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## The Impact of Taxation on the Equalizing Effect of Social Insurance to Income Inequality: a Comparative Analysis of Ten Welfare States

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# **Luxembourg Income Study Working Paper Series**

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**The Impact of Taxation on the Equalising Effect of  
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A Comparative Analysis of ten Welfare States**

**Tommy Ferrarini and Kenneth Nelson**

**October 2002**



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**Luxembourg Income Study (LIS), asbl**

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social insurance to income inequality:  
A comparative analysis of ten Welfare States.**

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## Summary

*Welfare state regimes vary in their redistribution strategies. Some welfare states have extensive taxable social insurance schemes, while others rely more on non-taxable means-tested benefits. In order to assess the distributive effects of different program types, it is necessary to analyse social insurance after taxes, something rarely practised in comparative research. In this paper, we evaluate distributive effects of social insurance after taking taxes into account in ten welfare states. However, a study of net social insurance raises estimation problems in countries where spouses are taxed separately and income data only is reported on household level. The paper therefore includes a series of validity tests of estimated levels of social insurance after taxes. The main conclusion is that it is possible and necessary to estimate social transfers net of taxes in order to not misspecify the redistributive outcome of social insurance in both inter-country and intra-country analyses of income distributions. The analyses are based on micro level income data from the Swedish Level of Living Survey (LLS) and the Luxembourg Income Study (LIS) including ten countries.*

Substantial differences in income inequality across welfare democracies are well documented (e.g. Fritzell, 1991: 2000; Förster, 1993; Atkinson et al., 1995; Gottschalk and Smeeding, 1999). These differences are, furthermore, often attributed to the institutional structure of social policies. Korpi and Palme (1998), for example, argue 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. Even if evidence from comparative analyses of aggregate outcomes of the total tax/transfer system seem to support such propositions, only a limited number of studies have attempted to specify the link between specific social transfer programs and income inequality. Thereby, the knowledge about which institutional structures that produces certain distributive outcomes is limited.

Comparative analyses of the distributive effects of separate parts of the social transfer system are problematic for several reasons. One problem is that welfare states differ on the principles of taxation of social transfers. The importance of taking the tax system into consideration in comparative and institutional analyses of social insurance has been recognized (Korpi, 1989; Palme, 1990; Esping-Andersen, 1990; Mitchell, 1991). Also in a more recent study of net social expenditure in OECD-countries, Adema (2001) highlights the importance of taking income taxes into account in comparative analyses of social transfer systems. According to Adema (2001) direct income taxes and social security contributions in some welfare states do significantly reduce public social effort, something that makes countries more similar in this respect. Yet, previous analyses of the relationship between particular transfers and income inequalities do not deduct taxes paid on social insurance benefits (e.g. Deleck, 1992; Jäntti, 1997; Aa-berge et al, 1997; Hataaja, 1999; Pedersen, 1999). Consequently, the level and equalising ef-

fect of social insurance to disposable income inequality is overestimated, both in absolute terms and in relation to non-taxable transfers, such as means-tested benefits.

The purpose of this paper is to evaluate the role of income taxation in redistributive analyses of separate social transfers. The main question is to what extent income taxes affect the contribution of social insurance to income inequality in inter- and intra-country comparisons of income distributions. We will here use comparative micro income data from the *Luxembourg Income Study (LIS)* to decompose income inequality into both gross and net transfer components.

The countries included in the analyses are Belgium, Canada, Denmark, Finland, Germany, the Netherlands, Norway, Sweden, the United Kingdom and the United States. These ten welfare states differ not only in the institutional structure of the social transfer system, but also in the taxation of social insurance. Social insurance payments, such as unemployment compensation and sick pay, are provided at a higher benefit level in the Scandinavian and Continental European welfare states than in the English speaking countries. Whereas means-tested benefits and universal child benefits usually are non-taxable, social insurance payments are subject to taxation in most countries. However, cross-national differences in the way taxes reduce the value of transfer income are substantial. Such tax claw-backs are obviously greater in high-tax countries where social insurance is liable to taxation, for example Denmark, Sweden and the Netherlands, than in low-tax countries, such as the United States and the United Kingdom.

One reason why previous attempts to analyse the link between social insurance institutions and redistributive outcomes have not paid sufficient attention to taxation of social entitlements may

be that comparative income data does not provide information of the post-tax level of social insurance. The Luxembourg Income Study, for example, contains only information on pre-tax social insurance benefits at the household level.<sup>1</sup> Taxation of social insurance must therefore be estimated from total household income taxes paid. One method is to ascribe taxable social insurance benefits a proportional share of the total income taxes paid corresponding to their relative size in the gross household income package (Rainwater, 1993). This proportional tax estimation technique may, however, create estimation errors of net social insurance in two-earner households when taxes are levied on individual income. Therefore, we also analyse whether the proportional tax estimation raises any serious problems of validity.

The redistributive analyses refer to the situation in the mid 1990s and are restricted to households headed by individuals of working age. Although public social transfers have important implications for the relative income position of other population groups, such as the elderly, the redistributive processes at hand are rather different compared with those determining the economic well being of individuals of working age. Inequalities in disposable income among the elderly, for example, have less to do with the distribution of market income than with the mix of public and private retirement plans (Kangas and Palme, 1990; Palme, 1996; Pedersen, 1999), and hence raises different questions beyond the present paper to explore.

The paper begins with a brief description of the institutional structure of each country's social policy and income tax systems. Thereafter we apply the proportional tax estimation technique for validity analyses on household income data. The last section includes both cross-country

and intra-country comparisons of income distributions when social insurance is measured gross and net of taxes.

### **Institutional structure of social and fiscal policy**

As noted above, the ten countries in this study differ both in the provision of social security and in the taxation of social insurance. Two important redistributive characteristics laid down in social transfer programs are the level of benefits and number of persons covered. As is evident from *Figure 1a-b* significant cross-national differences exist regarding these aspects of social insurance.<sup>2</sup> Coverage varies from around 50 percent in the United States to 100 percent in Norway. The level of social insurance before taxes shows somewhat greater variation, ranging from about 20 percent of an average production worker's gross earnings in the United Kingdom to nearly 90 percent in Norway.

