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ARE PUBLIC AND PRIVATE SOCIAL EXPENDITURES COMPLEMENTARY? *

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Abstract

Most analyses of social protection are focussed on public arrangements. However, social effort is not restricted to the public domain; all kinds of private arrangements can be substitutes to public programs. OECD-data indicate that accounting for private social benefits and the impact of the tax system on social expenditure has an equalising effect on levels of social effort across a number of countries. This suggests complementarity between public and private social expenditures. Changes in the public/private mix in social protection will, however, have distributional effects. We expect that private schemes will generate less income redistribution than public programs.

In this paper we will perform an empirical analysis. Using comparative international data we analyse whether there is a relationship between public and private social expenditures, and the distribution of income. We find a negative relationship between net *public* social expenditures and income inequality, but a positive relationship between net *private* social expenditures and income inequality across countries. In fact, when we incorporate private social security expenditures, the impact of total social expenditure on the income distribution becomes statistically trivial. We conclude that changes in the public/private mix in the provision of social protection may affect the redistributive impact of the welfare state.

JEL-classification: D3, H22, and H55

Keywords: Public/Private-Mix, Social Protection, Income Distribution

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1 Introduction

In recent years considerable progress has been made in empirical research on public and private social protection expenditures. (Adema, 2001) has recently done a comprehensive study on net social expenditure. His OECD-data indicate that accounting for private social benefits and the impact of the tax system on social expenditure has an equalising effect on levels of social effort across a number of countries. This suggests complementarity between public and private social insurance. However, cross-country differences in the public/private mix in the provision of social protection, and cross-country differences in social policy aspects of tax systems may have distributional effects. Do public and private arrangements in social protection systems have (dis)similar distributional effects?

In this paper, we will investigate the relationship, if any, between cross-country differences in the public/private mix in social protection and the distribution of income in 16 wealthy nations.¹ We analyse both the effects of accounting for private social benefits, and the impact of the tax system on social protection statistics, and link both net public social spending and net private social spending to indicators of income inequality. Especially the link between income inequality and private arrangements (on average 9.4 percent of total net social expenditures across countries) is unclear at this stage. This relationship is also relevant from a policy point of view. In some countries welfare systems have been reformed fundamentally in recent years. E.g. the Netherlands has changed the public/private mix of social protection rather drastically. Recent reductions in public benefit levels have to a large extent been offset by supplementary private benefits, often negotiated in collective wage agreements. As far as pensions are concerned, there is also a trend towards a higher share of supplementary private benefits in total income.

The paper is organised as follows. Section 2 summarises empirical results of the level of income inequality across countries. In section 3 we discuss the influence of cross-country differences in the public/private mix in social protection on the distribution of income. Next we present the results of cross-country analyses on gross and net social expenditures (section 4). In section 5 we will perform an empirical analysis on (net) public and private social expenditures, and the distribution of income. Section 6 concludes the paper.

2 Empirical evidence on income inequality at one point in time ²

The best cross-nationally comparable collection is the Luxembourg Income Study (LIS).³ LIS was created specifically to improve consistency across countries. The LIS data are a collection of micro data-sets

1 We build on earlier work on the impact of social policy on the distribution of income. See Caminada and Goudswaard (2001).

2 It should be noted that income inequality has continued to increase in the large majority of the world's rich nations over the past decade (Atkinson 2000).

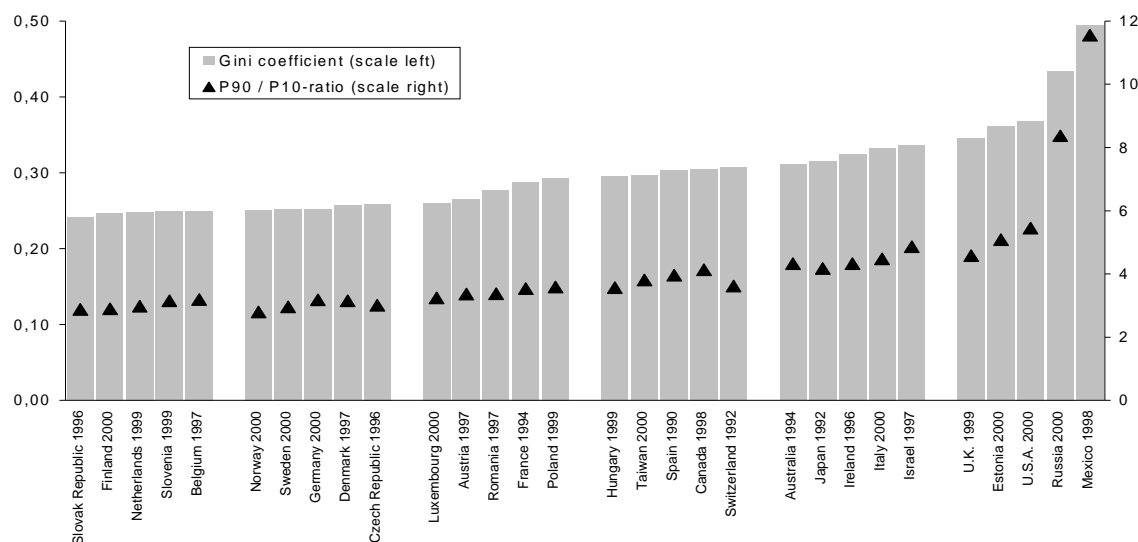
3 On the World Wide Web several sites can be found about the distribution of income around the world. See e.g. the UNU/WIDER - UNDP World Income Inequality Database <http://www.wider.unu.edu/wiid/wiid.htm>. See also <http://www.worldpolicy.org/globalrights/econindex.html>. Some contain large data-sets 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 and 2002) e.g. compiled data on income inequality for a very large panel of countries. Their data consist of income inequality measures for 104 countries. 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. However, 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, and by others, most very large data-sets on world wide income inequality are not fit for cross-country analyses (See Atkinson and Brandolini (1999 and 2001) for criticisms on this type of large "secondary" data-sets). Countries 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 sub-national). Those, and other, factors in different studies make it hard to compare levels or even trends of income inequality across countries.

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 approach adopted by LIS overcomes most, but not all, of the problems of making comparisons across countries that plagued earlier studies (Smeeding, 2002).

This section summarises the evidence on cross national comparisons of annual disposable income inequality over 29 nations based on empirical evidence from Gottschalk and Smeeding (1997 and 1998), and Smeeding (2000), and others using data from the LIS. We summarise empirical results of the levels of income inequality across countries around 1997. 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 Gini coefficients 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 Kingdom, Estonia, United States, Russia, and Mexico, while the Slovak Republic, Benelux, Slovenia, and Nordic countries are the most egalitarian nations.

Figure 1 Summary measures of the income distribution (adjusted disposable household income)



Note: Data refer to adjusted disposable income based on data from LIS; Gini coefficients are based on income which are bottom-coded at 1 percent of median disposable income and top coded at 10 times the median disposable income.

