19.80	20.34	21.38	20.87	21.65	21.78	22.09	22.18	22.41	23.08	24.72	25.72	25.94	25.15	23.71	-
JPN	9.95	10.42	10.81	11.13	10.96	11.38	11.77	12.01	11.73	11.57	11.34	11.46	12.05	12.63	13.26	14.06	-
KOR	-	-	-	-	-	-	-	-	-	-	4.10	4.04	4.49	4.69	4.98	5.38	5.60
LUX	24.52	26.31	25.49	25.68	24.21	24.03	22.99	24.27	23.37	22.73	23.43	24.36	24.26	24.85	24.16	25.24	-
MEX	-	-	-	-	-	2.12	2.02	2.37	2.29	2.26	2.78	3.22	3.41	3.40	3.55	3.67	-
NLD	28.53	29.38	30.99	31.15	29.94	28.87	28.56	28.88	28.51	28.16	29.68	29.77	30.18	30.51	28.97	27.99	26.91
NZL	16.49	17.10	18.22	17.97	17.03	17.57	17.54	18.64	19.87	21.62	22.24	22.60	22.52	19.14	18.89	18.80	19.22
NOR	18.79	-	-	-	-	20.04	-	-	25.34	26.42	27.05	28.31	29.54	29.22	29.03	28.48	-
POR	11.57	12.47	11.77	11.88	11.73	11.87	12.75	13.03	13.44	12.97	14.62	15.67	16.41	17.85	18.38	18.64	19.02
ESPA	16.29	17.47	17.43	18.12	17.82	18.53	18.23	18.15	18.66	18.80	19.59	20.37	21.34	22.42	21.99	21.49	-
SWE	29.78	30.72	30.94	31.31	30.04	31.10	31.19	31.41	32.01	31.38	32.18	34.31	36.41	37.44	36.29	33.38	-
CHE	15.91	15.61	16.61	17.45	17.53	17.41	17.70	18.26	18.45	18.28	19.35	20.65	22.52	24.33	24.71	25.22	-
TUR	3.94	3.74	4.05	4.46	4.13	3.83	4.00	4.14	4.45	4.98	5.85	7.26	6.69	6.54	7.14	6.79	-
UK	18.32	19.85	20.23	20.93	21.20	21.12	21.36	20.53	19.18	18.82	19.63	21.28	23.02	22.91	23.05	22.79	-
USA	13.74	13.85	14.17	14.62	13.56	13.41	13.56	13.66	13.63	13.63	14.08	15.23	15.98	16.12	16.13	16.26	-

source: OECD, SOCX Database (downloading 11-1-2001); <http://www.oecd.org/els/social>

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