This institutional variation to large extent follows along the lines of different social insurance models outlined by Korpi and Palme (1998). According to the authors, Finland, Norway and Sweden have developed an encompassing social insurance system with both high degrees of coverage and generous wage replacement.<sup>3</sup> Belgium and Germany belong to the corporatist social insurance model, which also is characterised by relatively high replacement levels but lower degrees of coverage than encompassing schemes. The low coverage in corporatist schemes is to great extent due to the inclusion of only economically active individuals, even if economically non-active spouses in some instances may benefit from rights derived from the insured spouse. In the post-war period Germany has continuously added new groups of previously non-covered citizens to social insurance, establishing what can be called a "quasi-



universal” social insurance system (Carroll, 1999: 150). The English speaking countries and Denmark have developed basic security social insurance schemes, which among other things are characterised by low degrees of earnings replacement. The meagre social insurance benefits in the United Kingdom are primarily explained by a strictly flat rate benefit structure. Most other countries with basic security systems have elements of weak income relatedness in social insurance.

[Figure 1a-b about here]

With few exceptions, taxation of social transfers is a relatively recent feature. Since the early 1970’s, it is possible to discern a trend among the advanced welfare states towards a more frequent taxation of social insurance. Among the ten countries studied here, social insurance is in principle the only type of transfer program liable to taxation.<sup>4</sup> For these countries social insurance payments are, with the exception of old age pensions in some countries, taxed in the same way as working income. Hence, no special tax allowances or tax credits exist for insurance benefits due to unemployment, work injury or sickness.

Germany and the United States are the only countries in this study where social insurance benefits in some instances are not taxed. The former country taxes only old age pensions whereas the latter country levies taxes on all social insurance payments except compensation due to occupational accidents. Although taxes are not levied on major social insurance schemes in Germany, payments received are taken into account in determining the tax rate applicable to work income. The grey staples in Figure 1b show the average net benefit of major

social insurance schemes as a proportion of an average production worker's gross wage. Hence, the difference between the black and the grey staples is the income tax paid on social insurance in each country.

For the type case households used in this comparison, income taxes claw back the greatest share of social insurance payments in high tax countries such as Denmark, Finland, the Netherlands and Belgium. Sweden, Canada and Norway hold an intermediate position whereas the United Kingdom, the United States and Germany tax social insurance to a more limited extent. When taxes are deducted a slightly different pattern in the level of social insurance benefits emerges. Not only is cross-national variation compressed by taxation, but country ranks also change. The clearest example is Germany, which has medium levels of social insurance benefit generosity before taxes, while having the most generous benefits after taxation.

The strategies chosen in the development of social insurance have had consequences for the mix of different types of social transfers in the social policy system. For example, due to relatively meagre social insurance benefits, means-tested schemes have come to play a more prominent role in the distributive process in the Anglo-Saxon countries than in the Scandinavian and Continental European welfare states (Lödemel and Schulte, 1992; Korpi, 1975).<sup>5</sup> However, here it should be noted that expenditures of means-tested benefits in Canada are on a much lower level than in the other English-speaking countries. Among the three countries with corporatist social insurance systems, expenditure of means-tested benefits is at a higher level in Germany and the Netherlands than in the Scandinavian countries (Eardley et al., 1996), something that may be due to the structure of social insurance. For example, in contrast

to the Swedish social insurance system, which provides a relatively high level of basic security, social insurance in Germany is not directly intended to address poverty risks (Leisering and Leibfried, 1999). German social insurance is restricted to those with an adequate earnings-record and core social insurance programs lack minimum benefits for those with low earnings.

Cross-national variation in the generosity of benefit levels is not solely restricted to social insurance. On average, means-tested benefits are provided at a higher benefit level in countries with generous social insurance schemes, such as the Scandinavian countries and the Continental European countries, than in Canada, the United Kingdom and the United States (Eardley, 1996). At the aggregate level this seems to indicate an institutional interplay, where the generosity of social insurance has opened up for an implementation of generous transfers in other parts of the social policy system (Korpi and Palme, 1998:678). This process may have been facilitated in part by the “crowding out” of means-testing through social insurance, which has generated a large redistributive budget and increased the budgetary and welfare political premises to extend means-tested benefits further up the income scale.<sup>6</sup>

### **Validity test of net social insurance estimates**

Since comparative income data on separate social transfers is only available at the household level in the LIS database, taxation of social insurance must be estimated from total household income taxes. This can be achieved with the proportional tax estimation technique (for detailed information, see Data and methodological appendix). Since an estimation of taxes may pose validity problems of the level of net social insurance in countries where taxation is individual,

we will here conduct two validity tests of the proportional tax estimation technique. The first validity analysis is based on micro level income data from the Swedish Level of Living Survey (LLS) and restricted to couples aged 25-59.<sup>7</sup> With this data it is possible to compare estimates of the level of net social insurance when the proportional tax estimation technique is applied on household and individual income packages, respectively.<sup>8</sup> The estimation error of the level of net social insurance is the difference between the two estimates.

We can expect that this estimation error on average is negative, since the spouse with the largest share of social insurance in the individual income package is likely to have a lower taxable income than the other spouse. Due to the progressivity of income taxes, the proportional tax estimation technique will in such cases over-estimate the tax claw-back of transfer income and under-estimate the level of net social insurance.<sup>9</sup> *Figure 2* shows the relative estimation errors of net social insurance in ten income groups delineated on basis of equivalised gross taxable income.<sup>10</sup> The results are in line with the expectation that the proportional tax estimation over-estimates taxation of social insurance when household income packages are used. However, the relative estimation errors are small. On average net social insurance is under-estimated by 1 per cent, which should be evaluated in relation to an over-estimation by approximately 30 per cent if taxes are not deducted.

[Figure 2 about here]

The estimation error of net social insurance is almost negligible compared with the misspecification occurring from not taking taxation into account in the Swedish case. However, the size

of the estimation error depends on the redistributive mechanisms of the income tax system. The proportional tax estimation may therefore pose validity problems in countries with separate taxation of spouses and where the income tax system is more progressive and tax rates are higher than in Sweden.<sup>11</sup> As is evident from *Figure 3*, however, none of the tax systems in the other countries satisfy both these conditions.<sup>12</sup> Germany is excluded from *Figure 3* since the institutional structure of social and fiscal policies make tax estimation redundant in these analyses. It is clearly shown that countries tend to rely either on high tax rates or on high tax progressivity.