Source: LIS Key Figures (<http://www.lisproject.org/keyfigures.htm>, download 16-03-2004), with the exception for Japan (source: Smeeding, 2000, p. 211)

Other inequality indices would alter the country-ranking to some extent (see Annex A for details). However, the relative inequality patterns found here correspond roughly to the results found in Atkinson et al. (1995), and Smeeding (2002), which use earlier years' LIS data in most cases.⁴

⁴ 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. If the Lorenz curve that represents a distribution lies entirely inside

We see that a majority of the countries have Gini coefficients in the range of 0.24 to 0.30. Spain, Canada, Switzerland, Australia, Japan, Ireland, Italy, Israel and the United Kingdom have somewhat higher coefficients (0.30 to 0.35), while four other countries, including the United States, have the highest coefficients (above 0.35), indicating the highest degree of inequality. Figure 1 indicates that a wide range of inequality exists across developed nations, with the nation with the highest inequality coefficient (Mexico) over twice as high as the nation with the lowest coefficient (the Slovak Republic).

3 Social protection and income inequality across countries

Most nations have designed systems of social protection to shield their citizens against the risk of a fall in economic status due to unemployment, divorce, disability, retirement, and death of a spouse. We briefly review the growing literature on redistribution by governments (and/or social policy) and income inequality. The relationship between economic inequality and social spending is one of mutual interdependency in which it is crucial to distinguish specific types of social spending, which are affected by different aspects of inequality (Swabisch et al., 2003). Smeeding (2002) showed that social policies, wage distributions, time worked, social and labor market institutions and demographic differences all have some influence on why there are large differences in inequality among rich nations at any point in time. However, in this paper we focus on social protection systems only.

The substantial differences in income inequality across welfare democracies are well documented (e.g. Föster, 2000; Atkinson et al., 1995; Gottschalk and Smeeding, 1997).⁵ These differences are often attributed to the institutional structure of social policies. Föster's empirical analyses showed that in most developed countries, between one third and 45 percent of all public transfers goes to the lower incomes.⁶ In general, tax/transfer systems as a whole reduce market-income inequality in all OECD countries. Moreover, cross-country correlations show a rather strong negative relationship between social expenditures and income inequality (e.g. Cantillon et al., 2002, and Atkinson, 2000). Countries that spend less on their safety nets suffer higher levels of inequality, and vice versa. Korpi and Palme (1998), for example, showed that welfare states with generous social insurance programs redistribute economic resources more effectively and have a more equal distribution of incomes than welfare states with less generous insurance schemes.

Usually the impact of social policy on the distributions of income is calculated in line with the work of Musgrave, Case and Leonard (1974), i.e. statutory or budget incidence analysis.⁷ That is, important issues of tax/transfer shifting and behavioural responses are ignored.⁸ The measure of the redistributive impact

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. Gini, and Atkinson Indices) will rank the distributions uniformly. However, if Lorenz curves do cross, then the way in which different inequality measures rank two different distributions depends on the importance each gives to different parts of the distribution (Atkinson, 1970). Several measures may therefore value and rank one and the same income distribution differently (Champernowne, 1974). See also Bazen and Moyes (2003) on the international comparisons of income distributions.

5 An important development has been the Luxembourg Income Study in which micro data-sets from countries have been harmonised. Consequently it is possible to study income inequality across countries. Föster (2000) summarises trends and driving factors in income distribution and poverty on the basis of a harmonised questionnaire of OECD Member Countries (i.e. distribution indicators derived from national micro-economic data).

6 Figures refer to the distribution of non-pension transfers; the lower income groups refer to the three bottom deciles of the working-age population.

7 See e.g. Ervik (1998) for a comparative analysis of taxes, tax expenditure transfers and direct transfers in eight countries.

8 See for a critical survey of efforts to measure budget incidence by Smolensky et al. (1987). However, models that include e.g. behavioral links are beyond the scope of existing empirical work (Gottschalk and Smeeding, 1998, p. 3). Therefore, researchers have restricted themselves largely to accounting exercises which decompose changes in overall inequality into a set of components.

of social protection on inequality is straightforwardly based on formulas developed by Kakwani (1986) and Ringen (1991):

$$\text{Redistribution by government} = (\text{primary income} - \text{disposable income}) / (\text{primary income}) \times 100$$

This formula is also used in Table 1 to estimate the reduction in inequality caused by social protection, 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. Table 1 shows the Gini income inequality before and after taxes/transfers and the inequality reduction coefficient in ten countries in the mid-1990s for households where the head is between 25-59 years. The figures in Table 1 give some evidence: the Scandinavian and Continental European countries achieve a greater redistribution of economic resources than do the English-speaking countries. It turns out that the most Anglo-Saxon societies are in fact those with the least equality, while the non-English-speaking European countries have the least degree of inequality.

Table 1 Disposable income inequality in ten welfare states, around 1995: Gini coefficient before and after taxes/transfers

| | Gini before taxes/transfers | Gini after taxes/transfers | redistribution |
|----------------|-----------------------------|----------------------------|----------------|
| Belgium | 0.355 | 0.217 | 38.9 |
| Canada | 0.389 | 0.288 | 25.9 |
| Denmark | 0.360 | 0.240 | 33.2 |
| Finland | 0.365 | 0.257 | 29.7 |
| Germany | 0.390 | 0.293 | 25.0 |
| Netherlands | 0.380 | 0.267 | 29.9 |
| Norway | 0.328 | 0.219 | 33.0 |
| Sweden | 0.391 | 0.205 | 47.5 |
| United Kingdom | 0.470 | 0.347 | 26.2 |
| United States | 0.419 | 0.350 | 16.4 |
| Average | 0.385 | 0.268 | 30.6 |

Source: Ferrarini and Nelson (2002)

However, the results in Table 1 do not show the redistributive impact of separate parts of social protection systems. Recent literature suggests that the determination of the relationship between social expenditures and inequality should be carried out on a disaggregated basis (see Swabisch et al., 2003). Ferrarini and Nelson (2002) showed that only a limited number of studies have attempted to specify the link between specific social transfer programs and income inequality. Thereby, the knowledge about the institutional structures that produce certain distributive outcomes is limited. Especially earlier studies that decompose inequality into specific transfers do not pay sufficient attention to the problem of taxation of social insurance. To gain a deeper understanding of the redistributive mechanisms of the welfare state it is necessary to disaggregate the social transfer system into program specific components (see e.g. Caminada and Goudswaard, 2001 and 2002).

Although one new and appealing feature in this literature is the determination of the relationship between social expenditures and inequality on a disaggregated basis, we found no literature focussed on the distibutional impact of *private* social benefits. It is plausible that the redistributive effects of transfers are weaker in countries where programmes mostly rely on earnings-related schemes compared to countries with mostly (public) means-tested provisions of transfers. Private insurance schemes are actuarially fair as a rule. Most private insurances are not earnings-related. Individual private pension insurances, for

example, have a defined contribution character, and therefore do not contain any elements of (ex ante) income redistribution. Private schemes can also have earnings-related benefits. It is sometimes argued that earnings-related social insurance benefits only reproduce inequalities in market income and therefore do not redistribute economic resources between income segments, in case benefits are perfectly earnings-related and the risk of being in receipt of benefit is equally distributed in the population. So, in that case a higher share of private social protection will not have any (partial) effect on the distribution of income. However, private earnings-related schemes may not be actuarially fair and may contain elements of solidarity. This is often the case when (supplementary) private schemes are negotiated by social partners in collective labour contracts. These schemes are mandatory for (a group of) workers. Defined benefit pension schemes, for example, generally redistribute resources both within generations (for instance through redistributive elements such as thresholds or ceilings) and across generations (risk sharing, backservice). Defined benefit systems for early retirement tend to redistribute to members who leave before the official retirement age from those who stay. In fact, as we will mention in the next section, private *social* programs by definition contain elements of interpersonal redistribution.

Also, tax advantages (to households or to employers) can be used to stimulate the provision of private benefits. This is often the case in supplementary pension programs, where contributions are tax exempt. The fiscal advantages related to, for example, supplementary private pension plans are positively related to income levels in most countries. In general, as Ferrarini and Nelson (2002, p. 14-15) showed, social insurance is less equalising after taxation in all countries.

At this stage the distributional impact of taking account for private social schemes in a cross-country analysis is not fully clear. Private arrangements will certainly have less redistributive effects compared to public programs. In addition, it is plausible that mainly higher income groups will make use of private social schemes (Casey and Yamada, 2003). Considering also that private schemes often have favourable tax treatment (deductibility of contributions), which benefits the rich, it is possible that private social expenditure has a positive effect on income inequality. In other words, we expect income inequality to be relatively high (low) in countries where the share of private arrangement in the total social benefits is relatively high (low).

4 Public and private social expenditures

For his OECD-study, Adema (2001) has developed indicators that aim to measure what governments really devote to social spending, *net public social expenditure*, and what part of an economy's domestic production recipients of social benefits draw on, *net total social expenditure*. This requires capturing private social benefits and the impact of tax systems on social effort.

Adema (2001, p. 9) defines private programs as 'social' when they serve a social purpose and contain an element of interpersonal redistribution. However, the demarcation of private social benefits is less straightforward than for public benefits. Private social programs can be mandatory or voluntary. Mandatory private benefits are often incapacity related. In several countries employers are obliged to provide sickness benefits.⁹ In some countries public disability benefits (and sometimes unemployment benefits) can be supplemented by private benefits with mandatory contributions, agreed upon in collective negotiations between employers and employees.¹⁰ A number of EU-member states have supplementary

9 In the Netherlands all sickness benefits are paid by employers since the privatisation of the sickness benefit program.

10 Again, the Netherlands is a good example. Occupational injuries and accidents ('risque professionnel') can also be covered by mandatory private insurances.

employment-based pension plans with mandatory contributions, based on a funding system. Voluntary private social security covers a wide range of programs, of which private pension plans and private social health insurance constitute major components. But again, there has to be interpersonal redistribution involved. Thus, for voluntary private plans to be labelled as 'social', they need to be fiscally advantaged, or contain some legal stipulation. Purely private insurance programs are excluded. Finally, it should be mentioned that the OECD-data only refer to institutional arrangements that are close substitutes to public programs. Consequently, only benefits provided by institutions are included, while transfers between or within households, albeit of a social nature, are not.

The impact of the tax system on the social effort is threefold. In some countries cash benefits are taxable as a rule, in other countries they are not. In the former countries net social effort is less than suggested by gross spending indicators. Indirect taxation of consumption by benefit recipients is another factor that may blur the picture. When indirect taxes are higher, benefit recipients have less effective purchasing power. And thirdly, the tax system can be used for social purposes. Tax deductions (e.g. family tax allowances) replace direct expenditures in some cases. The Earned Income Tax Credit in the United States is a good example of a tax break, which has the features of a social protection program. Also, tax advantages (to households or to employers) can be used to stimulate the provision of private benefits. This is often the case in supplementary pension programs, where contributions are tax exempt.

Table 2 presents figures on the net social expenditure as % GDP for 1997. The picture shows an international comparison of all countries for which information is available on net social spending indicators: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, Germany, Ireland, Italy, Japan, Korea, the Netherlands, New Zealand, Norway, Sweden, the United Kingdom and the United States. Most social support is publicly provided. In the European countries the share of public social benefits in total social expenditures exceeds 90 percent, except in the Netherlands and the United Kingdom. However, the role of private arrangements of varying nature in providing close substitutes to public social protection expenditure is considerable in some OECD countries: 30 percent of all social benefits in the US and almost half of all social benefits in Korea.

Table 2 Net social expenditure (% GDP), 1997 (ranked according net social expenditure)

| Country | Gross public social expenditure (2) | Gross total social expenditure (3) | Net public social expenditure (4) | Net total social expenditure (5) | Share net private expenditure (6)=[(5)-(4)]/(5) |
|---------------------------------|--|---------------------------------------|--------------------------------------|-------------------------------------|--|
| Sweden | 31.8 | 34.8 | 25.4 | 27.3 | 7 |
| Germany | 26.4 | 28.6 | 24.6 | 26.1 | 6 |
| Belgium | 27.2 | 29.5 | 23.5 | 25.4 | 7 |
| Denmark | 30.7 | 32.0 | 22.9 | 23.5 | 3 |
| Italy | 26.4 | 27.8 | 21.6 | 22.7 | 5 |
| Finland | 28.7 | 30.0 | 21.4 | 22.1 | 3 |
| Austria | 25.4 | 27.0 | 20.9 | 22.0 | 5 |
| United States | 14.7 | 22.9 | 19.2 | 21.8 | 30 |
| United Kingdom | 21.2 | 24.9 | 15.3 | 21.8 | 12 |
| Norway | 26.1 | 27.2 | 21.1 | 21.7 | 3 |
| Netherlands | 24.2 | 29.1 | 18.2 | 21.5 | 15 |
| Australia | 17.4 | 21.7 | 16.6 | 20.4 | 19 |
| Canada | 17.9 | 22.1 | 16.2 | 18.9 | 14 |
| New Zealand | 20.7 | 21.3 | 17.0 | 17.5 | 3 |
| Czech Republic | 19.0 | 19.4 | 17.2 | 17.2 | 0 |
| Ireland | 17.6 | 19.2 | 15.4 | 16.5 | 7 |
| Japan | 14.2 | 15.1 | 13.9 | 14.7 | 15 |
| Korea | 4.3 | 8.4 | 4.4 | 8.3 | 47 |
| <i>Average</i> | <i>21.9</i> | <i>24.5</i> | <i>18.6</i> | <i>20.5</i> | <i>9.4</i> |
| <i>Coefficient of variation</i> | <i>0.316</i> | <i>0.263</i> | <i>0.265</i> | <i>0.220</i> | <i>1.242</i> |
| <i>Standard deviation</i> | <i>6.91</i> | <i>6.45</i> | <i>4.93</i> | <i>4.52</i> | <i>11.64</i> |
| <i>Average EU Members</i> | <i>26.0</i> | <i>28.2</i> | <i>21.3</i> | <i>22.8</i> | <i>6.5</i> |
| <i>Coefficient of variation</i> | <i>0.155</i> | <i>0.141</i> | <i>0.136</i> | <i>0.127</i> | <i>0.602</i> |
| <i>Standard deviation</i> | <i>4.02</i> | <i>3.98</i> | <i>2.90</i> | <i>2.88</i> | <i>3.94</i> |

Note: Social expenditures include the following areas: old-age cash benefits; disability cash benefits; occupational injury and disease; sickness benefits; services for the elderly and disabled; survivors; family cash benefits; family services; active labour market policies (ALMPs); unemployment compensation; housing benefits; public health expenditure; and other contingencies e.g., cash benefits to those on low income.