[*Figure 3* about here]

To evaluate whether the proportional tax estimation technique pose validity problems in countries with different tax systems than in Sweden, we will in the following simulate the effects of direct income taxes and social security contributions in Belgium, Denmark and Sweden as expressed in tax legislation of 1995 on a modified version of the fictitious income distribution applied above.<sup>13</sup> Belgium and Denmark are chosen for comparison with the Swedish case since the first country has greatest tax progressivity whereas the second has highest average tax levels of the ten countries under investigation. *Figure 4* shows the results of this exercise. Negative simulated relative estimation errors indicate an underestimation of the level of net social insurance. The positive estimation error for Sweden in the first income group is due to the basic allowance, which is regressive in lower income segments. Most importantly, however, simulations of the Danish and Belgian income tax systems do not reveal any larger deviations from the Swedish pattern.<sup>14</sup>

[Figure 4 about here]

The results from the two validity tests suggest that the proportional tax estimation technique does not pose serious validity problems in analyses of household income data. The under-estimation of the level of net social insurance when the proportional tax estimation technique is applied on household income data is much less of a problem than the over-estimation resulting from not taking taxes into account. This seems to be the case regardless of the degree of tax progressivity and average tax levels of the income tax systems of modern welfare states. In the following we therefore use this technique to analyse the redistributive effects of taxing social insurance.

### **Contribution of social insurance to overall inequality**

Comparative studies of income redistribution are often based on aggregate analyses of the combined effects of the whole tax/transfer system (e.g. example Mitchell, 1991; Korpi and Palme, 1998; Fritzell, 1991; 2000). 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 (Le Grand, 1982; Barry, 1990; Tullock, 1983). This statement is, however, only valid if benefits are perfectly earnings-related and the risk of being in receipt of benefit is equally distributed in the population. In reality, these assumptions are unrealistic. Most earnings-related social insurance programs have defined in-

come ceilings and often defined minimum benefit levels as well. Furthermore, individuals in lower income groups on average have a larger propensity to utilise major social insurance entitlements, such as sick pay and unemployment compensation. This is one reason why Korpi and Palme (1998) argue that countries with encompassing or corporatist social insurance systems achieve a greater redistribution of economic resources than do countries relying more extensively on flat-rate or means-tested benefits

*Table 1* shows the Gini income inequality before and after taxes/transfers and the inequality reduction coefficient in our ten countries in the mid-1990s for households where the head is between 25-59 years.<sup>15</sup> The figures in the table give some evidence to the idea put forth by Korpi and Palme (1998) rather than to the argument proposed by proponents of means-tested strategies (Le Grand, 1982; Barry, 1990; Tullock, 1983). Evidently, the Scandinavian and Continental European countries achieve a greater redistribution of economic resources than do the English-speaking countries.

Although aggregate analyses of the whole tax/transfer system indicate a correlation between different models of social protection and distributive outcomes, such analyses do obviously not assess to what extent particular social security institutions relate to certain patterns of income inequality. 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.

[Table 1 about here]

In the analysis of the contribution of social insurance to overall inequality we will use a commonly recognized method of decomposing the Gini coefficient by factor components (see for example Rao, 1969; Shorrocks, 1983).<sup>16</sup> The decomposition of the Gini-coefficient measures the contribution of each income component to overall inequality simultaneously but it does not indicate whether a marginal increase in an income component contributes to an increase or a decrease in overall inequality, all other things being equal (Aaberge et al., 1997). This could, however, be evaluated by calculating the elasticity of the Gini (Lerman and Yitzhaki, 1985; Podder, 1993).<sup>17</sup>

In previous studies of the impact of social insurance on income inequality total taxes are often included as a separate negative income term in decompositions of, for example, the Gini-coefficient (Jäntti, 1997; Aaberge et al., 1997; Pedersen, 1999). The contribution of social insurance to overall inequality is, however, usually analysed without reference to the income tax component. Hence, the redistributive effects of social insurance are in practise compared gross of taxes. Moreover, even if the income tax component is considered, it is difficult to give it a substantial interpretation since the tax component does not specify how income taxation affects the level and distribution of particular income components. In the following we will therefore compare the redistributive outcome of social insurance before and after taxes.

The differences between countries' social and fiscal policy systems sketched above indicate that taxation is an important aspect in analyses of social insurance and income inequality (see Figure 1a-b). However, the level and progressivity of the tax system have opposite effects on the redistributive outcome of social insurance. The tax claw-back of transfer income affects the



weight of social insurance in disposable income, causing a reduction in the equalising effect of social insurance. This implies that income taxes make social insurance less equalising in high-tax countries, such as Denmark, Finland, the Netherlands and Sweden, than in moderate- and low-tax welfare states, for example Belgium, Canada, Norway, the United States and the United Kingdom. The progressivity of the income tax system works in the opposite direction. The larger relative tax claw-back in higher income segments results in an increased equalising effect of social insurance, which should be of greater magnitude in the three English-speaking countries and Belgium than in the five remaining countries.

Due to these two opposing effects of the tax system, it is difficult to predict how taxes in reality will affect the redistributive outcome of social insurance in each country. On the basis of the differences between countries in the level of social insurance benefits, we could, nevertheless, expect that taxation will have most profound consequences for the contribution of social insurance to income inequality in the Scandinavian countries, followed by the corporatist countries and the English-speaking countries. Taxation of German social insurance should be of minor importance since taxes are only raised on pension benefits whereas the redistributive analyses are confined to the population of working age.

In evaluations of the redistributive outcome of social insurance, comparisons are usually made between similar arrangements across countries or between different social transfer programs within countries. We begin here by discussing the role of income taxes in cross-country evaluations of social insurance and income inequality. *Table 2* shows the contribution of gross and net social insurance to income inequality in each country.<sup>18</sup> Social insurance is less equalis-

ing after taxation in all countries. This suggests that the tax progressivity is not sufficient to counter-act the redistributive effects of reduced social insurance benefits after taxation.<sup>19</sup> For example, a marginal increase in the mean value of social insurance before taxes reduces income inequality by about 23 per cent in Sweden; after taxes, the corresponding reduction is approximately 16 per cent. Notably, the variation across countries in the equalising effect of social insurance is less after than before taxes.<sup>20</sup>

[Table 2 about here]

In general, taxes are more disequalising to social insurance in the Scandinavian countries, which combine generous social insurance entitlements with high income-taxation, than in the Continental European countries or the Anglo-Saxon welfare states. Some interesting re-rankings of countries occur when taxes are deducted from social insurance. Whereas the equalising effect of gross social insurance in Sweden is higher than in Belgium, net social insurance in the two countries perform equally well. Before taxes, social insurance is more effective in reducing income inequality in Denmark than in Belgium. After taxes the opposite result appears. Hence, if not taxes are deducted from social insurance, not only is the contribution of social insurance to income inequality over-estimated but comparisons between countries are also in some instances likely to be inaccurate.

Despite large differences between countries in the tax claw-back of transfer income, some welfare states are still more redistributive than others. This is most obvious if comparisons are made between the Scandinavian and the English-speaking countries. For example, whereas a

marginal increase in the level of net social insurance in Canada and the United Kingdom would reduce income inequality by approximately four and one per cent, respectively, the corresponding reduction in Sweden is about 16 per cent. This is probably explained by the institutional differences in the generosity of social insurance entitlements. As was discussed above, social insurance in Sweden is provided at a higher net benefit level than in the Anglo-Saxon countries.

The impact of taxation on the performance of German social insurance is negligible since only pension benefits are subject to taxation. The reduction of income inequality attributed to social insurance in Germany is much lower than in, for example, Denmark and Sweden, and only slightly higher than in the United Kingdom. This result is quite remarkable since German social insurance offers a comparatively high level of income protection in times of work incapacity. The low coverage of social insurance entitlements and the absence of minimum benefit levels may, however, lower the equalising effect of social insurance in Germany. It should be emphasised that problems exist with German income data, which affect comparability with other countries, and that the results therefore should be interpreted with caution. Government transfers are generally more under-reported in Germany than in for example Sweden and the United Kingdom (Behrendt, 1999). Furthermore, sickness and accident compensation in Germany is paid by employers during the first six weeks (*Lohnfortzahlung*) and included in market income in original income data (Rainwater, 1993).<sup>21</sup>

So far, we have focused on cross-country differences in the contribution of total social insurance to income inequality. The results indicate that income taxes in some instances have a de-

cisive impact on the contribution of social insurance to income inequality. Nevertheless, the analysis of net transfer components supports earlier insights that the institutional structure of social insurance is an important factor for explaining cross-national patterns in disposable income inequality.<sup>22</sup>

Next, the question of how income taxation affects the redistributive effects of social insurance in intra-country evaluations is analysed. Table 2 also shows the contribution of means-tested benefits to disposable income inequality. In relation to the performance of means-tested benefits, analyses of gross incomes obviously over-estimate the reduction of inequality attributed to social insurance. In Finland and the Netherlands it is shown that means-tested benefits are more effective than social insurance in reducing income inequality net of taxes, whereas the opposite occurs when the analysis is confined to gross incomes.

Another finding is that social insurance in Sweden and Denmark, two high tax countries, also after taxes is more effective than means-tested benefits in reducing income inequality. Hence, if comparisons are made between the redistributive effects of total social insurance and means-tested benefits, income taxation may not alter the rank order of such benefits. This may in part reflect that the analyses are based on rather broad transfer categories. The social insurance category includes income from several extensive transfer programs, such as unemployment compensation, sick pay and maternity allowances. In Sweden, for example, social insurance benefits constitute about 60 per cent of the total transfer package, whereas means-tested benefits only make up about 10 per cent. We might expect the role of income taxation to be

particularly important if comparisons instead are made between taxable and non-taxable transfers with more similar weights in the social policy system.

[Table 3 about here]

After the return of mass unemployment in the 1970s, most Western countries experienced an increase in income inequality. At the same time unemployment benefit recipiency increased as did the extent of means-tested benefits. From this perspective, it is of interest to compare the redistributive effect of unemployment compensation with that of means-tested provisions. As noted above, unemployment compensation is subject to taxation in all countries except Germany and therefore must be measured net of taxes to be comparable with means-tested benefits. *Table 3* shows the contribution of gross and net unemployment compensation and means-tested benefits to income inequality.

As in the analysis of aggregate social insurance, the results show that income taxation affects the redistributive outcome of unemployment compensation to varying degrees in the ten countries. Some re-rankings of countries occur. Whereas the equalising effect of gross unemployment compensation is greatest in Finland followed by Sweden, Denmark and Belgium, the equalising effect of net unemployment compensation is greatest in Belgium, now followed by Sweden, Finland and Denmark.

Furthermore, in Denmark, Finland and Sweden, analyses based on gross figures lead to the inaccurate conclusion that unemployment compensation is more effective in reducing income

inequality than means-tested benefits. Subtracting taxes in the Finnish case, for example, reveals the opposite result. Means-tested benefits are now more effective in reducing income inequality than unemployment compensation. In several countries, means-tested benefits contribute to a larger reduction in income inequality than gross unemployment compensation, and consequently, the tax system enhances the difference in performance of the two programs.<sup>23</sup> Finally, we may state that the results presented here clearly illustrate that taxation might have considerable consequences for comparisons between redistributive outcomes of taxable and non-taxable social transfers.

## **Discussion**

The analyses presented in this paper show that the precision of redistributive analyses of separate parts of the social transfer system are improved by deducting income taxes from social insurance. We argue that earlier studies that decompose inequality into specific transfers do not pay sufficient attention to the problem of taxation of social insurance. It is shown that the use of gross incomes misspecifies the redistributive outcome of social insurance, particularly in countries with relatively generous taxable social transfers and high tax rates. In some cases taxation of social transfers may result in re-rankings of countries in the effectiveness of social insurance to reduce income inequalities. Furthermore, in comparisons between different types of social transfers within countries, such as a comparison between unemployment compensation and means-tested benefits, taxation may also affect the ranking of transfers according to the reduction of income inequality.

Although a separation of social and fiscal policies enhances the possibilities of identifying important mechanisms in the distributional process of modern welfare states, an interesting finding is that the importance of measuring incomes after taxes in cross-country evaluations of social insurance and income inequality is partly related to the selection of countries under study. If welfare states with large institutional differences in social insurance are compared, income taxation does not affect the ranking of countries in terms of the equalising effects of social insurance. For example, due to large initial differences in social insurance benefit levels, the equalising effect of net social insurance is larger in the Scandinavian than in the Anglo-Saxon countries, even though the Scandinavian income tax systems claw back a much a larger share of social insurance benefits.

It is difficult to determine beforehand the degree to which analyses of gross incomes misspecifies the distributive process and thus may lead to inaccurate conclusions about the outcome of social insurance. A general recommendation based on the results in this study, is that redistributive analyses of separate parts of the social transfer system are carried out with net income components. One method of calculating net social transfers from household income data is to ascribe taxable transfers a proportional share of the total income taxes paid corresponding to their size in the gross household income package. A potential problem with this proportional tax estimation technique is that the tax liability of social insurance is overestimated in countries where taxes are levied on individual income. The validity tests carried out in this paper, however, indicate that the loss in prediction is negligible compared with that which occurs when taxes are not taken into account.

In recent decades there has been a gradual shift in the importance of social insurance and means-tested benefits in the social transfer system among the advanced welfare states. In many countries an increasing number of individuals have come to rely on means-tested benefits at the same time as cuts have been made in social insurance provisions. As highlighted in this study, however, social insurance is still an important redistributive instrument in most welfare states, and large cross-national differences exist regarding both the institutional structure and distributive outcomes of social insurance. This underlines the importance to separate the redistributive effects of different policy instruments. In this context this paper shows that such analyses ought to take taxation of social insurance into account, in order avoid incorrect conclusions about the distributive mechanisms of the welfare state.