We relate social spending indicators to GDP at market prices rather than GDP at factor cost (as Adema does), because GDP at market prices is the most frequently used indicator of the size of an economy.

Source: Adema (2001), and own calculations

The data indicate that accounting for private social benefits has an equalising effect on levels of social effort across countries. We calculated the standard deviation and the coefficient of variation.¹¹ Both measures show that the variation of social expenditure decreases in case private benefits are taken into account (compare column 2 and column 3, or column 4 and column 5). This suggests complementarity between public and private social expenditures. Apparently, preferences for the level of protection do not differ as much between countries as often suggested. Lower public protection may induce private social

¹¹ A property of the standard deviation is that its value rises with the average value of the data set to which it is applied. To account for this, we also use the so-called coefficient of variation, defined as the standard deviation divided by the value of the average of the corresponding data set.

arrangements of different nature. But a shift from public to private provision of social protection can also be an explicit policy objective, to alleviate public budgets, or to strengthen incentives in the system. For example the privatisation of the sickness benefit program in the Netherlands was directed at increasing the incentives for employers to reduce the number of beneficiaries.

Accounting for taxes substantially reduces the average expenditure ratio (compare column 3 and 5). Especially the Nordic countries and the Netherlands put high tax levies on social benefits and ensuing consumption. This effect clearly outweighs the effect of tax breaks for social purposes, that increase social expenditure. The impact of the tax system on social expenditure also has an equalising effect on levels of social effort across the eighteen countries. The coefficient of variation drops by 16 percent, while the standard deviation even drops by 30 percent. Especially within the EU Member-countries (10 EU countries are included) differences in total net spending levels are small. Perhaps surprisingly, the net expenditure ratio of the US is higher than the OECD average (for the countries included), and only one percent point of GDP lower than the EU average (for the EU countries included) .

Obviously, this straightforward analysis is too simple to draw far-reaching conclusions. The evidence presented is only descriptive and does not explain differences in the public/private mix in social protection systems in the European Union and in the OECD. It should also be noted that differences across countries in expenditure ratios do not (always) reflect social policy. They may also reflect differences in unemployment rates or demographic structure across countries. Expenditure ratios can thus only be considered as rough indicators of welfare state policies.

5 The link between public/private social protection and income inequality

Cross-country differences in the public/private mix in social protection may have distributional effects. Obviously, countries differ in the extent to which social policy goals are pursued through the tax system and/or in the role of private provision within social protection systems. We observe that national preferences for social protection differ substantially across countries. Especially Anglo-Saxon countries do not seem to be prepared to sustain the high protection levels prevailing in other countries with the same level of income. This may be an expression of cultural differences within the group of OECD countries. These differences could point to variance in the re-distributional nature of social systems as well. Private social programmes may generate a more limited re-distribution of resources than public ones, and tax advantages towards private pension and health plans are more likely to benefit the rich. Private employment-related social benefits mostly re-allocate income between the (formerly) employed population. The same holds for fiscal advantages related to, for example, supplementary private pension plans. In general, we do expect that private schemes will generate less income redistribution than public programs (see section 3).

We performed a cross-country analysis of the relationship between public and private social expenditures and the income distribution. Obviously, this analysis is not very sophisticated. The material presented is only descriptive and does not explain the household income distribution. Such an analysis should ideally be based on a theory, which would have to address at least the following cross-national differences (*cf.* Gottschalk and Smeeding, 2000, p. 263): differences in labour markets that affect earnings of individual household members; difference in 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 labour market decisions; and differences across countries in tax and transfers policies that not only affect family income directly, but also may affect work and investment decisions. Such a comprehensive approach is far beyond the scope of this paper.

Table 3 illustrates a cross national comparison of annual disposable income inequality for sixteen wealthy nations also listed in Table 2.¹² Countries are listed in order of their Gini coefficient of adjusted disposable household income. The highest inequality is found in the United States, while Nordic and Benelux countries are the most equal nations.

Table 3 Social protection and summary measure of the income distribution

| Country | Year | Gini Coefficient | Net Public and Private Social Expenditure (% GDP), 1997 | |
|----------------------|------|------------------|---|----------------|
| | | | <i>public</i> | <i>private</i> |
| average | | 0.286 | 19.6 | 1.9 |
| above-average | | | | |
| United States | 2000 | 0.368 | 15.3 | 6.5 |
| United Kingdom | 1999 | 0.345 | 19.2 | 2.6 |
| Italy | 2000 | 0.333 | 21.6 | 1.1 |
| Ireland | 1996 | 0.325 | 15.4 | 1.1 |
| Japan | 1992 | 0.315 | 13.9 | 0.8 |
| Australia | 1994 | 0.311 | 16.6 | 3.8 |
| Canada | 1997 | 0.291 | 16.2 | 3.7 |
| below-average | | | | |
| Austria | 1997 | 0.266 | 20.9 | 1.1 |
| Czech Republic | 1996 | 0.259 | 17.2 | 0.0 |
| Denmark | 1997 | 0.257 | 22.9 | 0.6 |
| Germany | 2000 | 0.252 | 24.6 | 1.5 |
| Sweden | 2000 | 0.252 | 25.4 | 1.9 |
| Norway | 2000 | 0.251 | 21.1 | 0.6 |
| Belgium | 1997 | 0.250 | 23.5 | 1.9 |
| Netherlands | 1999 | 0.248 | 18.2 | 3.3 |
| Finland | 2000 | 0.247 | 21.4 | 0.7 |

Source: Adema (2001) and LIS Key Figures (<http://www.lisproject.org/keyfigures.htm>, download 16-03-2004), with exception of Japan (Smeeding, 2000, p. 211), and own calculations

Seven countries combine an above-average level of net *public* social expenditure (% GDP) with a below-average level in income inequality; six other countries combine relatively high levels of inequality with relatively low levels of *public* social spending. Moreover, it appears that some countries combine an above-average level of inequality with an relatively small *share* of public social expenditure in total net social expenditure, especially the United States, the United Kingdom, Australia, and Canada. These are indications that support our hypothesis. For the group of countries with relatively low levels of inequality, we would expect the opposite. Indeed, the *share* of public social expenditure in total net social expenditure is relatively high in Sweden, Finland, Norway, Belgium, Denmark, Czech Republic, Germany, and Austria.

¹² For two countries listed in Table 2 (New Zealand and Korea) we do not have figures for the level of income inequality around 1997. Therefore, we can not include New Zealand and Korea in our empirical analysis.

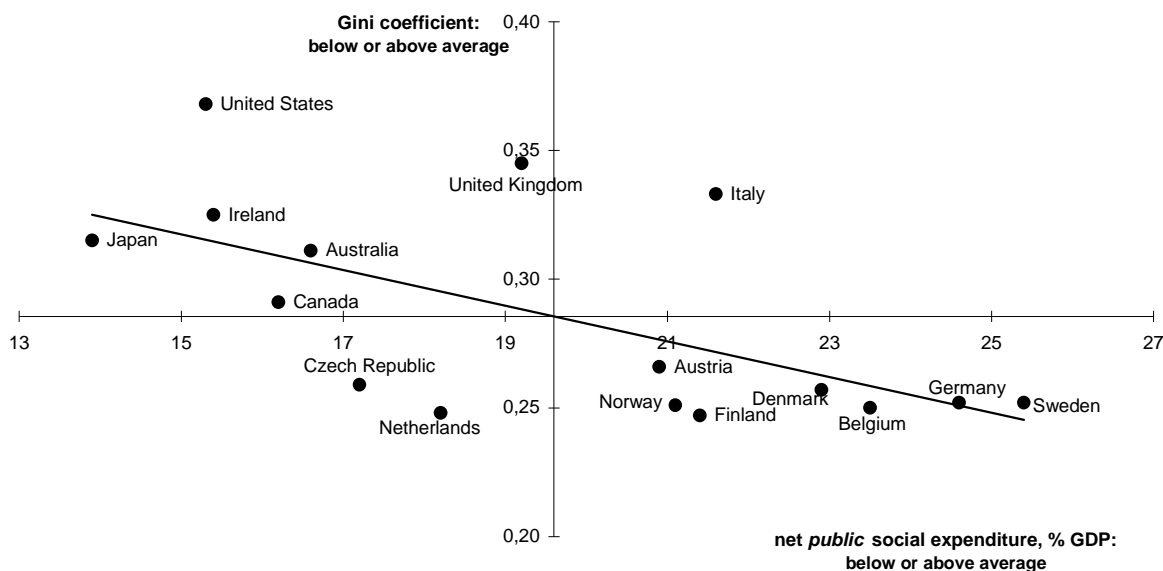
For a group of countries, however, the picture seems less clear: Italy, Ireland, Japan, and the Netherlands.¹³

In Figure 2, we have plotted the average level of net *public* social expenditure (% GDP) and the average level of the Gini coefficient for countries, where both data-items are available. Both averages are represented by the cross of both axes: 19.6 percent for net *public* expenditures, and 0.286 for Gini. Several countries show levels in social security transfers above this average. Other countries combine a below-average level of net *public* social expenditure (% GDP) with a above-average level in income inequality. We find a pretty good fit of a OLS-regression with the level of the Gini and the level of net *public* social spending (a similar regression is done by Gouyette and Pestieau, 1999); see Figure 2 (panel a). Using net *public* expenditure as dependent variable produces the expected negative sign, while the coefficient is statistically significant. Obviously, net public social security transfers are well-targeted towards the poor.

The picture alters when we take *private* social security expenditures into account in our analysis; see Figure 2 (panel b). A negative relationship between net *private* social expenditures and inequality can not be found. This is confirmed by a simple regression analysis reported in Table 4. The estimated coefficient of net *private* expenditure-variable is significant, and positive. Again, these are indications that support our hypothesis that public and private arrangements in social protection do have opposite distributional effects. This positive (rather than a negative) sign may reflect that higher income groups find it easier to opt in to private social programs.

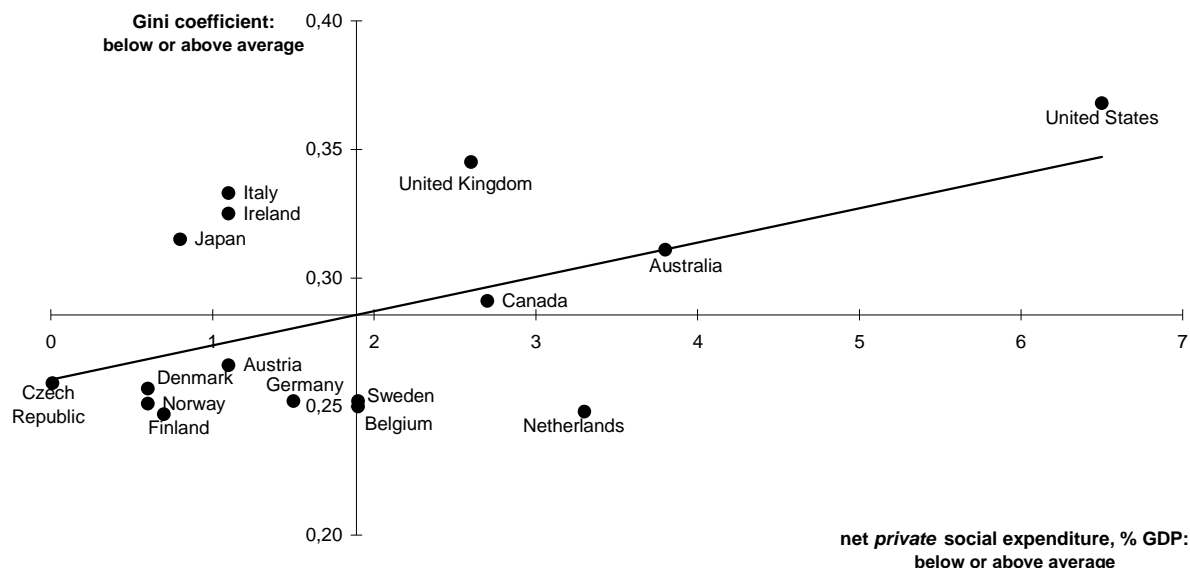
Figure 2 Cross country differences in social expenditures and Gini coefficient, around 1997

(a) Net public social expenditures



13 Caminada and Goudswaard (2001) studied the cross-country-relationship between *changes* in inequality and *changes* in welfare state policies in the period 1980-1997. They found several countries that combined an above-average rise in inequality with a reduction in the generosity of the welfare system. For example, the Netherlands combined a relative sharp increase in income inequality with a quite fundamental reform of the welfare state; almost 40 percent of the increase in inequality in the period 1981-1997 can be attributed to income transfers. Another important force was a more unequal distribution of market income. Their budget incidence analysis thus indicates that social security reforms have had an important impact on increasing inequality in the Netherlands. However, after the social security reforms, both the generosity of the Dutch income transfer system and the level of income equality are still quite high in an international perspective.