### **Data and methodological appendix**

*Table 4* exhibits the construction and tax liability of net variables used in the analyses, and the original LIS income variables for Belgium 1992, Canada 1994, Denmark 1995, Finland 1995, Germany 1994, the Netherlands 1994, Norway 1995, Sweden 1995, the United Kingdom 1995 and the United States 1994. All taxable income components are calculated less their proportional share of central and local income taxes and mandatory contributions for employees and self-employed.

[Table 4 about here]



The proportional tax estimation technique of net social insurance is shown below. Assume that an income distribution comprises only married couples and let each spouse, (i) and (j), receive an amount of taxable social insurance benefits (S). Let (T) denote the amount of income tax paid on total taxable income (M). If income data are available at the individual level, estimated net social insurance benefits of the household (h) are calculated in three steps, as shown in formulas 1.1 to 1.3 below. The first two steps involve a separate calculation of net social insurance for each spouse. The third step is simply constituted of a summation of net social insurance of the two spouses.

$$(1.1) \text{ Estimated Net } S_i \\ = S_i - (S_i / M_i) * T_i$$

$$(1.2) \text{ Estimated Net } S_j \\ = S_j - (S_j / M_j) * T_j$$

$$(1.3) \text{ Estimated Net } S_h \text{ from individual income packages} \\ = \text{Estimated Net } S_i + \text{Estimated Net } S_j$$

If income data are only available at the household level, it is not possible to apply the three steps shown in the above formulas. Instead, the proportional tax estimation technique ascribes social insurance a proportional share of the total income taxes paid corresponding to its relative size in the gross taxable income package of the household, as shown in formula 2 below. The right side of the equation shows the proportional weighting procedure of the total taxes

paid by the household. The difference between the estimated level of net social insurance when the proportional tax estimation technique is applied on household and individual income packages, respectively, is the error of net social insurance due to the use of household income data, as shown in formula 3.

(2) Estimated Net  $S_h$  from household income packages

$$= S_h - (S_h / M_h) * T_h$$

(3) Estimation Error  $S_h$

$$= \text{Estimated Net } S_h \text{ from household income packages} - \text{Estimated Net } S_h \text{ from individual income packages}$$

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### **Notes**

<sup>1</sup> The Luxembourg Income Study does provide some data at the individual level. However, the only social transfers reported at an individual level are unemployment compensation and private and public pensions.

<sup>2</sup> The level of social insurance benefits is an additive index of the average income of a single adult household and a one-earner family with two children receiving sickness, work accident and unemployment insurance, respectively, for a short period of duration (the first week after waiting days) and a long period of duration (26 weeks of benefits and 26 weeks of earnings). It is assumed that the type case households earned an average production worker's wage before receiving any social insurance benefit. The index of coverage measures the percentage of relevant population categories covered by social insurance. The Social Citizenship Indicators Program (SCIP) is part of an ongoing research project at the Swedish Institute for Social Research, Stockholm University. The database includes empirical information on the institutional structure of state legislated social insurance programs. For a description of the SCIP database see Korpi (1989).

<sup>3</sup> Unemployment insurance is to some extent an exception to this pattern (Carroll, 1999). In Sweden, for example, youths are excluded from the basic unemployment benefit.

<sup>4</sup> Since 1982 income support payments are liable to taxation for unemployed recipients in the United Kingdom (Atkinson, 1989:134-135). In Canada, furthermore, child allowances were made liable to taxation in the early 1990s, before being replaced by a tax credit for families with dependent children.

<sup>5</sup> During the economic recession in the 1990s, most Western countries experienced an increase in the extent of means-testing, particularly in social assistance caseloads and expenditures. The Scandinavian countries are not exceptions of this process, but compared with the English speaking countries, expenditures on social assistance have been on a considerably lower level in the 1990s (Eardley et al., 1996; Guibentif and Bouget, 1997; OECD, 1998a; 1998b).

<sup>6</sup> In Sweden, for example, it has been possible to set social assistance scale rates according to a household budget approach and to provide minimum income protection sufficient for a reasonable standard of living and participation in ordinary social life. This has been done without making this form of social protection more generous than social insurance and without putting too much pressure on local authorities' economic budgets. In the United Kingdom, on the other hand, there has not been any recent investigation of what constitutes a minimum income standard (Eardley, 1996; Veit-Wilson, 1998). Instead social assistance scale rates are to some extent based on ideas of minimum levels of social protection outlined in the Beveridge Report of 1942 and updated according to political judgements rather than to empirical studies of household budgets or consumer patterns (Veit-Wilson, 1993; 1992).

<sup>7</sup> Only couples are chosen as a base line for comparison, since an estimation of taxes paid on different income components is necessary only for these households.

<sup>8</sup> Although the proportional tax estimation technique is used on individual income packages, it may over-estimate the tax claw-back of social insurance when the tax treatment on certain types of social provisions differ from those of working income. However, for the countries included in this study, only taxation of pension income in Denmark is laid down in a separate act. However, the estimation error of the level of net pension income in the Danish case should be of minor importance since the redistributive analyses is confined to households headed by individuals of working age. Furthermore, for public pension income special tax allowances or tax credits often do exist. Sometimes it is argued that such tax expenditures should be included in social policy analyses for a better understanding of the social security effort of welfare states (Adema, 2001; Wennemo, 1994). Here we do not include such tax benefits as part of the social transfer package. The total tax burden of an individual is established with reference to total annual taxable in-

come in all countries under investigation here. Hence, any special tax allowances or tax credits for pension reciprocity decrease the tax burden on working income accordingly. From this perspective such tax benefits do not cause an estimation error of the level of net social insurance when the proportional tax estimation technique is used on household income packages in countries with separate taxation of spouses.

<sup>9</sup> Consequently, the level of net social insurance is underestimated and market income overestimated by the corresponding amount.

<sup>10</sup> The equivalence scale used throughout the paper is the one proposed by the OECD, which ascribes a weight of 1 to the first adult, 0.7 to each subsequent adult, and 0.5 to each child.

<sup>11</sup> Another factor that may cause biased estimates is cross-national differences in the intra-household distribution of different income sources. Since labour force participation and market income are more equally distributed in some countries than in others, cross-national differences in the intra-household distribution of different income sources could cause validity problems of estimated net social insurance. However, a factor working in the other direction is that the lower paid female spouse in countries with comparatively unequal distributions of market income more often is confined to untaxed means-tested benefits, while working males are more likely to receive taxable social transfers (Sainsbury, 1996).