(b) Net private social expenditures



Source: see below Table 3; and own calculations

Other inequality indices do not alter the results. Table 4 reports several regressions with various income inequality measures (see annex B for more details). In all cases, we find a pretty good fit of OLS-regressions with the level of the income inequality measures and the levels of both net public *and* net private social spending. The estimated coefficients of net public *and* net private expenditure-variables are significant. However, public and private arrangements in social protection do have opposite distributional effects (opposite signs).

Notice that *private* arrangements mitigate the impact of *public* social effort on income inequality to a large extent. In fact, we do not find a significant impact of net *total* social spending on income inequality in our cross-country analysis. Our OLS-regression results show that the estimated coefficient of the net *total* expenditure-variable is – in all cases - negative, but not significant. This result may come as a surprise, because the share of *private* arrangements in *total* net social expenditures is rather small across countries (on average 9.4 percent). As a result of the divergent effects of net public social expenditure versus net private social expenditure, the relationship between total social expenditures and income inequality across 16 wealthy countries appears to be statistically trivial.

Table 4 Impact of net social expenditure (% GDP) on income inequality around 1997

| <i>Dependent variable</i> | Intercept | Net public social expenditure | Net private social expenditure | Net total social expenditure | adj. R ² |
|-----------------------------------|-------------------|-------------------------------|--------------------------------|------------------------------|---------------------|
| Gini Coefficient | 0.040 (0.22) | -0.460* (-3.16) | 0.033* (1.78) | | 0.426 |
| | -0.112 (-0.41) | | | -0.329 (-1.61) | 0.095 |
| Decile Ratios P90/P10 | 1.440 (5.54) | -0.690* (-3.42) | 0.063* (2.41) | | 0.511 |
| | 1.142 (2.74) | | | -0.441 (-1.41) | 0.061 |
| Atkinson Index ($\epsilon=0.5$) | -0.160 (-0.46) | -0.783* (-2.88) | 0.067* (1.92) | | 0.420 |
| | -0.502 (-0.98) | | | -0.498 (-1.29) | 0.043 |
| Atkinson Index ($\epsilon=1.0$) | 0.062 (0.19) | -0.717* (-2.80) | 0.080* (2.43) | | 0.461 |
| | -0.331 (-0.65) | | | -0.395 (-1.03) | 0.004 |

Note: Logarithmic OLS-regression; t-statistics in parentheses.

* significant at 95%-level

Source: see below Table 3, and own calculations

6 Conclusions

Calculations with OECD-data indicate that accounting for private social benefits and taxes has an equalising effect on social effort across countries. This suggest complementarity between public and private social expenditures on an aggregate level. But what about the distributional impact of public versus private arrangements? We performed a cross-county analysis, which is obviously not very sophisticated. We analysed this question empirically on a cross-country basis. Such an analysis should ideally be based on a theory, which would have to address several cross-national differences explaining the household income distribution. Such a comprehensive approach, however, is far beyond the scope of this paper.

Our material nevertheless does support a divergent relationship between income inequality and public versus private social expenditures across countries. Accounting for private social arrangements (and for the impact of the tax systems) matters as far as the distributional impact of the social protection is concerned. We find a negative relationship between net public social expenditure and income inequality, and a positive relationship between net private social expenditure and income inequality. The impact of total expenditures (public and private) on income inequality across 16 wealthy countries appears to be statistically trivial. As a result, changes in the public/private mix in the provision of social protection may indeed affect the redistributive impact of the welfare state.

References

- Adema, W. (2001), 'Net Social Expenditure: 2nd edition', *Labour Market and Social Policy - Occasional Papers* no. 52, Paris: OECD.
- Atkinson, A.B. (1970), 'On the Measurement of Inequality', *Journal of Economic Theory* 2, p. 244-263.
- Atkinson, A.B. (2000), 'The Changing Distribution of Income: Evidence and Explanation', *German Economic Review* 1 (1), p. 3-18.
- 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., and A. Brandolini (2001), 'Promise and Pitfalls in the Use of Secondary Data-Sets: Income Inequality in OECD Countries as a Case Study', *Journal of Economic Literature* 39(3) (September), p. 771-800.
- 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: OECD.
- Bazen, S., and P. Moyes (2003), 'International Comparisons of Income Distribution', *Luxembourg Income Study Working Paper Series* 341, Luxembourg.
- Caminada, K., and K.P. Goudswaard (2001), 'International Trends in Income Inequality and Social Policy', *International Tax and Public Finance* 8 (4), p. 395-415.
- Caminada, K., and K.P. Goudswaard (2002), 'Income Distribution and Social Security in an OECD Perspective', in: Roland Sigg and Christina Behrendt (eds.) *Social Security in the Global Village*, International Social Security Series, Volume 8, Transaction Publishers, New Brunswick / London, p. 163-188.
- Cantillon, B., I. Marx, and K. van den Bosch (2002), 'The puzzle of egalitarianism. About the relationships between employment, wage inequality, social expenditures and poverty', *CSB-Berichten* (Centrum voor Sociaal Beleid UFSIA), Antwerp, Belgium.
- Casey, B.H. and A. Yamada (2002), 'The Public-Private Mix of Retirement Income in Nine OECD Countries: Some Evidence from Micro-data and an Exploration of its Implications', *Luxembourg Income Study Working Paper Series* 311, Luxembourg.
- Champernowne, D.G. (1974), 'A Comparison of Measures of Inequality of Income Distribution', *Economic Journal* 84, p. 787-816.
- Cornelisse, P. A., and K.P. Goudswaard (2002), 'On the convergence of social protection systems in the European Union', *International Social Security Review*, Vol. 55, 3, p. 3-17.
- Deiningner, K., and L. Squire (1996), 'A New Data Set Measuring Income Inequality', *The World Bank Economic Review* 10 (3) (September), p. 565-592.
- Deiningner, K., and L. Squire (2002), 'Measuring Income Inequality: A New Database', Economic Growth Research, The World Bank Group.
- Ervik, R. (1998), 'The Redistributive Aim of Social Policy. A Comparative Analysis of Taxes, Tax Expenditure Transfers and Direct Transfers in Eight Countries', *Luxembourg Income Study Working Paper Series* 184, Luxembourg.
- Ferrarini, T., and K. Nelson (2002), 'The Impact of Taxation on the Equalising Effect of Social Insurance to Income Inequality: A Comparative Analysis of Ten Welfare States', *Luxembourg Income Study Working Paper Series* 327, Luxembourg.
- Ferrarini, T., and K. Nelson (2003), 'Taxation of Social Insurance and Redistribution: A Comparative Analysis of Ten Welfare States', *Journal of European Social Policy* 13(1), p. 21-33.
- 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.

- Gottschalk, P., and T.M. Smeeding (1997), 'Cross-National Comparisons of Earnings and Income Inequality' *Journal of Economic Literature* 35 (June), p. 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.M. Smeeding (2000), 'Empirical Evidence on Income Inequality in Industrialized Countries', in: A.B. Atkinson and F. Bourguignon (eds.), *Handbook of Income Distribution*, New York: Elsevier-North Holland Publishers, Vol. 1, p. 262-307.
- Gottschalk, P., B. Gustafsson, and E. Palmer (eds.) (1997), *Changing Patterns in the Distribution of Economic Welfare*, Cambridge University Press, Cambridge.
- Gouyette, C., and P. Pestieau, (1999), 'Efficiency of the Welfare State', *Kyklos* 52 (4), 1999, p. 537-553.
- Gustafsson, B., and M. Johansson (1997), 'In Search for a Smoking Gun: What Makes Income Inequality Vary Over Time in Different Countries?', *Luxembourg Income Study Working Paper Series* 172, Luxembourg.
- Kakwani, N.C. (1986), *Analyzing Redistribution Policies*, Cambridge University Press, Cambridge.
- Korpi, W. and J. Palme (1998), 'The Paradox of Redistribution and Strategies of Equality: Welfare Institutions, Inequality and Poverty in the Western Countries', *American Sociological Review*, 63(5), p. 661-687.
- Luxembourg Income Study, 'LIS Key Figures' and 'LIS Information Guide - Revised February 1998', *Luxembourg Income Study Working Paper Series* no. 7, Luxembourg, 1998. LIS-website <http://www.lisproject.org/>.
- Musgrave, R.A., K.E. Case, and H.B. Leonard (1974), 'The Distribution of Fiscal Burdens and Benefits' *Public Finance Quarterly* (2), July, p. 259-311.
- OECD (2002), *Benefits and Wages. OECD Indicators*, Edition 2002, Paris.
- Ringen, S. (1991), 'Households, standard of living and inequality', *Review of Income and Wealth* 37, p. 1-13.
- 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: Springer-Verlag, p. 205-224.
- Smeeding, T. (2002), 'Globalization, Inequality and the Rich Countries of the G-20: Evidence from the Luxembourg Income Study (LIS)', *Luxembourg Income Study Working Paper Series* 320, Luxembourg.
- 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.
- Swabisch, J., T. Smeeding, and L. Osberg (2003), 'Income Distribution and Social Expenditures: A Cross-National Perspective', *Luxembourg Income Study Working Paper Series* 350, Luxembourg.

Annex A Comparative database: availability data

| Countries | <i>database 1</i> | <i>database 2</i> | <i>database 3</i> | <i>database 4</i> | <i>database 5</i> | qualified |
|--------------------|---|--|--|---|---|-----------|
| | gross + net social expenditure as % of GDP | social transfers as % of GNP data set OECD | net social expenditure as % of GDP | income inequality measures (several) | income inequality measures (several) | |
| | 1993, 1995, 1997 | 1960-1999 | 1980-1996 | around 1997 | around 1995 | |
| | Adema | Economic Outlook | OECD / SOCX | LIS | LIS / Smeeding | |
| 1 Australia | x | x | x | x | x | yes |
| 2 Austria | x | x | x | x | n.a. | yes |
| 3 Belgium | x | x | x | x | x | yes |
| 4 Canada | x | x | x | x | x | yes |
| 5 Czech Republic | x | n.a. | x | x | n.a. | yes |
| 6 Denmark | x | x | x | x | x | yes |
| 7 Estonia | n.a. | n.a. | n.a. | x | n.a. | no |
| 8 Finland | x | x | x | x | x | yes |
| 9 France | n.a. | x | x | x | x | no |
| 10 Germany | x | x | x | x | x | yes |
| 11 Greece | n.a. | x | x | n.a. | n.a. | no |
| 12 Hungary | n.a. | n.a. | x | x | n.a. | no |
| 13 Iceland | n.a. | n.a. | n.a. | n.a. | n.a. | no |
| 14 Ireland | x | x | x | x | x | yes |
| 15 Israel | n.a. | n.a. | x | x | x | no |
| 16 Italy | x | x | x | x | x | yes |
| 17 Japan | x | x | x | n.a. | x | yes |
| 18 Korea | x | n.a. | x | n.a. | n.a. | no |
| 19 Luxembourg | n.a. | n.a. | x | x | x | no |
| 20 Mexico | n.a. | n.a. | x | x | n.a. | no |
| 21 Netherlands | x | x | x | x | x | yes |
| 22 New Zealand | x | n.a. | x | n.a. | n.a. | no |
| 23 Norway | x | x | x | x | x | yes |
| 24 Poland | n.a. | n.a. | n.a. | x | n.a. | no |
| 25 Portugal | n.a. | x | x | n.a. | n.a. | no |
| 26 Romania | n.a. | n.a. | n.a. | x | n.a. | no |
| 27 Russia | n.a. | n.a. | n.a. | x | n.a. | no |
| 28 Slovak Republic | n.a. | n.a. | n.a. | x | n.a. | no |
| 29 Slovenia | n.a. | n.a. | n.a. | x | n.a. | no |
| 30 Spain | n.a. | x | x | x | x | no |
| 31 Sweden | x | x | x | x | x | yes |
| 32 Switzerland | n.a. | x | x | x | x | no |
| 33 Taiwan | n.a. | n.a. | n.a. | x | x | no |
| 34 United Kingdom | x | x | x | x | x | yes |
| 35 United States | x | x | x | x | x | yes |
| coverage | 18 | 20 | 27 | 29 | 20 | 16 |

sources:

database 1: Adema (2001); Net Social Expenditure, second edition

database 2: Data Set OECD Economic Outlook (December 1998)

database 3: OECD, Social Expenditure Database SOCX (download 11-1-2001)

database 4: LIS Key Figures (<http://www.lisproject.org/keyfigures.htm>, download 16-03-2004)

database 5: Smeeding (2000, figure 1, p. 211)

Data: Net Social Expenditure (% GDP), 1997 : selected countries (16)