<sup>12</sup> An income tax system is defined as progressive (regressive) if the richer (poorer) individuals pay more (less) tax in proportion to their incomes; and it is defined as proportional if the tax liability is equally distributed among the individuals in relation to their incomes. Progressivity is measured as the excess of the concentration index of taxes over the Gini index of the pre-tax income (Kakwani, 1976). The average tax rate is simply defined as the average tax liability of included households. For each country we have simulated direct income taxes and social

security contributions as expressed in tax legislation of 1995 on a fictitious income distribution. The fictitious income distribution comprises a single and a one-earner family with two children earning .1, .2, .3, up to 3.0 times of an average production worker's wage.

<sup>13</sup> The fictitious income distribution in this exercise comprises only two-earner households with none, one, two and three children where one of the spouses receives work income and the other spouse receives taxable social insurance for the whole tax year. Work income is defined as 0.5, 0.6, 0.7, up to 3.0 times of an average production worker's wage and social insurance as 60 per cent of these amounts.

<sup>14</sup> The simulated estimation errors are larger than in reality due to the assumptions used in the fictitious income distribution (compare Figure 2).

<sup>15</sup> The lower age limit is set to 25 years in order to improve comparability of income data sets across countries. In some countries all young adults still living their parents are treated as independent households, while this is not the case for other countries. The higher age limit is set to 59 years to decrease the number of pre-retirement pensioners.

<sup>16</sup> This method includes a calculation of concentration coefficients and factor shares for each income source. The concentration coefficient measures the distribution of a factor component at different income levels when ranked according to the distribution of disposable income. The contribution of an income factor to overall inequality, usually denoted factor inequality share, is then a multiplicative function of the concentration coefficient of the income component and its share in the overall income package divided by the Gini coefficient. If a factor component is equally distributed among the income units, the concentration coefficient is zero and by definition its contribution to overall inequality is also zero. A negative value of the concentration coefficient will result in a negative factor inequality share which means that the

contribution of the income component to overall inequality is equalising. Similarly, a positive concentration coefficient indicates a dis-equalising contribution to overall inequality.

<sup>17</sup> The elasticity of the Gini coefficient is the difference between the concentration coefficient and the Gini coefficient weighted by the share of the income component in the total income package and subsequently divided by the Gini. It should be noted that Gini elasticity estimates are suitable only for interpretations of marginal changes in an income component. If the change is more substantial, the ranking of the income units could be affected. In such cases, the elasticities would not give an accurate estimate of the expected change in overall inequality (Pedersen, 1999:322).

<sup>18</sup> The income components used in the decomposition of the Gini coefficient are market income, social insurance income, means-tested benefits and other social benefit such as child allowances (for detailed information of the classification of the original LIS income variables see Data and methodological appendix). For ease of presentation only social insurance and means-tested benefits are shown in Table 3.

<sup>19</sup> German social insurance includes some elements of taxable social insurance in this analysis, since some individuals receive taxable pre-retirement pension benefits.

<sup>20</sup> The coefficient of variation for gross social insurance is 0.91, whereas the corresponding figure when taxes are deducted is 0.79

<sup>21</sup> If corresponding classifications are made in the other countries to improve comparability of data, the reduction rate of the social insurance system is reduced accordingly. However, the ranking of countries in terms of to the reduction of income inequality ascribed to social insurance is not altered.

<sup>22</sup> Other factors may also explain cross-national differences in redistribution and income inequality, for example demographic and socio-economic structures (Danziger and Jäntti, 1992; Kangas and Ritakallio, 1998). Furthermore, the behavioural effects of social policy institutions may serve as a redistributive mechanism in this context.

<sup>23</sup> These results do not necessarily suggest that the best strategy to equalise market income inequality is to redistribute economic resources through selective programs. Previous studies have shown that the final redistribution achieved by the social transfer system in the long run is dependent not only on the distribution of social transfers but also on the size of the redistributive budget, and that there is a trade-off between targeting and size of benefits (Korpi and Palme, 1998). Means-tested benefits in Sweden may therefore be highly effective in reducing income inequality due to generous social insurance programs, which gives larger possibilities of extending means-tested benefits further up the income scale.

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**Table 1** Disposable income inequality in ten welfare states, around 1995, head of household aged 25-59, Gini coefficient before and after taxes/transfers and Gini reduction coefficient<sup>1</sup>

	Gini before taxes/transfers	Gini after taxes/transfers	Gini reduction coefficient
Belgium	35.5	21.7	38.9
Canada	38.9	28.8	25.9
Denmark	36.0	24.0	33.2
Finland	36.5	25.7	29.7
Germany	39.0	29.3	25.0
Netherlands	38.0	26.7	29.9
Norway	32.8	21.9	33.0
Sweden	39.1	20.5	47.5
UK	47.0	34.7	26.2
USA	41.9	35.0	16.4
Average	38.5	26.8	30.6

<sup>1</sup> Reduction coefficient =  $[(\text{Gini before taxes/transfers} - \text{Gini after taxes/transfers}) / \text{Gini before taxes/transfers}] * 100$

Source: LIS

**Table 2** Contribution of social insurance and means-tested benefits to income inequality in ten welfare states, around 1995, head of household aged 25-59 (elasticities of the Gini coefficient of disposable income, country ranks within parenthesis)

		Bel	Can	Den	Fin	Ger	Neth	Nor	Swe	UK	USA
Gross	Social insurance	-17.1 (3)	-4.9 (8)	-22.6 (2)	-15.8 (4)	-5.5 (7)	-7.4 (6)	-12.5 (5)	-22.8 (1)	-1.2 (10)	-2.3 (9)
Net	Social insurance	-16.4 (1)	-4.5 (8)	-15.1 (3)	-12.4 (4)	-5.3 (7)	-5.8 (6)	-11.2 (5)	-16.4 (1)	-1.2 (10)	-2.3 (9)
	Means-tested benefits	-1.2	-7.6	-7.7	-13.9	-5.2	-7.2	-5.0	-9.9	-14.4	-5.2
Gross-net	Social insurance	-0.7	-0.4	-7.5	-3.4	-0.2	-1.6	-1.3	-6.4	-0.1	0.0

Source: LIS

**Table 3** Contribution of unemployment compensation and means-tested benefits to income inequality in ten welfare states, around 1995, head of household aged 25-59 years (elasticities of the Gini coefficient of disposable income, country rank within parenthesis)

	Bel	Can	Den	Fin	Ger	Neth	Nor	Swe	UK	USA
Unemployment compensation before taxes	-10.1 (4)	-4.4 (5)	-12.1 (3)	-15.7 (1)	-2.7 (7)	-1.3 (8)	-3.5 (6)	-13.2 (2)	-0.5 (10)	-0.7 (9)
Unemployment compensation after taxes	-9.4 (1)	-4.0 (5)	-7.8 (4)	-8.3 (3)	-2.7 (7)	-1.0 (8)	-2.8 (6)	-9.3 (2)	-0.4 (10)	-0.6 (9)
Means-tested benefits	-1.2	-7.6	-7.7	-13.9	-5.2	-7.2	-5.0	-9.9	-14.4	5.2

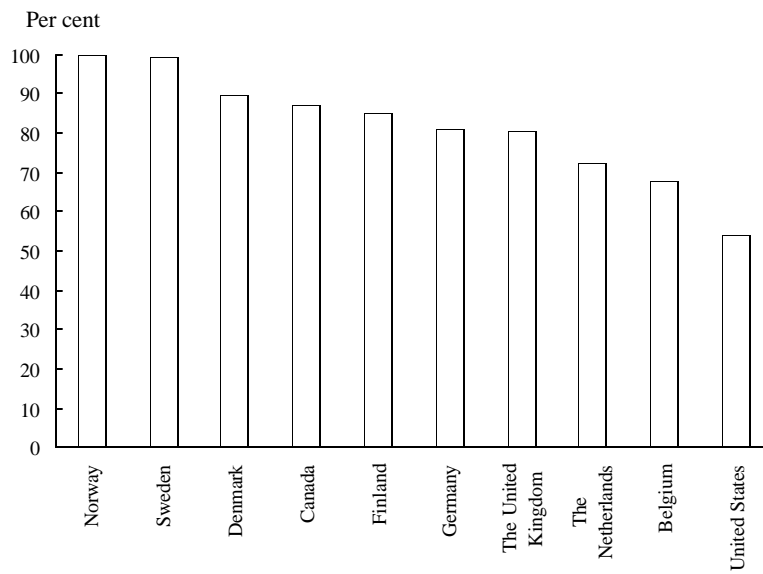
Source: LIS

**Table 4** Categorisation and tax liability of original LIS income variables, around 1995.

	Market Income	Social Insurance	Unemployment Insurance	Means -tested benefits	Other Social Benefits
Belgium	MI*, V36	V18*, V19*, V21*	V21*	V25	V20, V34
Canada	MI*, V36	V19*, V21*	V21*	V25	V20, V24
Denmark	MI*, V36	V16*, V18*, V19*, V21*, V22*	V21*	V25, V26	V20, V24, V34
Finland	MI*, V36	V16*, 17*, V18*, V19*, V22*	V21*	V25, V26	V20, V23, V24, V34
Germany	MI*, V35	V18, V19*, V21, V22	V21	V25, V26, V28	V20, V34
Netherlands	MI*	V16*, V18*, V19*, V21*	V21*	V25, V26	V20, V34
Norway	MI*, V36	V18*, V19*, V22*	V21*	V25, V26	V20, V24, V34
Sweden	MI*	V16*, V19*, V21*, V22*	V21*	V25, V26	V20, V24, V34
UK	MI*, V35, V36*	V16*, V17*, V18*, V19*, V21*, V22*	V21*	V25, V26	V20, V23, V24, V34
USA	MI*, V36	V16, V18, V19, V21*	V21*	V25	V23, V24, V34

\* Taxable

**Figure 1a** Index of coverage of social insurance in ten welfare states in 1995<sup>1</sup>

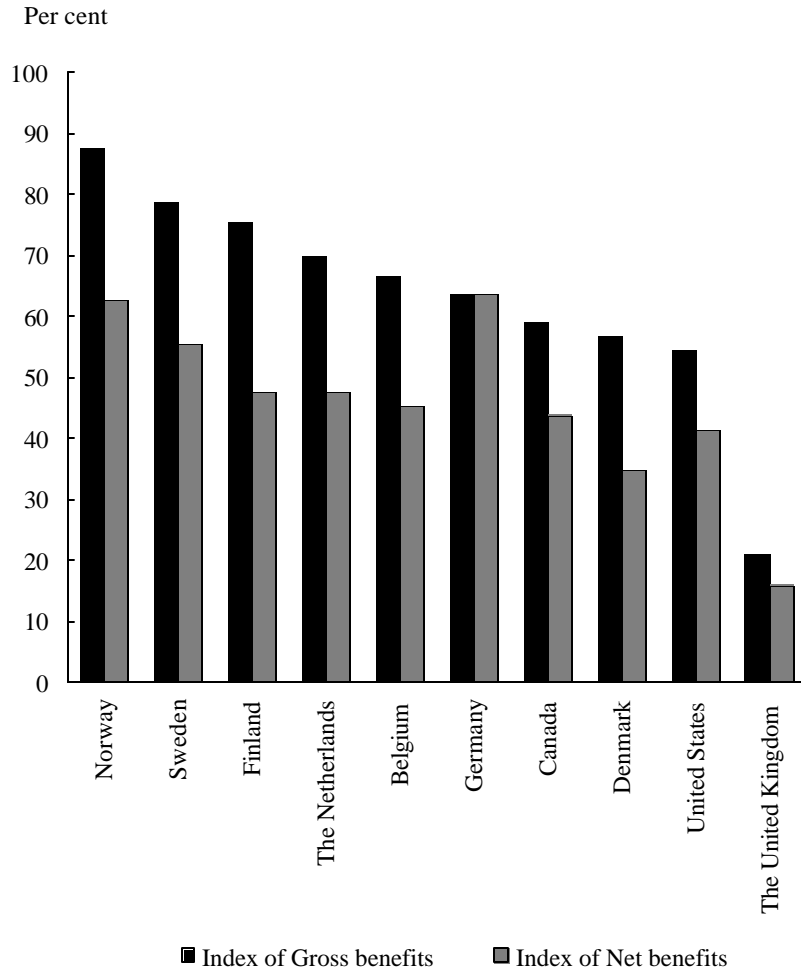


<sup>1</sup>Includes sickness insurance, occupational accident insurance and unemployment insurance. In the United States only occupational accident insurance and unemployment insurance. For Finland, Germany and the United States the figures refer to 1990.