| | Gross public social expenditure | Gross private social expenditure | Gross total social expenditure | Net public social expenditure | Net private social expenditure | Net total social expenditure |
|------------------------------|---------------------------------------|--|--------------------------------------|-------------------------------------|--------------------------------------|------------------------------------|
| selected countries | | | | | | |
| Australia | 17.4 | 4.3 | 21.7 | 16.6 | 3.8 | 20.4 |
| Austria | 25.4 | 2.0 | 27.4 | 20.9 | 1.1 | 22.0 |
| Belgium | 27.2 | 2.3 | 29.5 | 23.5 | 1.9 | 25.4 |
| Canada | 17.9 | 4.2 | 22.1 | 16.2 | 2.7 | 18.9 |
| Czech Republic | 19.0 | 0.4 | 19.4 | 17.2 | 0.0 | 17.2 |
| Denmark | 30.7 | 1.3 | 32.0 | 22.9 | 0.6 | 23.5 |
| Finland | 28.7 | 1.3 | 30.0 | 21.4 | 0.7 | 22.1 |
| Germany | 26.4 | 2.2 | 28.6 | 24.6 | 1.5 | 26.1 |
| Ireland | 17.6 | 1.6 | 19.2 | 15.4 | 1.1 | 16.5 |
| Italy | 26.4 | 1.4 | 27.8 | 21.6 | 1.1 | 22.7 |
| Japan | 14.2 | 0.9 | 15.1 | 13.9 | 0.8 | 14.7 |
| Netherlands | 24.2 | 4.9 | 29.1 | 18.2 | 3.3 | 21.5 |
| Norway | 26.1 | 1.1 | 27.2 | 21.1 | 0.6 | 21.7 |
| Sweden | 31.8 | 3.0 | 34.8 | 25.4 | 1.9 | 27.3 |
| United Kingdom | 21.2 | 3.7 | 24.9 | 19.2 | 2.6 | 21.8 |
| United States | 14.7 | 8.2 | 22.9 | 15.3 | 6.5 | 21.8 |
| <i>average</i> | <i>23.1</i> | <i>2.7</i> | <i>25.7</i> | <i>19.6</i> | <i>1.9</i> | <i>21.5</i> |
| <i>variation coefficient</i> | <i>0.25</i> | <i>0.75</i> | <i>0.20</i> | <i>0.18</i> | <i>0.86</i> | <i>0.16</i> |
| <i>standard deviation</i> | <i>5.65</i> | <i>2.00</i> | <i>5.27</i> | <i>3.59</i> | <i>1.62</i> | <i>3.41</i> |

Source: Adema (2001), and own calculations

Data: Decile Ratios, Gini Coefficient, and Atkinson Indices : selected countries (16)

| | Year | Decile ratio P90 / P10 | Gini Coefficient | Atkinson Index ($\epsilon = 0.5$) | Atkinson Index ($\epsilon = 1.0$) |
|------------------------------|---------------|---------------------------|---------------------|--|--|
| selected countries | | | | | |
| Australia | 1994 | 4.33 | 0.311 | 0.084 | 0.184 |
| Austria | 1997 | 3.37 | 0.266 | 0.060 | 0.122 |
| Belgium | 1997 | 3.19 | 0.250 | 0.053 | 0.110 |
| Canada | 1997 | 4.13 | 0.291 | 0.072 | 0.150 |
| Czech Republic | 1996 | 3.01 | 0.259 | 0.056 | 0.106 |
| Denmark | 1997 | 3.15 | 0.257 | 0.062 | 0.143 |
| Finland | 2000 | 2.90 | 0.247 | 0.053 | 0.101 |
| Germany | 2000 | 3.18 | 0.252 | 0.055 | 0.116 |
| Ireland | 1996 | 4.33 | 0.325 | 0.086 | 0.162 |
| Italy | 2000 | 4.47 | 0.333 | 0.093 | 0.183 |
| Japan | 1992 | 4.17 | 0.315 | n.a. | n.a. |
| Netherlands | 1999 | 2.98 | 0.248 | 0.055 | 0.120 |
| Norway | 2000 | 2.80 | 0.251 | 0.050 | 0.117 |
| Sweden | 2000 | 2.96 | 0.252 | 0.056 | 0.112 |
| United Kingdom | 1999 | 4.58 | 0.345 | 0.099 | 0.195 |
| United States | 2000 | 5.45 | 0.368 | 0.115 | 0.224 |
| <i>average</i> | <i>1997.8</i> | <i>3.69</i> | <i>0.286</i> | <i>0.071</i> | <i>0.143</i> |
| <i>variation coefficient</i> | | <i>0.22</i> | <i>0.14</i> | <i>0.28</i> | <i>0.27</i> |
| <i>standard deviation</i> | | <i>0.80</i> | <i>0.04</i> | <i>0.02</i> | <i>0.04</i> |

Source: LIS Key Figures (<http://www.lisproject.org/keyfigures.htm>, download 16-03-2004), with the exception for Japan (Smeeding, 2000, p. 211), and own calculations

Annex B Regression Analysis

Impact of Net Social Expenditure (% GDP) on Income Inequality Measures around 1997 (Gini Coefficient, Decile Ratios P90/P10, and Atkinson Indices)

| <i>Dependent variable</i> | Intercept | Net public expenditure | Net private expenditure | adj. R ² |
|-----------------------------------|-------------------|------------------------|-------------------------|---------------------|
| Gini Coefficient | 0.040 (0.22) | -0.460* (-3.16) | 0.033* (1.78) | 0.426 |
| Decile Ratios P90/P10 | 1.440 (5.54) | -0.690* (-3.42) | 0.063* (2.41) | 0.511 |
| Atkinson Index ($\epsilon=0.5$) | -0.160 (-0.46) | -0.783* (-2.88) | 0.067* (1.92) | 0.403 |
| Atkinson Index ($\epsilon=1.0$) | 0.062 (0.19) | -0.717* (-2.80) | 0.080* (2.43) | 0.443 |

| <i>Dependent variable</i> | Intercept | Net total expenditure | adj. R ² |
|-----------------------------------|-------------------|-----------------------|---------------------|
| Gini Coefficient | -0.112 (-0.41) | -0.329 (-1.61) | 0.095 |
| Decile Ratios P90/P10 | 1.142 (2.74) | -0.441 (-1.41) | 0.061 |
| Atkinson Index ($\epsilon=0.5$) | -0.502 (-0.98) | -0.498 (-1.29) | 0.043 |
| Atkinson Index ($\epsilon=1.0$) | -0.331 (-0.65) | -0.395 (-1.03) | 0.004 |

| <i>Dependent variable</i> | Intercept | Net public expenditure | adj. R ² |
|-----------------------------------|--------------------|------------------------|---------------------|
| Gini Coefficient | 0.046 (0.23) | -0.463* (-2.98) | 0.344 |
| Decile Ratios P90/P10 | 1.452 (4.82) | -0.696* (-2.97) | 0.344 |
| Atkinson Index ($\epsilon=0.5$) | -0.1471 (-0.39) | -0.790* (-2.66) | 0.289 |
| Atkinson Index ($\epsilon=1.0$) | 0.076 (0.41) | -0.724* (-2.43) | 0.247 |

| <i>Dependent variable</i> | Intercept | Net private expenditure | adj. R ² |
|-----------------------------------|--------------------|-------------------------|---------------------|
| Gini Coefficient | -0.550 (-37.46) | 0.033 (1.38) | 0.058 |
| Decile Ratios P90/P10 | 0.554 (26.22) | 0.064* (1.85) | 0.139 |
| Atkinson Index ($\epsilon=0.5$) | -1.166 (-44.11) | 0.069 (1.58) | 0.091 |
| Atkinson Index ($\epsilon=1.0$) | -0.859 (-34.90) | 0.082* (2.02) | 0.171 |

Note: Logarithmic OLS-regression; t-statistics in parentheses

* significant at 95%-level

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