Source: SCIP



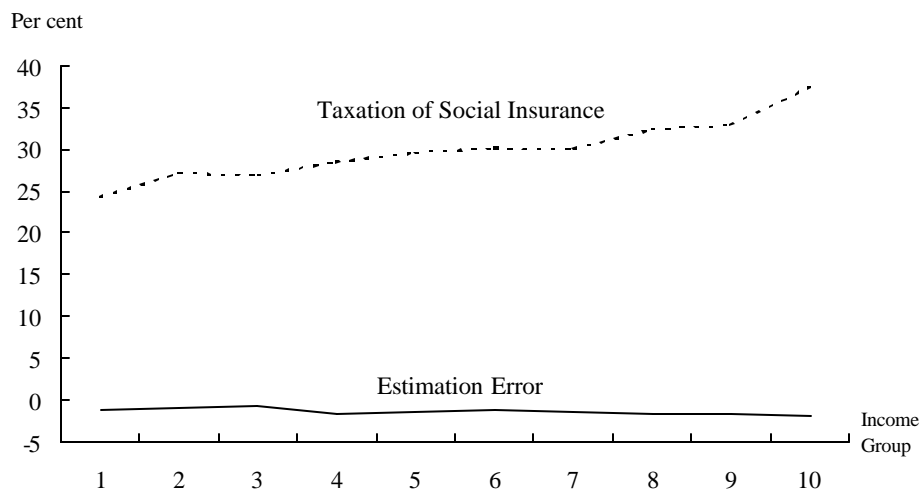
**Figure 1b** Index of replacement rates in social insurance (gross and net of taxation) in ten welfare states in 1995<sup>1</sup>



<sup>1</sup>Includes sickness insurance, occupational accident insurance and unemployment insurance. In the United States only occupational accident insurance and unemployment insurance. Social insurance is not subject to direct taxation in Germany.

Source: SCIP

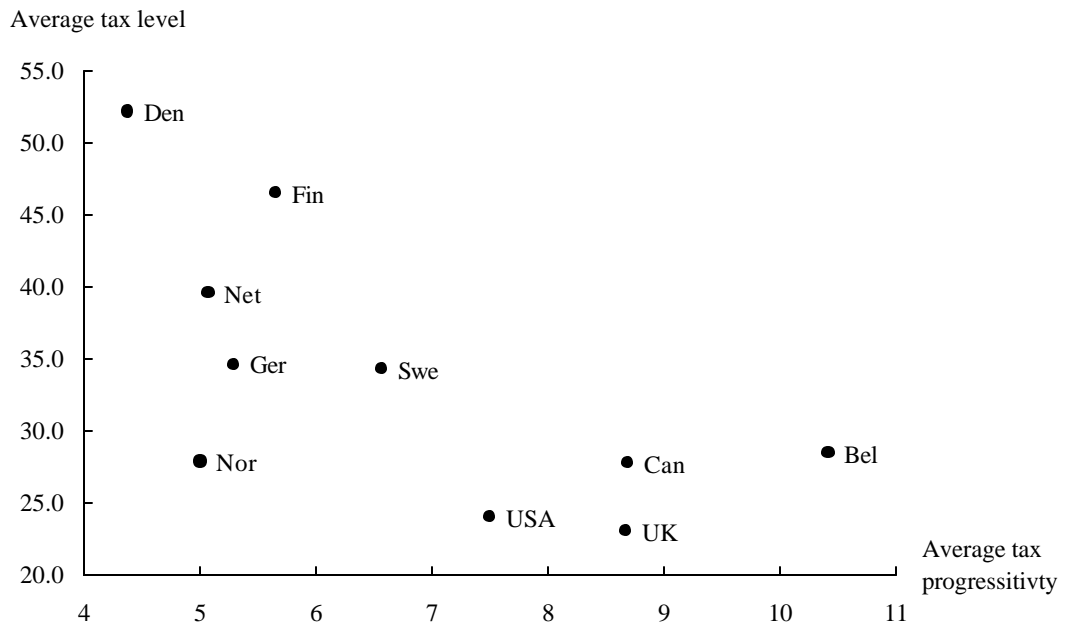
**Figure 2** Relative estimation error\* of net social insurance and taxation of social insurance in ten income groups in Sweden 1991, couples 20-59.



Source: LNU

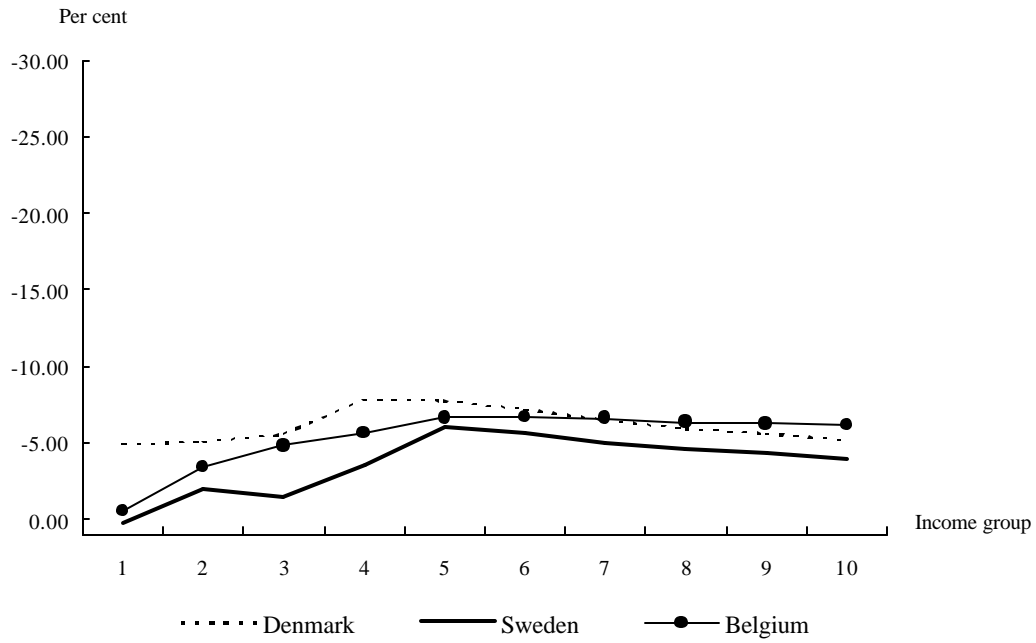
\*The relative estimation error shows the absolute estimation error as a percentage of the actual level of net social insurance.

**Figure 3** Institutional characteristics of direct income taxes in ten OECD countries in 1995.  
Average tax-level and average tax progressivity (Figures based on fictitious income data)



Source: National tax legislation (tax year 1995).

**Figure 4** Relative simulated estimation errors of net social insurance in ten income groups in Denmark, Sweden and Belgium (figures based on fictitious income data)



Source: National tax legislation (tax year 1995).